POST-DISASTER RECONSTRUCTION

Meeting Stakeholder Interests

Proceedings of a Conference held
at the Scuola di Sanità Militare

Florence, Italy 17-19 May 2006

Edited by
David Alexander, Colin Henry Davidson, Andrew Fox,
Cassidy Johnson and Gonzalo Lizzaralde

for
i-Rec Information Group on Post-Disaster Reconstruction

and
CESPRO, Civil Protection and Risk Management Centre,
University of Florence

Firenze University Press
2007

Post-Disaster Reconstruction : Meeting Stakeholder Interests : Proceedings of a conference held at the Scuola di Sanità Militare, Florence, Italy 17-19 May 2006 / edited by David Alexander, Colin Henry Davidson, Andrew Fox, Cassidy Johnson, Gonzalo Lizzaralde. – Firenze : Firenze University Press, 2007.
(Atti ; 14)

http://digital.casalini.it/9788884536112

ISBN 978-88-8453-611-2 (online)
ISBN 978-88-8453-612-9 (print)

711 (ed. 20)
Ricostruzione edilizia

CESPRO - Centre for Research, Knowledge Transfer and Advanced Teaching in the Fields of Risk and Security Management and for Development of Civil Protection and Environmental Activities
University of Florence

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Università degli Studi di Firenze
Firenze University Press
Borgo Albizi, 28, 50122 Firenze, Italy
http://epress.unifi.it/

Printed in Italy

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PREFACE

Prof. Sergio Boncinelli
Director, CESPRO
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CESPRO, the University of Florence's Centre of Excellence for the Study of Risk Conditions and Civil Protection, is proud to have hosted the Third Biennial Conference of *i-Rec*, International Group for the Diffusion of Research and Information on Post-Disaster Reconstruction.

i-Rec was founded in the School of Architecture at the University of Montreal and now involves experts in many different disciplines that have an interest in studying recovery from disaster, who are active in many different countries. The Group has held international conferences in Montreal in 2002 and Coventry, UK, in 2004. The 2008 symposium. *i-Rec IV*, will be held in New Zealand.

The 2006 symposium took place in Florence, Italy, at the School of Military Medicine, a venue with a history that dates back to the 12th century. Some 112 experts on shelter, housing and reconstruction attended the meeting. CESPRO worked with colleagues at the Universities of Montreal and Coventry to organise three days of papers, debates, competitions and study of disaster recovery and reconstruction. Seven speeches and 44 papers were delivered by speakers from Italy, Canada, Colombia, India, Iran, Kenya, the Netherlands, New Zealand, Romania, Singapore, Sri Lanka, Turkey, the United Kingdom and the United States--in other words from five continents. Other countries, including Australia, were involved in the student projects competition, which was won by a group from the University of Newcastle-upon-Tyne in the United Kingdom.

There were sessions on the technical and administrative aspects of housing and other buildings after disaster. Emphasis was firmly given to participatory reconstruction, consultation and social involvement. As these two volumes of proceedings show, there were special sessions on planning and managing the recovery from the Bam earthquake of 2003 in Iran and the South Asian tsunami of 2004. In synthesis, delegates brought a wealth of experience to three rather intense days of interdisciplinary study, debate and interaction.

We were also particularly grateful for the interest in this conference shown by the Region of Tuscany. The year 2006 is of course the 40th anniversary of the floods that devastated Florence in 1966, killed 34 people in the city and did terrible damage to priceless art treasures. We choose to commemorate this important anniversary by looking, not merely back to the past, but forward to a safer Florence and a safer world. We were also delighted to welcome members of the voluntary services to the conference. Tuscany has an unbroken tradition of volunteer civil protection that stretches back more than 760 years, and hence it is home to one of the best developed services of its kind in the world. Moreover, since 1966 there have been many developments in civil protection that have made Italy a leader in disaster management with respect to all the phases of emergencies and their aftermaths. We look forward to continuing and developing that tradition.

CESPRO and the University of Florence are pleased to offer these volumes of the conference proceedings as a valuable and lasting record of three intense days of learning and discussion.

Federico Gelli
Vice-President of the
Regional Government of Tuscany

I am convinced that the high scientific quality of the papers and prestigious reputation of their authors endow these Proceedings with great value and significance. The symposium which gave rise to them offered an important opportunity to compare perspectives and develop a common understanding of problems that have global repercussions.

The i-Rec Conference was particularly welcome in Florence in 2006, a year in which the city commemorated the 40th anniversary of the devastating floods of 1966, which involved a dual process of reflecting on the past and encouraging future progress in science.

The Regional Government of Tuscany has been very busy in recent years in the fields of disaster prevention, and in particular with respect to the reduction of seismic and hydrogeological risks. We have not only encouraged theoretical development, but have also fostered applied science of great value and significance. For example, in addition to managing the reconstruction of Apennine mountain areas of Versilia and Garfagnana that were devastated by floods in 1996, we have also vigorously promoted risk reduction in these areas, in particular through the use of structural protection that respects the natural environment.

Thus our approach is strongly orientated towards prevention. We realise that spending on the reduction of vulnerability and risk is also a significant investment for the future. For example, as the cost of prevention is, according to some calculations, only between a fifth and a tenth of the cost of reconstructing buildings and structures damaged by disaster, we aim to spend on damage prevention in order to save on the need to repair damage. To this must be added the incalculable benefit of saving human lives through timely prevention measures.

It is, of course, vitally important to know what to do next. These Proceedings will help us to understand how to plan our strategies. They offer us a valuable means of understanding of complex issues and processes.

Introduction

"FROM RUBBLE TO MONUMENT" REVISITED: MODERNISED PERSPECTIVES ON RECOVERY FROM DISASTER

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Abstract

This essay re-evaluates a classic geographical paper on the theory of post-disaster reconstruction. "From Rubble to Monument", published by Robert W. Kates and David K. Pijawka in 1977, proposed four phases of the recovery process and applied them to a variety of historical and contemporary disasters. It examined the apportionment of resources in the aftermath of catastrophe and related this factor to the speed and efficacy of reconstruction processes. The paper is first described, then evaluated and finally reconsidered in the light of recent advances in disaster theory and in contemporary knowledge of how reconstruction proceeds. It is concluded that Kates's and Pijawka's concept of monumental reconstruction is confirmed by various recent and historical cases, but the phases that these authors propose are something of an oversimplification of reality, which is complicated by different forms of vulnerability, the political and geographical connectedness of damaged communities, and evolving modern approaches to disaster relief.

Keywords: model; phases of reconstruction; vulnerability; resilience; sustainability; theoretical discussion.

Introduction: the Kates and Pijawka Model

Geographers have long sought to understand the social and economic processes inherent in catastrophe and its aftermath (White, 1945). Despite the chaotic nature of disasters, it is possible to apply some simple models, and one that has been frequently cited is the four-stage recovery scheme proposed in 1977 by Robert W. Kates and David J. Pijawka, then of Clark University, Massachusetts (Kates and Pijawka, 1977). During almost three decades that have passed since the publication of this work, information and experience have accrued and as a result our understanding of post-disaster situations is greatly improved (Bhatt, 2005). The purpose of this essay is to reevaluate the model in the light of current knowledge of the recovery and reconstruction processes.

Kates and Pijawka based their analysis on a comparison of the recovery from a selection of major disasters. Because seismic events produce the archetypical or pre-eminent kind of sudden-impact disaster, they restricted their study to post-earthquake situations. In particular they considered the following cases: San Francisco 1906, Alaska 1964 and Nicaragua 1972. Although the geographical and historical range was far from all-embracing, they did permit a measure of temporal, socio-economic and cross-cultural comparison to be made. In fact, there were significant discrepancies between the examples considered by the study.

The stages in the model are as follows:-

1. The *emergency period* usually lasts from a few days to about four weeks and ends when the basic needs of survivors have been met. Throughout this phase, attention is focussed on pressing and fundamental needs. Major infrastructure is cleared, mass feeding programmes are instigated, search and rescue take place, precarious structures are buttressed and basic shelter is pro-

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vided to survivors. When the majority of these tasks has been accomplished or they no longer need to be carried out, the phase is over.

2. The *restoration period* may last from two to nine months. During this time buildings that cannot be repaired are demolished, damaged buildings are rehabilitated (or entry is banned, pending reconstruction) and infrastructure and public utilities are repaired.
3. The *replacement-reconstruction period* may last from three to 20 years, depending on the seriousness of the damage and the extent of the area affected by the disaster. Capital stocks are gradually rebuilt, the local economy recovers to pre-disaster levels (if it can), and social equity, which prevailed in the early stages of the disaster, is replaced by social differentiation. This last observation stems from the fact that people of higher social standing tend to have greater access to capital, credit and insurance than do the poor, and hence have more opportunities to recover and more access to mechanisms that speed up the process.
4. In the *phase of developmental reconstruction* monumental building commemorates the disaster and shows that the area has overcome the problems associated with it. This phase also marks the process of local or regional regrouping in order to launch economic growth. It usually occupies some years after the end of the replacement reconstruction phase.

Kates and Pijawka reached the following conclusions:-

- each stage of the recovery process is characterised by distinctive functional and operational needs that have to be satisfied;
- the stages are more or less consecutive, with some overlap;
- level of economic development is one of the determinants of the speed of recovery, with the poor tending to lose out progressively as reconstruction proceeds;
- because of their access to capital, financial institutions tend to rebuild first and in the most central locations;
- land values are distorted by disaster (*cf.* Tobin and Newton, 1986).

One of the most innovative aspects of Kates's and Pijawka's study was the identification of monumental (i.e. commemorative) reconstruction, and its differentiation from mere replacement of what had been destroyed. They cited the example of San Francisco's new city hall, built over the period 1915-29 to replaced the one destroyed in the 1906 earthquake (*cf.* Hamburger and Meyer 2006). It was designed in an imposing and opulent style that Kates and Pijawka interpreted as designed to send the message to the USA and the world that San Francisco had risen from the rubble of the disaster and would henceforth be a stronger, richer city. The other aspect that struck a particular chord with students of disaster was Kates's and Pijawka's comparison of recovery rates between the middle and upper classes, on the one hand, and the poor and disadvantaged on the other. At the same moment in time researchers had begun to illuminate the phenomenon of marginalisation, in which groups of people, perhaps even whole societies, become socially, economically and politically disadvantaged because they lack the power to assert their rights, either through repression or deprivation (Wisner *et al.*, 1983; Varley, 1994). Marginalisation can be both a cause and a consequence of disaster, which can destroy the means of sustenance of a group of people or can offer opportunities for their adversaries or exploiters to intensify repression (Arnold, 2006).

Support for the Kates and Pijawka Model

Robert Kates had ample field experience of the dreadful aftermath of the earthquake that on 25 December 1972 devastated parts of Managua, Nicaragua, killing

4000 people, injuring 16,000, and depriving more than 200,000 of their homes and livelihoods. He noted that the city's small middle class, with the benefit of access to capital, recovered in six months while some of the poorest members of society never rebuilt at all (Kates *et al.*, 1973). These early studies of deprivation after disaster are nowadays in the process of being broadened into a veritable 'science of vulnerability' (Cardona, 2004). The people most afflicted by or at risk are those who have no collective voice, or whose powerless confines them to the shadows when resources are allocated or national debates are started. In many cases they are ethnic, social or religious minorities: the Dalits of India for example, or the people who sleep rough in Tokyo. In fact, as Ben Wisner has demonstrated, there may be little to differentiate the vulnerability of such minorities in rich and poor countries if they are substantially marginalised (Wisner, 1998). Moreover, in a country or region that is in the throes of a complex emergency, a majority of the population may live in a perpetual state of extreme vulnerability. This may explain why so little progress has been made in reducing the impact of earthquakes in Afghanistan (Atmor, 2001).

Kates and Pijawka considered the problem of recovery after disaster from the standpoint of the cultural ecology paradigm of Burton *et al.* (1978). This was based on the concept of the economic rationalist as propounded by Herbert Simon in the 1950s. The resulting analysis had a distinct slant towards an economic interpretation of spatial patterns and decision making. In this context, the identification of the 'replacementreconstruction' phase is somewhat at odds with the rest of the model, except that monument-building depends on capital accumulation as much as any desire to regenerate local culture (but in Managua, afflicted by blockades, civil war, insurgency and political polarisation, there was no money for monumental reconstruction of the kind that occurred in San Francisco--*cf.* Olson and Gawronski 2003).

Although a question mark hangs over the concept of developmental reconstruction, there are abundant examples in which monuments, more or less large, came to symbolise the end of the reconstruction process, and perhaps also its success. One of the most well-known is the rebuilding of Lisbon after the 1755 earthquake, which killed an estimated 60,000 people and reduced most of the city's major buildings to rubble. The triumphal arch that divides the main avenue of the new city from the waterfront square, Praça do Commercio, is symbolic of, on the one hand, the connection between the Portuguese empire and its centre of power, and on the other the rebuilding of the city on elegant, rational and imposing lines (Kozák *et al.*, 2005).

On a smaller scale the post-earthquake reconstruction of towns in the northeast Italian region of Friuli Venezia-Giulia over the period 1976-85 also involved a degree of symbolism (Hogg, 1980). In the ancient mediaeval centre of Venzone, for example, the stones were numbered before they were labouriously put back in sequence as walls were rebuilt. Employing a fashionable architectural technique, the cathedral, rebuilt from 8000 stones that were laid out in a field and individually catalogued, was reconstructed using an offset in the walls to distinguish original masonry from that which had been repaired. One building, a convent that was entirely ruined by the earthquakes, was left as a ruinous façade, presumably to remind inhabitants and visitors that the earthquakes of 1976 were still an important part of its history. A tenuous link here can be seen with the ruins conserved at ground zero in Hiroshima.

One of the most ambitious and startling examples of monumental reconstruction is that of the town of Gibellina in the Belice Valley of western Sicily. In 1968 this agricultural backwater was struck by a series of 14 earthquakes of low power that nevertheless killed 268 people and turned a dozen villages, including Gibellina, into piles of rubble. Local populations were relocated into prefabs, where they remained for decades (Latina, 1987). In the 1980s, after years of stagnation new projects were launched in response to increasing pressure to solve the Belice reconstruction problem, and also following rejuvenation of the intermediate tiers of government by granting them regional autonomy. The rubble was cleared away from the old town of Gibellina and it was transformed into a gigantic environmental sculpture, visible from 50 km away. The new town was built on farmland as part of an ambitious "social engineering" project to create a post-modern town out of what had been a simple agricultural settlement. The new town was distinguished by avant garde architecture (some of which was so out of the ordinary as to end in structural collapse), modern art (Fig. 1), a museum and theatre, an abundance of outdoor sculpture, and frequent visual references to its Greek and Arab past. It is hard to say whether the *genius loci* of the place was revived by a sort of cultural electric shock treatment or whether it was manufactured *ex novo* on the spot. On the one hand, the whole project was so redolent of a "brave new world" as to reek of that notorious cultural trait, southern Italian eutopianism, while on the other it could be seen as a vigorous attempt to stimulate tourism in an area that had previously been shunned by visitors. In either event, it was monumental reconstruction run riot.

Figure 1. Reconstruction of Gibellina, Sicily: the civil tower.

Criticisms of the Kates and Pijawka Model

Whatever the virtues of the Kates and Pijawka model, it also has its vices. The principal criticisms are that it does not account for political factors that accelerate or retard recovery, it does not allow for local variations in rate of recovery from disaster, and the phases are not always sequential (Hogg, 1980)

Returning to the Belice Valley example from western Sicily, reconstruction after the 1968 earthquakes took place in a political and economic climate that was inimical to rational planning. Reconstruction took a stop-start course. It lasted more than 20 years, when with proper funding and organisation the same could have been achieved in a fraction of that time, and it was geographically very uneven, reflecting a patchwork of political and social marginalisation in the area (Angotti, 1977). Over-ambitious schemes were started and abandoned, only to be restarted years or even decades later. The catalyst for the resumption of public works came from distant phenomena, particularly the European Union's development funds, and the galvanising effect of the 1980 earthquake on the southern Italian mainland, a catastrophe that killed 2735 people and set the course for a long drawn-out revision of national counter-disaster policy. For certain periods, rather than catalysing reconstruction in

Sicily the 1980 event and subsequent disasters merely diverted national resources elsewhere. Hence the sporadic nature of the reconstruction (Ventura, 1984).

Even in Friuli, where reconstruction was completed in ten years--to the great pride of the Friulani--the Kates and Pijawka model fits badly. Sarah Jane Hogg (1980) found that the speed and success of reconstruction depended on the political and geographical connectedness of each particular settlement with respect to the main centres of power and decision-making--Udine and Rome in particular. Robert Geipel, who directed meticulous research on the social connotations of reconstruction in Friuli, found that, although it was broadly successful and the buildings were put back together again, this was achieved at the price of considerable suffering among the affected families and a high level of indebtedness (Geipel, 1982, 1990).

The one thing that connects the two situations at either end of Italy, so different in terms of culture and resources, is the strong emphasis on local culture: this is what Italians call *campanalismo*, adherence to the local church tower, a state of mind which cannot quite be translated as 'parochialism' but certainly involves the vigorous defence of one's own community against life's varied vicissitudes (Alexander, 1989).

Pace Kates and Pijawka, but if financial chaos or mismanagement follows disaster, it is not uncommon for fiscal policies to be regressive, especially if an economic free-for-all ensues (Vinso, 1977). This may occur because it tends to be somewhat easier to create and apply regressive taxes than progressive ones that spread the burden of reconstruction more fairly. Regressive taxes, such as those on purchases or fuel, can be created rapidly, but there are more appropriate ways of financing reconstruction, such as rolling credit in which repayments fund the loan system.

It is axiomatic that the lack of a reconstruction blueprint reduces the opportunities to benefit from disaster and increases the suffering of survivors (Foster, 1980). Moreover, the financial bonanza often goes hand-in-hand with undisciplined urban development, as the availability of funding may seduce planning committees (if such exist) to relax the restrictions in order not to lose a development opportunity.

At any rate it is reasonable to hypothesise, as Hogg (1980) did, that the speed and degree of success of reconstruction depend on three main factors; the availability of funding and affordable credit to finance the work, how well politically and geographically connected a settlement is, and the degree of social and cultural cohesion of the community (Nakagawa and Shaw, 2004). However, this begs the question of what culture means in the context of reconstruction, a phenomenon thrown into sharp relief by the importance of *genius loci*, but nevertheless difficult to define adequately (Morherg-Schulz, 1980).

Culture, Disasters and Sustainable Reconstruction

It cannot be denied that disasters and reconstruction have cultural contexts (Philips, 1993). Nonetheless, the published literature on both is quite thin, and in the case of culture it amply demonstrates the difficulty even of defining the phenomenon, let alone of measuring it (Palm, 1998). Yet culture is innate in a population's way of doing things: for example, the Friulani made great stock of the fact that they have a reputation for being a no nonsense, plain speaking, entrepreneurial people capable of getting things done quickly and efficiently with a minimum of fuss (Geipel, 1982).

Seen in another light, culture offers opportunities if one works with it or poses constraints if one works against it. In most cases the necessary cultural analysis is accomplished purely intuitively. In fact a more precise approach would require some estimation of the historical underpinnings of a particular culture, together with its pliability in the face of the onslaught of the modern mass culture. The cultural dimension, so often dimly perceived, teaches us that imposed solutions to the shelter problem easily fall foul of the questions of acceptability and conformity with local economic and social patterns of living. Many expensive failures of post-disaster relief result, not merely from the absence of any estimation of what the real needs are, but of failure to consider the cultural dimensions of a population and its activities (Oliver-Smith, 1991). Just as a community demoralised by the death and destruction that go with disaster is struggling to rebuild its life and livelihood, outsiders come along and impose the straitjacket of a foreign solution by insisting on an unfamiliar and perhaps unacceptable way of doing things.

Despite the common failure to respect local cultures, it should not be imagined that they should be protected from change. When asking what it takes to make reconstruction after disaster sustainable, one should also ask whether that means changing the prevailing culture (*cf.* Davis, 1978). For centuries the lack of an "architectural Darwinism", or the survival of the fittest buildings, was notable in many places (though in India and Turkey it did emerge to some extent in regional designs of resilient wood-framed buildings). This suggests that a cultural change would have been helpful towards greater sensitivity to the question of how to make buildings proof against disaster--i.e. less fatalism. Despite this, progress seems to cut both ways: paradoxically, modern concrete and steel frame building permits both disaster-resistant construction and the erection of larger buildings that collapse more easily.

In terms of general principles, sustainable reconstruction:-

- is compatible (or symbiotic, or mutually reinforcing) with sustainable development
- has a broad base of public support
- stands the test of time
- adapts to changing circumstances
- does not harm the environment, and combines structural with non-structural methods.

Sustainable *development* has given rise to endless debate about exactly what it ought to involve, and hence it is hardly surprising that sustainable *reconstruction*, which should dovetail with it, is equally hard to pin down (Pelling, 2006). Nevertheless, it is something that should generate lasting employment through both the reconstruction process itself and the regeneration of local businesses. Furthermore, it should preserve the *genius loci* and foster a sense of attachment to place. Finally, it must not be divisive and should not fuel conflict in the local community.

One important point regarding divisiveness concerns the view of emergency relief as a barter market for resources. To a greater or lesser extent most disasters are conditioned by the pressures and trends of devolution and its counter-force, centrism. The role of local government is to negotiate more assistance from higher levels of public administration. The role of national government is to provide relief and support, but according to strict rules of economy, especially in the individualistic neoliberal climate that has come to replace so much of the social welfare of the late 20th century. The intermediate tiers of government must both ration resources distributed to the local level and negotiate more relief from the national level (Fig. 2). Reductions in welfare tend to reinforce Kates's and Pijawka's model of an economically-conditioned recovery in which the poor lose out. To begin with, the middle classes tend to have more access to the political centre than do the poor. Moreover, even devolution is not necessarily favourable to the poor if power is squarely in the hands of a local élite. In the end, the ultimate form of devolution may be the 'informal' economy. In the case of Thailand after the December 2004 tsunami, certain coastal settlements received relatively little from the national government, but on the other hand, tax revenues were low, as up to 70 per cent of earnings were achieved via the 'black' economy and were undeclared (Rigg *et al.*, 2005). This may be the only way that the dispossessed can survive in the absence of recognition and help from more powerful interests.

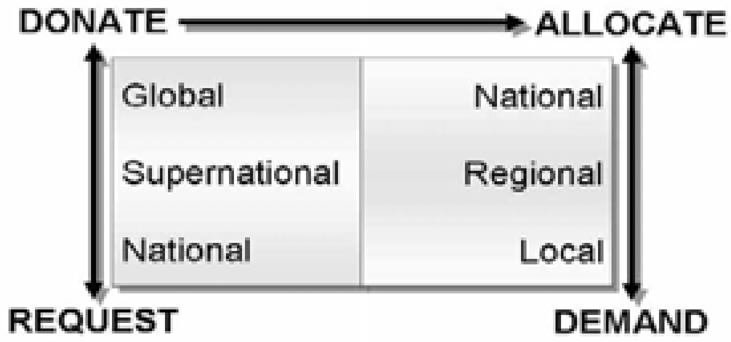

Figure 2. Post-disaster resources and levels of public administration.

There are a few rare instances in which the middle class were the primary victims; for example in the Las Colinas landslide in El Salvador in January 2001 (Crosta *et al.*, 2005), and in the collapse of blocks of apartments in Islamabad, Pakistan, during the October 2005 earthquake. However, it is generally true that disaster is a problem of the poor and marginalised: therefore so is reconstruction. For the rich, reconstruction is an opportunity: for the poor it is an obstacle. Whereas poverty and vulnerability are not precisely synonymous, as large economic resources are not necessarily required for basic organisation to be improved, they are nonetheless indissolubly linked. Hence, any new theory of reconstruction should build on Kates's and Pijawka's observations of the role of poverty but perhaps with greater reference to modern vulnerability theory.

Valediction of the Kates and Pijawka Model

In reality both resilience and the potential for successful reconstruction are influenced by a variety of forms of vulnerability (Alexander, 2000, p. 17). The following example of a classification of vulnerability to disaster illustrates some of the complexity (see also Fig. 3):-

- *total*: life is precarious in general (or *pristine*, when hazards are not yet been reduced)
- *newly-generated*: caused or exacerbated by deteriorating circumstances
- *economic*: e.g., the vulnerability of the marginally employed
- *technological/technocratic*: due to the interaction of natural and anthropogenic risks
- *delinquent*: due to corruption, organised criminal activity, etc.
- *deprived*: when existing knowledge is not utilised (or *residual*, due to lack of upgrading when new safety options are available)
- *wilful*: when existing knowledge is deliberately ignored for political or other reasons.

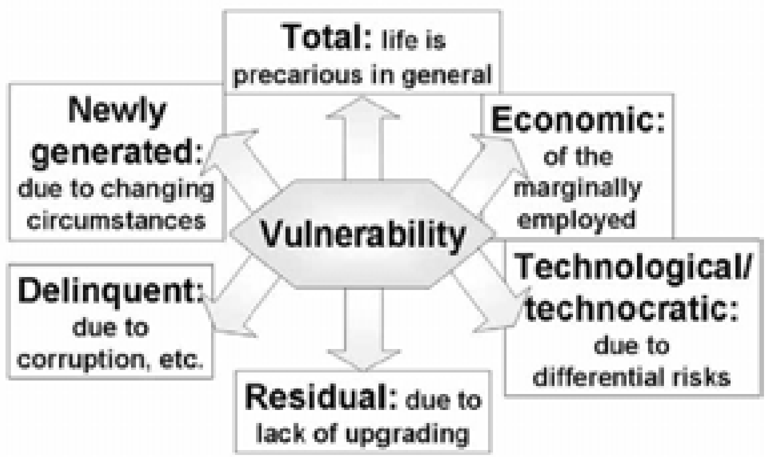

Figure 3. A model of vulnerability types.

Any of these forms of vulnerability can reduce the effectiveness, and above all the fairness and equity, inherent in the reconstruction process and can make it complex and long drawn-out. In this context, resilience signifies the ability to overcome vulnerability whether it is generated by spontaneous failings within society or is imposed deliberately or unwittingly from outside (Kaplan, 1999).

Despite all the shortcomings of development theory and practice, lessons have been learned in terms of needs assessment, efficiency of relief, involvement of stakeholders, and careful targeting of initiatives. As a result the phases of recovery overlap much more than they once did. Hence there may be no need to wait until the first two stages of Kates's and Pijawka's model have played themselves out before instituting a programme of replacement reconstruction. If local people are in agreement, 'replacement reconstruction' may even be an anathema, given the need to create something that is more resistant to disaster than what went before (Batabyal, 1998). To some extent this sort of approach was evident in the international response to the 2004 tsunami, but it should be borne in mind that this event was thoroughly anomalous, as the relief appeals yielded a vast amount of cash (Procacci *et al.*, 2005). At the same moment in time other disasters were roundly neglected by the donors, leading to much more rudimentary arrangements for recovery.

In conclusion, elements of the Kates and Pijawka model are valid and interesting, but the general problem of reconstruction is more complex and geographically more varied than the model allows. The phases, in particular, have lost their sense of sequence and continuity (Arnold, 2006; *cf.* Bello, 2006). Indeed, there is an imperative need to start the replacement reconstruction phase as soon after the impact of the disaster as possible, given the need to ascertain socio-economic and cultural needs, safety considerations, priorities, and ways and means. Moreover, reconstruction must be viewed in the light of the whole of the 'disaster cycle', in which there is much interconnectedness (Richardson, 2005).

References

Alexander, David E. (1989). "Preserving the Identity of Small Settlements During Post-Disaster Reconstruction in Italy", *Disasters*, Vol. 13, No. 3, pp. 228-236.

Alexander, David E. (2000). *Confronting Catastrophe: New Perspectives on Natural Disasters*, Harpenden, UK, Terra Publishing, and New York, Oxford University Press.

Angotti, T. (1977). "Playing Politics with Disaster: The Earthquakes of Fruili and Belice (Italy)", *International Journal of Urban and Regional Research* Vol. 1, pp. 327-331.

Arnold, Margaret (2006). "Disaster Reconstruction and Risk Management for Poverty Reduction. The Globalization of Disaster" *Journal of International Affairs* Vol. 59, No. 2, pp. 269-279.

Atmor, M.H. (2001). "Politicisation of Humanitarian Aid and its Consequences for Afghans", *Disasters*, Vol. 25, No. 4, pp. 321-330.

Batabyal, A.A. (1998). "The Concept of Resilience: Retrospect and Prospect", *Environment and Development Economics*, Vol. 3, No. 2, pp. 235-239.

Bhatt, Mihir (2005). "Learning from recovery" *Know Risk*. Geneva, ISDR Secretariat, and London, Tudor Rose, pp. 351-353.

Bello, Walden (2006). "The Rise of the Relief and Reconstruction Complex. The Globalization of Disaster", *Journal of International Affairs* Vol. 59, No. 2, pp. 281-296.

Burton, Ian, Robert W. Kates and Gilbert F. White (1978). *The Environment as Hazard*, New York, Oxford University Press. (second edition, 1993, New York, Guilford Press).

Cardona, Omar Dario (2004). "The Need for Rethinking the Concepts of Vulnerability and Risk from a Holistic Perspective: a Necessary Review and Criticism for Effective Risk Management", in G. Bankoff, G. Frerks and D. Hilhorst (eds) *Mapping Vulnerability: Disasters, Development and People*, London, Earthscan, pp. 37-51.

Crosta, G.B., S. Imposimato, D. Roddeman, S. Chiesa and F. Moia (2005). "Small Fast-moving Flow-like Landslides in Volcanic Deposits: the 2001 Las Colinas Landslide (El Salvador)", *Engineering Geology*, Vol. 79, Nos. 3-4, pp. 185-214.

Davis, Ian (1978). *Shelter After Disaster*, Oxford, Oxford Polytechnic Press.

Foster, Harold D. (1980). *Disaster Planning: The Preservation of Life and Property,* New York, Springer-Verlag.

Geipel, Robert (1982). *Disaster and Reconstruction: the Friuli (Italy) Earthquakes of 1976* (trans. P. Wagner), London, George Allen & Unwin.

Geipel, Robert (1990). *The Long-Term Consequences of Disasters: The Reconstruction of Friuli, Italy, in its International Context, 1976-1988,* Heidelberg, Springer-Verlag.

Hamburger, R.O. and J.D. Meyer (2006). "The Performance of Steel-Frame Buildings with Infill Masonry Walls in the 1906 San Francisco Earthquake. The 1906 San Francisco Earthquake: An Earthquake Engineering Retrospective 100 Years Later" *Earthquake Spectra* Vol. 22, No. 2, pp. S43-S67.

Hogg, Sarah Jane (1980). "Reconstruction Following Seismic Disaster in Venzone, Friuli" *Disasters* Vol. 4, No. 2, pp. 173-185.

Kaplan, H.B. (1999). "Toward An Understanding of Resilience: A Critical Review of Definitions and Models", in M.D. Glantz and J.L. Johnson (eds) *Resilience and Development,* New York, Kluwer, pp. 17-83.

Kates, R., J.E. Haas, D. Amaral, R. Olson, R. Ramos and R. Olson (1973). "Human Impact of the Managua Earthquake: Transitional Societies Are Peculiarly Vulnerable to Natural Disasters" *Science* Vol. 182, pp. 981-990.

Kates, Robert W. and David J. Pijawka 1977. "From Rubble to Monument: The Pace of Reconstruction" in J. Eugene Haas, Robert W. Kates and Martin J. Bowden (eds) *Disaster and Reconstruction*, Cambridge, Massachusetts, M.I.T. Press, pp. 1-23.

Kozák, J.T., V.S. Moreira and D.S. Oldroyd (2005). *Iconography of the 1755 Lisbon Earthquake,* Prague, GIAS Czech Republic and Academica.

Latina, Corrado (1987). "The Long-Term Performance of Prefabricated Housing after Italian Earthquakes", *Open House International,* Vol. 12, No. 3, pp. 27-38.

Morherg-Schulz, C. (1980). *Genius Loci: Towards a Phenomenology of Architecture*, New York, Rizzoli.

Nakagawa, Y. and R. Shaw (2004). "Social Capital: Missing Link in Disaster Recovery", *International Journal of Mass Emergencies and Disasters,* Vol. 22, No. 1, pp. 5-34.

Oliver-Smith, Anthony (1991). "Successes and Failures in Post-disaster Resettlement", *Disasters,* Vol. 15, No. 1, pp. 12-23.

Olson, R.S. and V.T. Gawronski (2003). "Disasters As Critical Junctures? Managua, Nicaragua 1972 and Mexico City 1985", *International Journal of Mass Emergencies and Disasters,* Vol. 21, No. 1, pp. 5-35.

Palm, Risa (1998). "Urban Earthquake Hazards: The Impact of Culture on Perceived Risk and Response in the USA and Japan", *Applied Geography,* Vol. 18, No. 1, pp. 35-46.

Pelling, Mark (2006). "Measuring Urban Vulnerability to Natural Disaster Risk: Benchmarks for Sustainability", in Christine Wamsler (ed) "Managing Urban Disasters", Open House, Vol. 31, No. 1.

Phillips, Brenda D. (1993). "Cultural Diversity in Disasters: Sheltering, Housing, and Long Term Recovery," *International Journal of Mass Emergencies and Disasters,* Vol. 11, No. 1, pp. 99-110.

Procacci, P., A, Mookerjee, T. German, M. O'Dwyer and G. Eppel (2005). "Funding Policies and Practices," *Prehospital and Disaster Medicine,* Vol. 20, No. 6, pp. 408-411.

Richardson, Brian (2005). "The Phases of Disaster as a Relationship Between Structure and Meaning," *International Journal of Mass Emergencies and Disasters,* Vol. 23, No. 3, pp. 27-54.

Rigg, J., L. Law, M. Tan-Mullins and C. Grundy-Warr (2005). "The Indian Ocean Tsunami: Socio-Economic Impacts in Thailand", *Geographical Journal,* Vol. 171, No. 4, pp. 374-378.

Tobin, G.A. and T.G. Newton (1986). "A Theoretical Framework of Flood Induced Changes in Urban Land Values" *Water Resources Bulletin* Vol. 22, No. 1, pp. 67-71.

Varley, Anne (1994). "The Exceptional and the Everyday: Vulnerability Analysis in the International Decade for Natural Disaster Reduction" in Anne Varley (ed) *Disasters, Development and Environment,* Chichester, UK, Wiley, pp. 1-12.

Ventura, Francesco (1984). "The Long-term Effects of the 1980 Earthquake on the Villages of Southern Italy", *Disasters,* Vol. 8, No. 1, pp. 9-10.

Vinso, J.D. (1977). "Financial Implications of Natural Disasters: Some Preliminary Indications", *Mass Emergencies,* Vol. 2, No. 4, pp. 205-218.

White, Gilbert F. (1945). *Human Adjustment to Floods: A Geographical Approach to the Flood Problem in the United States,* Research Paper No. 29, Chicago, Department of Geography, University of Chicago.

Post-Disaster Reconstruction

Wisner, Ben (1998). "The Geography of Vulnerability: Why the Tokyo Homeless Don't "Count" in Earthquake Preparations", *Applied Geography,* Vol. 18, No. 1, pp. 25-34.

Wisner, Ben, Patrick Susman and Phil O'Keefe (1983). "Global Disasters: A Radical Perspective" in Kenneth Hewitt (ed) *Interpretations of Calamity,* Boston, Allen & Unwin, pp. 263-283.

Part 1

Multi-disciplinary Planning Framework

Within post-disaster reconstruction there is a need to establish an efficient and effective multi-agency, multi-disciplinary planning framework capable of dealing with emergency, transitional and long-term reconstruction requirements.

STRATEGIC PLANNING OF EMERGENCY AREAS FOR TRANSITIONAL SETTLEMENT

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Abstract

In emergency conditions, the realization of a settlement develops according to an unplanned process then affecting the transformation - often permanent - of places through the imposition of uncodified rules. The research here set forth proposes criteria and guidelines for the planning of transitional housing settlement areas in order to effectively meet the requirements of emergency prevention and post-disaster reconstruction through a coordinated approach among land/town urban planners, emergency planners, disaster managers, users. The main topic is presented by following the study progress through the phases which have led to the final results. At the same time, the sequence of the single conceptual elements is based on the logic of problem-solving, as required in an architectural project so as to facilitate the interpretation by part of the final users. We believe that the research most important contribution is represented by the analytical approach towards the problem, which is based on a culture of the project, rather than on the mere identification of the technical standards. The research outcomes are represented by a framework of possible design solutions that verify the settlement patterns depending on the characteristics of the area and the size of the population. The research product is a transitional settlement planning guide to be used by local land authorities.

Keywords: shelter areas, emergency, temporariness, settlement, planning.

Introduction

The Italian Civil Protection regulations have increasingly evolved commencing from the release of the outline act n. 225 of 1992, up to the precise organization of the operational functions as proposed by the so-called "Metodo Augustus" of 1997. This progress has then produced a complex codification of the procedures for the activation of the emergency civil protection system. Within this legislative framework, specific provisions have been implemented to create the initial conditions for the preparation of the areas of transitional settlement, in particular the protocol note 3089/065 EMER of 8th July 1997, in which local authorities are invited to identify the area for early welcoming and the setting up of housing modules in case of emergency.

Upon a series of legislative provisions, the legislators have identified the main criteria for these areas, considering multiple factors and other peculiarities. The Regione Toscana has adopted these criteria - in particular, that one referring to the area multi-functionality - by act of the resolution no. 495/97 entitled "Technical instructions for the urban planning of multifunctional equipped areas of public interest". The intention of the resolution is that of defining specific technical parameters and the methodologies for the elaboration of the urban decisions which local authorities must introduce to regulate the areas of public interest. As specified in the resolution, these areas are devoted to the supervision, coordination and execution of the first-aid operations and life support to the population by part of the Civil Protection task force, in case of emergency.

Post-Disaster Reconstruction : Meeting Stakeholder Interests : Proceedings of a conference held at the Scuola di Sanità Militare, Florence, Italy 17-19 May 2006, edited by David Alexander, Colin Henry Davidson, Andrew Fox, Cassidy Johnson, Gonzalo Lizzaralde, ISBN 978-88-8453-611-2 (online), ISBN 978-88-8453-612-9 (print), © Firenze university press, 2007

In order to boost the selection and restructuring of the areas destined to the transitional settlement of housing systems during an emergency situation, the Italian Department of National Civil Protection has provided for a series of "guidelines for the identification and the realization of the shelter areas and the installation of prefabricated buildings for civil protection". These guidelines have currently been approved in technical terms by the Italian Conference of the Regions to the purpose of defining a consistent organizational pattern in terms of housing protection for the population affected by a catastrophe.

Although the legislative foundations have been laid, today we must still define the projecting criteria to configure the temporary settlement of first-aid and rescue areas in case of emergency and to design the relevant technical instruments for the application. In addition to an in-depth knowledge background, the research has been developed in the light of the recent evolution trends, which are modifying the cultural approach to the issue of transitional housing settlement in case of emergency (Bologna 2002, Bologna and Terpolilli 2005).

Guidelines for the Planning of Emergency Transitional Settlement

The research team is composed by a group of researchers from the Dep. of Architectural and Design Technology (Prof. Roberto Bologna scientific manager, Prof. Carlo Terpolilli, Arch. Francesca Burdisso, Arch. Lisa Casucci, Arch. Antonella Cesaroni, Arch. Stefano Combet), under the supervision of the superintendents of the Structural Interventions and Emergency Works Office of the National Department of Civil Protection at the Italian Government (Eng. Corrado Seller, Eng. Pasquale Gidaro) and of the Regional Division of the Civil Protection System at the Regione Toscana (Eng. Alessandro Guarducci).

The research team has made every effort possible to open a discussion with the direct users of these guidelines in a final applicative phase. This projecting laboratory has included a representative sample of members from the Local Authorities which mostly characterize the national situations. The laboratory objective has been to test the investigations results directly into the field and to contribute to perfecting the operational instrument.

Objective of the Local Authorities here represented has been that of creating a "handbook" of operational instructions to be used as a reference for the civil protection divisions at the Italian cities/towns which are responsible for the definition of specific plans for the housing of transitional shelter areas in case of emergency.

The operational instrument resulting from this research is represented by the guidelines for the planning of transitional settlements during an emergency event and the identification of the urban planning parameters referred to the Transitional Settlement System as a dimensional reference, to guarantee the satisfaction of the functional and, above all, the psychological and social requisites.

One of the guidelines focuses is the area infrastructures, which are assumed to be characterized by two modalities: *permanent infrastructure* and *temporary infrastructure*. A permanent infrastructure is meant to be the essential one as it guarantees the immediate setting up and functioning of a transitional settlement in case of emergency (primary road network, primary water and power plant, primary drainage and sewer system), and also the compatibility with respect to the specific usage destination expected in ordinary times. The area permanent infrastructure is conceived as an adaptable network in relation to the possible solutions of the first-aid system, which derive from the application of the different housing models defined in the guidelines. The technological dimension of the primary infrastructural networks can therefore comply with the functions generally assumed by the area during peacetime (a parking area, a green fully equipped area, a market, etc.) with the installation of a power and a road network, a parking area and a public green recreational park.

While for temporary infrastructure, we mean the temporarily housing settlement during an emergency or catastrophic event, in which the connection of the transitional housing units to the pre-installed primary networks is required. Once the transitional housing units are not urged any longer, the temporary infrastructure shall not undermine the re-settlement of the area to the ordinary functions.

Transitional Settlement System

The approach used to identify the functional features and the project requirements of the Transitional Settlement System is based on the meta-designing methodology and on a need-performance logic, in order to achieve the definition of a framework of project requirements and the identification of satisfaction and performance standards to be referred to by the designer during the settlement projecting phase. The Transitional Settlement System includes three subsystems:

1. Transitional Housing System,
2. Transitional Community System,
3. Services or Shared-Facilities System.

Each subsystem is organized into *Spatial Units*, grouped according to different categories. The Spatial Units are organized on the basis of their usage into Private Functions, Semi-private Functions and Public Functions.

For each Spatial Unit a series of *Basic Activities* are identified, which are grouped on the basis of their priority into Basic Functions and Optional Functions, according to an urgency scale. For the single Spatial Units and for the whole Transitional Settlement System, we also identify a number of *project requirements,* which are aimed to meet the typical problems related to temporary housing under emergency conditions:

- Enhancement of the life quality in terms of environmental well-being,
- Psychological support to final users,
- Implementation of adequate dimensional standards for the housing and service functions,
- Organization and differentiation of the usage modalities and space allocation,
- Importance of the local context social and environmental factors,
- Alternative usage of the areas,
- Reconversion and temporariness intervention criteria,
- Sustainable development.

At this point, it is important to underline that the knowledge and expertise required for the definition of the satisfaction and performance standards are derived partially from other previous studies in this field and partially from the instructions provided by the existing legislation material, but, above all, from a direct survey on the field, as application of the Post-Occupancy Evaluation methodology used after the earthquake event of 1997 in the territory of the Marche and Umbria regions (Bandini and Burdisso 1999, Bologna 2001).

Minimal Housing Unit

The basic element of the Transitional Housing Settlement System is the *Minimal Housing Unit*, which is structured as follows (Fig. 1):

1. *Confined space:*
   - Housing Module (MA).

2. *Exchange area of the housing module*:
   - Entrance / Path (ING),

- External Housing Area (AEV),
- Service Area (AS),
- Storage Area (D).

3. *Complementary facilities:*
   - Neighbourhood unit (UdV),
   - Parking area (P),
   - Unbuilt green area,
   - Road network.

The dimensional characterization of the Minimal Housing Units is based on the temporal development of the settlement process in two subsequent phases: this occurs today with the passage from the container (mobile unit ISO 20, 6x3 metres, 1/2 individuals, or unit ISO 40, 12x3 metres, 3/4 persons) to the prefabricated house (wooden prefabricated unit, 8x6 metres, and unit type DPC 40 for 1-2 persons, or unit type DPC 50 for 3-4 persons) in order to guarantee the interchangeability on the lot.

The surface of the Minimal Housing Unit components varies according to 2 criteria: the dimensional parameter is "constant" and "variable" in function of the changes in the housing model and in the aggregational typology.

The variable oscillates within a set range of values: this does not depend on the designer's arbitrary decision but it is strictly connected with the preventative decisions taken in relation to the housing model and the aggregational typology.

To sum up, it is possible to say that confined space and exchange area represent the dimensional constants, while the so-called Complementary Facilities suggest the dimensional variables. Moreover, the definition of the dimensional constants refers to functional-distribution criteria, while the dimensional variables refer to socio-psychological criteria. In other words, the dimensional constant values determine the surface levels required for the execution of the Basic Housing Functions, while the dimensional variable values determine the Optional Housing Functions.

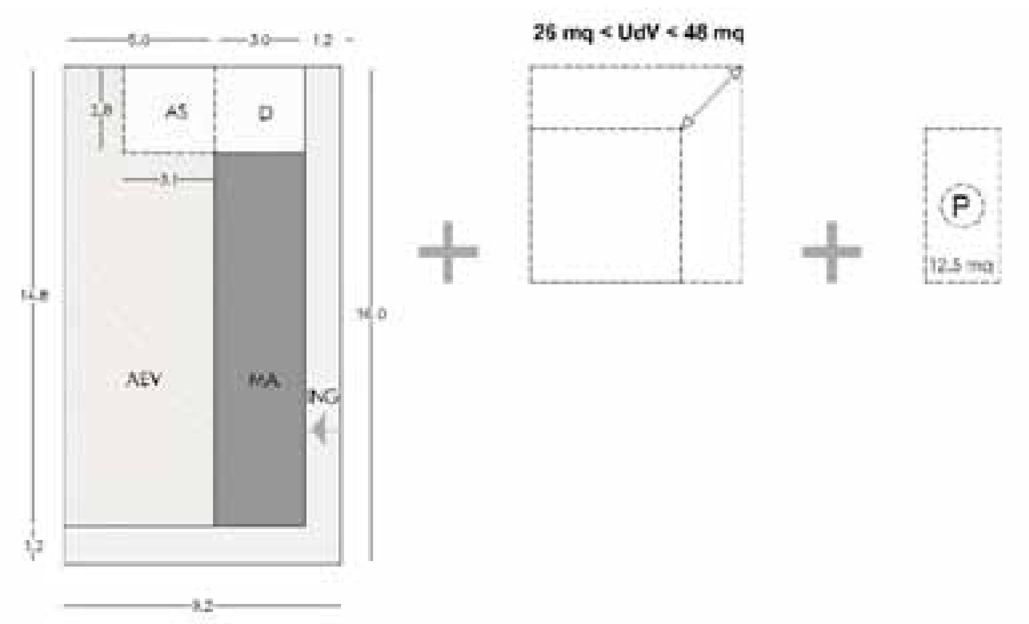

Figure 1. The elements of the minimal housing unit(example of the module "container" for 3-4 users).

Basic Aggregative Typologies (Formation of the Urban Fabric) and Aggregation Minimal Units

The study of the aggregational rules in the Minimal Housing Unit determined at the morphological and dimensional level leads to the definition of a basic block, that is the *minimal aggregational unit* (Fig. 2) of the transitional settlement fabric.

The analysis is carried out along two front lines: on the one hand, the survey on the historical-social reference material; on the other, the definition of the buildings block at a morphological-dimensional level to establish the number of modular units composing the block and, thus, the minimum social aggregate. All this is developed starting from considerations related to functionality and distribution and, also, upon social-anthropological considerations. The most relevant cultural-historical reference is represented by the urban models of the "foundation cities", as this model can effectively apply to the interpretation of the emergency transitional housing settlement, even though for a more contingent usage. In historical cities (Caniggia and Maffei 1996, 1999), buildings are positioned according to specific urban plans regulating the realization of an *aggregate*. The concept of urban aggregate has evolved in the course of the centuries, drawing from its extended evolution and history a system of building rules which regulate the formation of the *urban fabric.* The fabric is the concept of reciprocal proximity among different buildings positioned within a network of numerous ways, determining the changes of the urban aggregate. Buildings can assume a large variety of functions, and thus we can obtain a basic housing fabric or a services-oriented fabric. In this study, aggregational typologies belonging to the Italian historical urban tradition are referred to, defining its cultural elements. In Italy (Caniggia and Maffei 1979), the urban planning tradition of the historical centres is determined by the serial collocation of buildings, which are organised into 3 *basic aggregative typologies* modifiable in function of the system requirements of the area affected by the catastrophe, for the purposes of this research:

- *Row housing* is characterized by the positioning of the larger module parallel to the lot depth, with one short side facing the road and the other opening on the exchange common area (neighbourhood unit). This area is structured as a green and services-destined area, and is enclosed between a determined number of housing units.
- *Court-row housing* repeats the aggregational pattern of the row housing, where the positioning of the module is changed, with the major side opening on the road; a back space is thus enclosed as in a court.
- *Court* is created from the organization of the minimal housing units in an all-side delimited block. The housing modules are positioned closely with the longest side opening on the road; the enclosed structure determines an internal space for the exclusive use of the inhabitants (neighbourhood unit) like the ancient Roman patio.

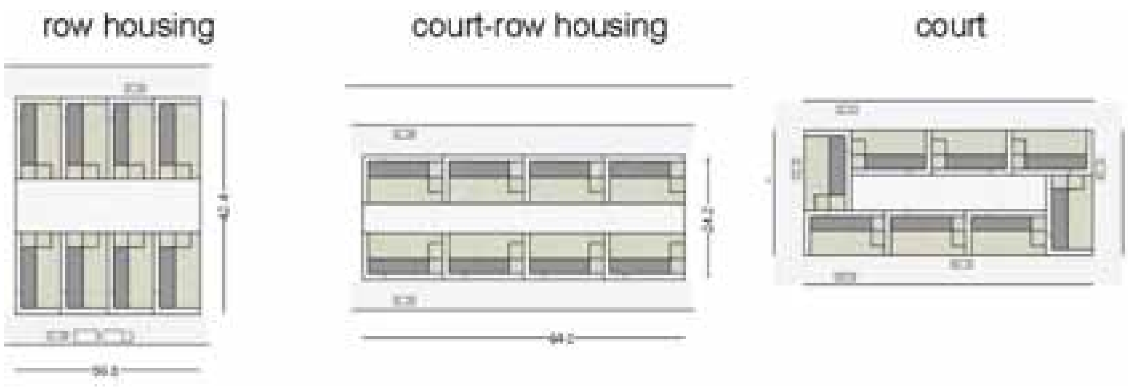

Figure 2. Minimal aggregation units (example).

At a dimensional level, each of the three aggregational patterns (row, court-row, court) can assume 3 different compositions made of 6, 8, or 12 housing modules, respectively. Nine minimal housing units are therefore created at a theoretical level, but seven in the practice, as two composition solutions are not consistent. Even in this case, the Minimal Aggregational units are preserved during the 2 phases of the settlement process as the interchangeability between the container and the prefabricated house is realized with no changes to the pattern.

Context conditions

The main data of the application context where the transitional settlement is realised are the following:

- *Characteristics area* (formation, gradient, orientation, accessibility)
- *number of inhabitants to be hosted* (100, 250 or 400 inhabitants)

These data have been indicated by the research promoter (the National Department of Civil Protection) on the basis of the acquired experience.

For the application of data to the context, a matrix system is used to synthesize the multiple situations which the urban planner may face during the projecting of the Transitional Housing Settlement (in the pre-emergency or in the emergency phases). As far as the area characteristics are concerned, the variables are four:

- area geometry
- accessibility
- gradient
- orientation

By putting into relation the first 2 variables, the solutions so obtained identify the discriminants in terms of geometric properties and accessibility, which may determine the projecting choice for the appropriate Settlement Pattern. In relation to the area geometry, two great categories have been identified, where the multiple projecting situations have been collected:

- extended formation area
- compact formation area

Accessibility is a fundamental parameter which can not be set aside. The settlement models, described below, are characterized by a strong directional dimension with respect to roading; this feature is strictly put into relation with the area accessibility, which can only be determined when applied to a real case. By comparing the 2 solutions obtained in terms of geometry (compact formation and extended formation) with the other variables (gradient and orientation) and considered the context accessibility, two matrixes incorporating all the theoretical solutions which may influence the projecting choices are so obtained. Some of the solutions obtained are not consistent with the project given a series of considerations referring to the predefined requisites (e.g., solarization, ventilation, formation-function ratio), and they have thus been discarded. The implication of this operation is that of progressively restricting the project variables, providing to the designer a series of indications and guidelines which he/she can choose to comply with, according to the specific circumstances.

Another fundamental element in the analysis of the context conditions is the users dimensional threshold, that is the number of potentially hosted inhabitants. Upon a social and anthropological assessment, but also upon a series of economic and functional considerations, three users thresholds have been identified:

- 100 inhabitants
- 250 inhabitants
- 400 inhabitants

The project guidelines and the synthesis of the urban planning parameters which represent the ultimate objective of this research are defined in relation to these thresholds. In the event that, in a real situation, the planner has to find the accommodation for an intermediate number of inhabitants, he/she can obtain the corresponding parameter values from simple interpolation calculations. For the identification of the spatial-geometric model, he/she has to adapt the reference model which mostly matches the context conditions.

Housing Settlement Models

At an urban-territorial level, the relations of spatial organization between Housing System, Community System (square, green area, roads network) and the Services System leads to the identification of three distinct *transitional housing settlement models*. As it already occurred with the aggregational patterns, we start with a survey on the historical-cultural reference material, mainly represented by the "city-founding historical tradition". The founding city planning provides for an historical repertoire of examples which mostly get closer to the aimed operation: as a matter of fact, the intention is "to found" a human settlement, where the temporariness implies specific aspects which can not be set aside: the alternative usage of the areas, the limitation of the minimal functional spaces, the reversibility of interventions, etc. In particular, three housing settlement models have been identified:

- *linear borough structure*
- *fortress-city or charterhouse structure*
- *Roman castrum*

In the urban planning analysis of the historical cities' fabric referred to in the organization of the emergency camps for the purposes of this research, the reading scale has been expanded to examine the ratio between different aggregates within the same urban centre. It is important to understand what is the role of an aggregate in relation to the other ones in the construction of the urban system. The urban system includes several modules (the aggregates) which are differently distributed in function of the housing settlement models applied. The result is the realization of an urban centre, a suburb area and the main cross road axes, creating a multipliable system. In this research, we make reference to housing settlement models for the organization of emergency camps which are inspired by the fundamental planning principles of the historical cities. Through their spontaneous or planned-founding structure, these cities offer to urban architects the basic planning rules for the setting up of the urban fabric. The reference is not carried out at a formal level, but in distribution and functional terms.

The *linear borough* (Fig. 3) is the basic structure typical of the ancient cities' early expansion phase or of small urban aggregates scattered across the territory; the generating line is represented by a road of great traffic (central axis), connecting the two borough ends. Within the research, along the main rectilinear path, different typologies of aggregates are developed: row housing, court-row housing, and courts, with roads varying in length according to the number of hosted inhabitants.

The *fortress city* typology refers to the fortress-stronghold city structure or to the abbadial/charterhouse city structure, which in the Middle Ages guaranteed a natural defence against the enemy thanks to the protecting walls. The fortress urban typology is characterized by the progressive hierarchical development of the spaces: from the public areas to the semi-public areas, all with specific organizational patterns, along an idealised axis.

The *Roman castrum* is the most ancient urban planning model for a founding city/town and can also fit to territorial difference of level. The castrum is realised by two generating lines which cross each other perpendicularly and is characterized by a regular physical bordering (the walls or the military *valla*). Also known as a "chess-board" plan for the construction of regular housing *insulae*, the public area is located at the centre at the crossing point of the two generating lines, while the other city squares are obtained by the "removal" of an insular-square block. An urban aggregate is composed of modules with an internal dialectics between a *centre* and a *suburbs*, an axis, and two ends for each direction, a longitudinal one and a crosswise one.

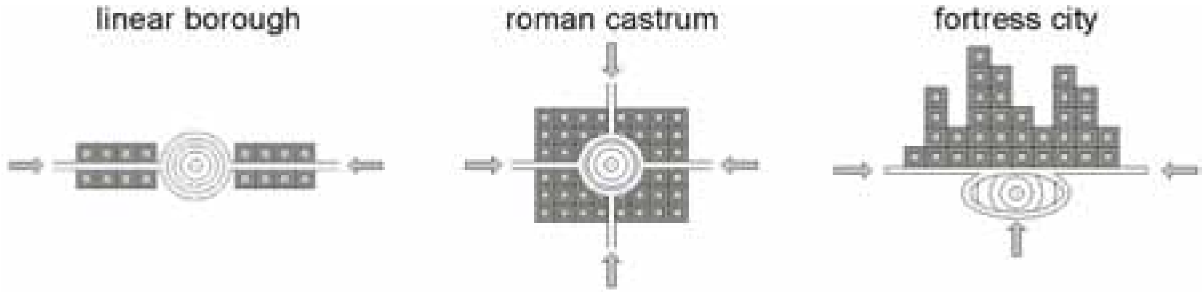

Figure 3. Transitional housing settlement models

The adaptation of different aggregate typologies, context conditions and housing settlement models is realized through a multi-dimensional matrix which identifies the possible solutions for a transitional settlement on a theoretical basis. The result is evaluated in terms of feasibility by taking into account the project requisites previously defined. The matching of these elements gives rise to non-consistent solutions (to be rejected on a prior basis), recommendable solutions (where the relationship between the matrix elements is optimal), unrecommendable solutions (where the relationship between the matrix elements presents too many disadvantages), possible solutions (where the results of the matrix elements relations is possible but not optimal). To sum up, a framework scheme incorporates all the housing hypotheses which may develop at the change of the housing settlement models, the aggregational typologies, the dimensional thresholds. The scheme reports the theoretical housing plans. The relationship between the aggregational typologies (row, court, row-court) and the context conditions represented in this case by the parameters "gradient – orientation" fatherly identifies the compatibility of the solutions.

Project Simulation of Settlement Configuration for the Calculation of Planning Parameters

Upon assessing the compatibility with the context conditions, 12 study cases are examined as examples, which are selected among the recommended solutions. These study cases are the object of a more in-depth projecting simulation. In support of the parameters calculation for the dimensioning of the transitional settlement, it is necessary to define two instruments categories: on one side, the existing legislative acts in the field of urban planning standards (in particular, the Ministerial Decree n. 1444/68), and on the other, the results obtained from the direct analyses in the field (The Post-Occupancy Evaluation related to the earthquake event in the regions Umbria - Marche of 1997). This typology of projecting simulation is still a theoretical operation which is too distant from the specifications of the real context. The result is an abstract scheme with geometric and distributional elements, where all components of the Transitional Housing System are defined in quantitative terms and are collocated according to functional relations and social-living factors.

The scheme has a double function: one the hand, that of being a guide to the effective projecting of the transitional settlement; on the other, that of providing (to comply with the research objectives) support to the calculation of the urban parameters related to the transitional settlement. For this purpose, 12 examples of study cases have been selected for the simulation with the intention of providing a general view of the main possible combinations which can be obtained by changing the variables: Housing Settlement Model, Aggregational Typology, Number of hosted inhabitants. The scheme so synthesised thus defines the urban planning standards through a process which, starting from an early dimensional hypothesis based on the existing legislation, is able to adjust the initial value with a retroactive effect, through a geometric-spatial simulation. The main table of the planning standards underlines how the parameters related to the housing system are indicated in strict relation to the single Minimal Housing Units, while those related to the system of the public spaces (community system and services system) are reported as unit value referred to each inhabitant. This is due to the fact that the housing system composition is based upon the number of houses and to the fact that the number of inhabitants per module can vary within the same Minimal Housing Unit.

By contrast, the public services system depends on the aggregation of constant geometric elements. At the top of the table, the surface value is reported for the Minimal Housing Unit which is kept constant when changing the Housing Settlement Model, the Aggregational Model and the Number of final users to be hosted. Directly connected with the Minimal Housing Unit are the values defining the Transitional Housing System. These values indicate the percentage/quota of surface per each Housing Unit which are destined to the complementary spaces (neighbourhood unit, green bordering area, parking area, road network). It is possible to notice how these values are changed upon preliminary projecting choices in terms of housing settlement model and aggregative typology. As far as the Community System is concerned, the relevant parameters are expressed as surface value per unit per each inhabitant; this value is variable in relation to Housing Settlement Model, Aggregational Typology, Number of users to be hosted. The Services System parameters are expressed as unit value per each inhabitant and exclusively change on the basis of the dimensional threshold. These parameters are kept constant even if the settlement model and the aggregational typologies change. The Road Network System is determined by parameterisation per each Minimal Housing Unit when referred to the system of public spaces.

Finally, it is necessary to underline that all the data supplied for the parameters indicate the minimum value under which the housing quality satisfaction is not guaranteed. These data must be interpreted as per mere reference, and not as compulsory instructions. On this respect, at the bottom of the table is the variance range (± 5%) for the total surface value associable to the Transitional Housing Settlement as a whole, in function of the real context conditions. As a guide to the projecting, the instructions here proposed are operational only when applied by the designer who is responsible for emergency relief solutions. The non-aggregate and aggregate numeric figures represent a reference theoretical value as they are the results of a projecting simulation which does not refer to a real context. The effectiveness and consistency of these data depend on evaluations inherent to the overall dimension of the post-disaster area and the real conditions deriving from the combination of the factors characterizing the intervention context (area formation, orography, orientation, accessibility, etc.) The observance of the parameters depends on the designer in charge of the intervention, who has to consider the surface availability to be used for this purpose. It is obvious that, under the minimum value indicated, the satisfaction of the project requisites characterizing this typology of transitional settlement can not be guaranteed.

Verification of Applications

In order to test the effectiveness of the proposed solutions, in the final phase of the research, a projecting laboratory has been organised with the involvement of 6

Local Municipal Authorities, located in various parts of the Italian territory: Maiano (Friuli), Parma (Emilia Romagna), Fosdinovo, Vicchio (Tuscany), Sansepolcro (Umbria) (Fig. 4), Panni (Puglia). Each of them has indicated the area for emergency relief in case of a catastrophe, as specified in the existing urban planning. On the basis of the context data (supply, territorial characteristics, etc.), the forecast evaluation criteria have been applied and an optimal settlement solution has been identified. At least from theoretical perspective, all the proposed solutions have demonstrated the reliability of the guidelines both in terms of urban parameters and dimensional standards and in terms of housing settlement models. The need for an urban planning modular and components-controllable instrument has led to the simulation of a calculation method, as an applicative verification of the suggested settlement typologies. The information system, tested in the embryonic stage in a manner limited by the general structure and represented in the form of a procedure sequence, has been designed as a support and guidance instrument for the designer in the formulation of the possible settlement solutions.

The first phase of the suggested procedure only implies the selection of models and the dimensional calculation of some component parts. In the second one, the choices and the quantities identified in the first phase are associated to the relevant urban planning parameters. The last phase is the synthesis of all standards, the adaptation of all the measure units previously diversified, with the objective of obtaining an indication on the quantity of total surface required for the transitional settlement. This verification procedure still needs to improve and represents an early stage of support to the designer who can now rapidly simulate different solutions as well as operating a first selection of the project in view of the area overall dimensions, which must match the available surface.

Figure 4. The application of the guidelines to the Municipality of Sansepolcro (Umbria).

Conclusions and Prospects

The first objective of these guidelines is to enhance the quality of emergency housing settlements by marking the passage from the condition of precariousness normally associated to the concept of temporariness to a condition of "liveability", which tries to meet the ordinary life standards as much as possible even in transitional conditions. The quality of housing is therefore connected with the supply of adequate dimensional standards for the living and service functions, the improvement of the environmental well-being, the organization and diversification of the usage modalities and space allocation, as well as with the psychological support to the users through the culture of the environmental psychology and the importance of the context social and environmental factors. The concept of temporariness in the emergency intervention must be evaluated considering the alternative usage of the areas, the reversibility criteria of the settlements, the necessity of facing sustainable development issues, the technical and operational feasibility of the operations in relation to the current production resources.

The different approach to the issue if compared to the current practice is evident in the insight analysis of the historical-cultural characteristics of a settlement planning, even though under transitional conditions: the reference to the founding city criteria (in Italy), the aggregation of the housing units and the typical construction of the urban fabric, characterized in Italy by a wide range of space allocation/distribution modalities (private, semi-private, public). A second objective of these guidelines is to introduce a new way of overcoming the difficulty of choosing the areas to be used as emergency rescue areas, with the intention of enhancing the relations between the transitional settlement and the local territory/urban centres and of acting beforehand in view of a possible catastrophe. This implies to set up all the procedures required to make the rescue-destined areas immediately exploitable. The research suggests that the selection of the rescue areas in a post-disaster emergency by part of local authorities within the framework of the general territorial and urban planning must not only rely on security criteria as this often implies the identification of marginal areas or areas of low environmental and social value. The selection must also consider the social and psychological factors, as well as the aspects of neighbourhood with the original housing centres, and, above all, the selected area must be exploitable for alternative uses under ordinary conditions or in peacetime; this would justify a huge economic investment required to realize the essential infrastructure.

The advantage of the differentiation of the infrastructure works in permanent and in temporary is multifaceted: it guarantees a constant usage of the area by part of the local population, it allows a high flexibility in the space organization and, then, the reestablishment of ordinary conditions once the emergency situation is over, it prevents the numerous maintenance problems due to the non-usage of the facilities, their abandonment, the operators' negligence, or the detrimental installation of a fencing, which makes the area to be perceived as a dangerous or private area, and, thus, as an inaccessible zone.

The research here set forth is part of a research programme promoted by the National Department of Civil Protection and the Region of Tuscany, which provides as a final result the definition of the entire process of transitional housing settlement. The results acquired in this research phase have positively been received by the National Civil Protection Department, but, above all, by the involved Local Municipal and District Authorities and the Italian Regional Administrations, to which the results have been presented. The operative instrument has been approved during the Conference of the Regions. According to the Civil Protection central body, this instrument shall become a reference model at a legislative level for all the Local City and Town Authorities which have to face the planning of transitional housing settlements in case of emergency. Further investigations have been demanded in order to identify - within a sample of Local Authorities - the reference projecting models for the organization and the realization of the rescue and relief area infrastructures.

These investigations, now under definition with the cooperation of the National Department of Civil Protection and the Region of Tuscany, shall focus on the identification of the projecting models for the planning of the areas destined to the transitional emergency settlements, favouring an alternative usage of these areas under ordinary conditions, with the following objectives:

- the definition of the area functions during peacetime in consideration of the specific urban planning, social, environmental context and of the existing urban constraints
- the verification of the options of economic feasibility in the realization of the post-disaster emergency areas
- the configuration of the primary infrastructure networks (roads, power and water plants, etc.)
- the compatibility with the transitional housing settlement models hypothesised during the research phase 1.

The research outcomes shall constitute an operational guidance instrument useful for the designing of an emergency rescue area. This instrument shall provide for general applicative instructions based on numerous context-related case histories, to be exploited as much as possible. The targeted users of these guidelines are the Local Authorities operators/technicians in charge of the territorial and urban planning. In cooperation with a determined number of these entities, project feasibility verifications shall be carried out.

References

Bandini, Roberta and Francesca Burdisso (1999). *Calamità e assistenza alloggiativi, Definizione delle Linee Guida di Processo per l'Assistenza Alloggiativa e delle Linee Guida di Progettazione del Sistema Insediativi Provvisorio in relazione alla Vulnerabilità Sismica sul territorio nazionale*, Degree paper, Faculty of Architecture, University of Florence.

Bologna, Roberto and Carlo Terpolilli (eds) (2005). *Emergenza del Progetto, Progetto dell'Emergenza. Architetture ConTemporaneità*, Federico Motta, Milan.

Bologna, Roberto (ed.) (2002). *La reversibilità del costruire*, Maggioli, Rimini.

Bologna, Roberto (2001). *Il concetto di transitorietà in una prospettiva sostenibile: Studio di un modello abitativo transitorio e reversibile*, Research report, Department of Architectural and Design Technologies, University of Florence.

Caniggia, Gianfranco and Gian Luigi Maffei (1999). *Lettura dell'edilizia di base*, Marsilio, Venice.

Caniggia, Gianfranco and Gian Luigi Maffei (1996). *Il progetto nell'edilizia di base*, Marsilio, Venice.

Caniggia, Gianfranco and Gian Luigi Maffei (1979). *Composizione architettonica e tipologia edilizia*, Marsilio, Venice.

Chiappi, Carlo and Giorgio Villa (1980). *Tipo, progetto, composizione architettonica*, Alinea, Florence.

Geddes, Patrick (1970). *Città in evoluzione*, Il Saggiatore, Milan.

Klein, Alexander (1975). *Lo studio delle piante e la progettazione degli spazi negli alloggi minimi: scritti e progetti dal 1906 al 1957*, Mazzotta, Milan.

Lynch, Kevin (2001). *L'immagine della città*, Marsilio, Venice.

Perriccioli, Massimo (ed.) (2005). *La temporaneità oltre l'emergenza. Strategie insediative per l'abitare temporaneo,* Kappa, Rome.

A MATTER OF KNOWLEDGE AND RECOGNITION: THE EMERGENCY AS A PROGRAMMATIC PROCESS

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…like a circle in a spiral,
like a wheel within a wheel.
Never ending or beginning,
on an ever spinning wheel…
As the images unwind
like the circles that you find
in the windmills of your mind.
Alan Bergman, from the soundtrack of the film" The case of Thomas Crown"

Preface

Memory is articulated in two separated contributions: the first one, is addressed on the process of different classification in the situations of local crisis; the second one keeps in mind the problem of the specific re-skilling the user implements to employ organisms, handwork and components, outlined apart his own will.

Keywords: knowledge; criticality; reversibility; usage.

Knowledge and Identification

Knowledge and identification are like a spiral, unwinding an endless wrapping – up on themselves, a building of images following one another in the mind like words, like the will to imagine a certitude, by who is involved in a ruinous situation; and, the more the wheel of modification turns round, the more the subject is in search of references and invent them, like objects stopped in the mind, like safe buildings in their urban *firmitas*, with the possibility to evoke and keep certitudes. So, the problem is not just to set technical solutions, consistent with the local conditions of time and space, but even to use in safe way projects, confirming the cultural places' inheritance, their ordinary life, process, their relationship among people and objects, the buildings and the ways of building, materials and tactile sensations. So, the disaster is not a sudden natural event or the unexpected one, the loss of goods and people, but even more the local bewilderment, the no more guaranteed recognition of known things, the inability to evoke and employing usual process of life and converting them.

The disaster is not a mere natural calamity, but also the following one another of unexpected events, depriving us of references' certitudes, stressing where to reflect expectations, or believing mind's images can be "hard phenomena". Neither a phenomenon doesn't arise from the emerging crisis, nor disasters are the topological point of discontinuance between the current running of a process and the uncontrolled turning; it's sufficient to think about the absurd condition of New Orleans on

Post-Disaster Reconstruction : Meeting Stakeholder Interests : Proceedings of a conference held at the Scuola di Sanità Militare, Florence, Italy 17-19 May 2006, edited by David Alexander, Colin Henry Davidson, Andrew Fox, Cassidy Johnson, Gonzalo Lizzaralde, ISBN 978-88-8453-611-2 (online), ISBN 978-88-8453-612-9 (print), © Firenze university press, 2007

Kathryn, while the disaster was, and must be interpreted in the same genesis of settlement and in the systematic negligence of partnership between men's pride and the active capability of Nature. The relationship among man, his settlement and Nature, is a continuous project involving catastrophic events, not the rescue culture, even if spontaneous at human level. The stay and stability are not fixed features of a place; the identification, the concepts clearness and the necessity of transition's stages, of instability of the system, keeps on concerning situation to face. The difficulties to act in a disaster conditions, is just in the extreme softness of understanding the point of gap, and leading it to a new current forms, almost as it was a fixed habit.

Sometimes, I had the opportunity to say that structures don't exist by themselves, but only because they're known: *: the historical presence does non exist on their own but it exists if understood*" (from: Cultures and shapes of the built civilisation, 2005, Rubbettino). Firmitas, is not neither the ability of a material structure to resist intact along the time, nor an architecture of a material disposition, but the ability to offer services complied with the programmed requisite for the planned time. It's a relative quality, and it must be planned, together with the possible interventions, connected to the "out of paradigm" events, or better, classes of parameters and markers' categories, to make sure the arising action and recognising the morphology of the same, for new reshuffling techniques, and making readable the kind of intervention.

Rescue and Criticality

On the whole, we must think about to the exact meaning of this kind of intervention in connection with the possibility to act in fixed times, with the certitude of having an outcome, according to the different categories of answers, the technical behaviours in extreme conditions, and the identification of joint fruition and cultural placing. All this, entails a new method projects, sensing that the "disaster", is not always a natural calamity, and the same in every place(climate, habitat, morphology), and even the intervention cannot be the same. The impact of the event, can't be planned according a storage traditional logic of production, or a catalogue one; it cannot use fixed material or available in a uniform way sources, because they lack demand and total definition. In such cases, the sudden temporal and space, are the memory and the reason of the project, not arosen to joint exigencies, requisites and capabilities. Technical times and nature's ones, as Le Goff says, are not and will never be the same, even because, often, both are not coherent; they are the cause of the event, and their aim is not the spectrum of the suddenly arising questions.

More than emergency, I'd like to talk about criticism. Emergency reminds an unexpected, sudden circumstance, arising by the linearity of the common stage and by the current form of an asset, to overlap with the existing outlook: even a particular concert, a sport event, a particular rebellion are emerging. The criticism, on the contrary, is not a linear, localized and recognisable situation; it requires cures and specificities, belonging to the same intervention; we cannot generalise them, neither in equal conformities, nor in ways, because they are part of different classifications of the event, and of the same place. Try to think about the reversals, due to a tsunami or the before mentioned New Orleans: in this case, we must talk about criticism, thinking about the categories of intervention; they mustn't be categorized as series of products, but joined for morphological local and cultural aims. Here, we remind the ring wrapping up as a spiral, a wheel inside another, an asset within a asset's configuration still existing and altered but not lost. In a methodological way, we must have a second thought about systems and process, whose final shape is not predetermined, or stopped as an hypostasis, alien to physical, material, cultural, local qualities, but able to get close to them.

We also talked about transitive properties of available components, that's the possible move of qualities, within technologic boards, inside and among different categories of technological unities; the problem, is always the same: the receiver is meant to use space and objects, organisms and furniture, forms and techniques: this is the real criticism. Often, the emergency becomes the unacceptable emergency by the receivers' place; this is the case of the new Gibellina, not accepted by its inhabitants, because it was new. The model is over-structuring the pre-existing and consolidated structure; the criticism, in this sense, becomes infrastructural, invasive, technologically and linguistically pervading the precedent organic asset, even if it's not excellent or not emerging.

Temporary and Transitory

In other occasions, some years ago, I talked about the opportunity to insert a category of organisms' and man habitat assessment, that I liked to define "the programmed decay "illustrating a technological prevision of decay -– technological forecasting – and showing before the critical situations , compatible with the cultural outlook of places. All this, is referred to the abused definitions, used every time we talk or lie ahead with a ruinous event: is it an event we can use transitory or temporary actions and phenomena? A temporary event, has got inside the concept of "provisory", of "not fixed"; it's an event, and the relative actions, having a limited last of time, should be assessed for a turning strongly ascendant and speedily falling. With this image, we can undoubtedly describe the impact an earthquake produces, a tsunami determines, a great sport event signs, but not determining what happens after: often, the remaining signs, are not limited in the time, and their incidence reflects in the configuration of territories, both in towns or landscapes, and even more in uses and habits, in the relationships, in the anthropoid mediations.

So, just to equate the ways of re-balance, we must think about a definition of "transitory": the event and its actions are meant to pass; they rule the stage of transition, from the total condition, to the varied conditions one. The transitory event is the image of a dynamic evolution toward a new balances stage: the actions to make, are provoked by the homeostatic skew of the system, but they must tend to form a composed balance. We all know the phenomenon of molecular biology ,"transpostasis", that's the transposition of sketch of DNA from a point to another one of the genoma; the action of the intervention in case of disaster, must be like a transpostasis, because this transfer doesn't involve the loss of gnomic qualities, using operation models, transferring assets without losing specific qualities. This is the demand of people affected by disasters(often unexpected), both natural and civilian (always expected!) . The matter concerning the operations of re-balance- instantaneous or enduring- remains; even such operations , must be laid to incipient reasons and forms of a place and, if so, how they must be laid.

Reversibility of Product and Process

The concept of transitory leads the transforming one: neither involves a value judgment, but both represent the acknowledgement of a stage flouting. No board is vital if it's not subjected to an evolution, a transformation; the same earthquakes are the evidence of the vitality of our planet. The matter is how to expect them and governing stages, and how to lead the broken balances, stopped by the incipient conditions. If we accept with no difference the concepts of suitability and activity ,it's simple to lead all the instantaneous and spread operations to deconstructing thoughts. Once made this rescue operation, in the critical point, it's always possible to restore the incipient assets and morphologies. Unfortunately, we know that it's not so, because of physical reasons (the entropy of a system) and for ethnical -anthropologic reasons; the re-integration of an environmental system, altered by an action of a disaster, in all its extended features, doesn't admit the reintroduction of a new cycle, both formal and productive. The falling-out of this process is harmful, both for the cultural status of places, and for the government of handwork process. We cannot conceive to stock continuous re-usage organic forms ,without regarding phenomena connected to usage, life rules, transports, old age, the answers' iscontinuity, in conditions of context's skew. So, the reversibility must not be the product, not a structural employing process, but the re-usage, in compliance with the local features.

The life cycle, Life Cycle Analysis, is connected to the process of a planned pre-production and the pre-planning for the minimum technological unities, with an open employment spectrum, expressed and built for open frontiers, assisted by a passive plant, available to charge itself of adjoined qualities, aleatory, if compared with the incipient programme, and good with the local background. In this case, the last of the object-organism, whatever the scale is, is finished, while the minimum unities' life cycle has got an appropriate last. It's not possible to imagine a finished product for every latitude, a "not place for not places", but a training law of boards, able to recover, even in extreme situations, qualities making a recognisable context to citizens for a continuous meaningful objects system ,determined by the same users. We don't need an intervention for organisms, but an open virtual folder law, where to access, according the stage and forms, in compliance with the evolutionary usages and habits, as the following part of memory clarifies

Emergency Use Design[1]
Object's Employment in Situations of Rescue: the Objects Illustrates New Usages

The emergency situations, as we outlined before, induce to multiple, sudden changes of context by the user, for imposing of re-environment. The user's memory strongly acts for catching the whole of handworks, to lead the interpretation to the constancy of the personal history. In substance, during the emergency, objects are used in a wrong way, attributing to them requisites and features, not coherent with the object's genesis, but forced by the arising need… So, it' important that the object, whatever its complied size is, is available to gather, and opening themselves to a not ordinate and not planned exigencies, to new outlooks, and new usages. In long times, such opportunities are assessed, even if without great resistance of users and handworks. The phenomenon of the first stage is more complex, above all in the first moments of emergency, when the relationship of subjects with the hard reality is still difficult and when the sense of extraneity between the situations and the configuration of historicized living it's strong. For this reason, it's not just a matter of flexibility of usage, but also of artefacts planning, of systems and components of the provisory assets ,in order to allow and, maybe, force people to find new solutions.

The Importance of Defining the Phase of Usage of the Object

The outlook in condition of disaster, together with the physical collapse of physical structures and infra-structural ,personal and collective, is shown by the strong jar among the object's qualities and the new definition of offered supports: the form of project employment, consolidating the continuous and direct relationship between the object and the user, the form and manifestation of a language determining the acknowledgement and the settlement of the single object-artefact- inside a project, the generation of forms of usage and impacts with the daily life, lack. The main drain, in these sad moments, is even represented by the inability to recognize the space and the tactile picture of daily life, represented at the end, by the synergy of objects, users and forms of employment.

[1]By Ernesto Maria Giuffrè

The Object's Quality

There's a quality developing with a continuous process connected to the different usage of objects, and insists on the modifying process and the consequent evaluation of the spaces, of the different scales where artefacts develop. The definition of the object in the time, involves a different meaning of the same one, because, they define once more their connotative structure just from their usage, and, as consequence, their specific forms and qualitative ways. In substance, they contribute to measure life spaces, measures what the disaster claws back to zero and spread itself, like material and physical values, as cultural virtuosities. The total quality of the artefact, on the other hand, comes from the relationship between the relativistic property, not absolute and constitutionally connected to the variability of interpretation and fruition of the same. Such symbiotic elective condition among objects and men, suddenly collapses, broken up in a vision of confused relationships, denying a still rooted civil continuity.

The Plan of An Artefacts' Usage

After having realized the loss of simple objects of daily life, we must analyse the determination of boards, composing the house structure on its completeness, just to allow a transitory stage, laid from the moment of highest crisis to the phenomenon's formalization; so, it's fundamental the usage plan of artefacts, of the components of a new and provisory reality, must be carried out through the definition of a series of jurisprudences, tracing their endeavour. This means that an object must not only meet the needs in the planning stage, but having insightful properties, not provided by the project, but coming from its complexion, by all the elements supplying what, (comparing with the man), it's possible to call "identity". It can be changeable and distinctive but, even being so, allowing a subjective identification. It's like objects could be persons, setting aside their conditions of mere materials, like they were physically present. For this reason, the first effort, must be recognising the qualities and the ability of an object, (whose aim is not the one of the incipient project), to meet the needs through its own features, not to the added ones. Hence, the necessity to detect and trace the element's constitutive road and discover the not deterministic logic of its usage. In facts, such qualities, once defined, in need to invent a new object for sudden functions or for incoherent requisites, provide the logic plan to draw important functions, together with the logic of demand, against the language sequence relationship. It's a logic of spontaneous addition, able to add virtuosities to a defined form; they all measure up the users and his vital space of reference.

The Definition of An Object's Endeavour

To define an artefact, it's necessary to start from the address rule, an instrument able to trace a guideline, to set the object as an adaptive complex system, able to evolve itself, and able to move in a dynamic way inside environment.

Usage and Recognition: the Unsteady Identity

So, artefacts' own capacity to transform, becomes the basis to recognise them and the necessary condition to state their identity, to formulate different indicators' classes to certificate the object's quality. Such quality, seems to be essential to recover a further condition of alienation coming soon after ruinous events and getting worse the dislike situation of single objects, having no spaces, no places, histories and daily lives. It's necessary to detect and define jurisprudences as reference outlook, imposing guidelines to the designer, to allow him to plan the artefact endeavour, regarding that the usage stage is not over during the performance stage, but along the time, together with all its changeable quality images, and the virtual reversibility of a process of sudden suitability. The quality of a single technological object, should not come from its ability to provide different services in the time, but from its real cyclical interactivity, from artefacts take and give qualitative capabilities, for an interactive changeable attitude.

Only through a leading rule, it's possible to trace a guideline to set the object ,as an "adaptive complex system", able to change its endeavour with the variation of the external inputs, and act modifying what's is existing, its own relationships, and creating new qualities. The systems of components, available in case of disaster, should be planned, not just as open stocked systems, but as wholes of joinable artefacts and opened to have several meanings, according to the different users and places of impact. In this sense, the product is a part of the reality, becoming an active and integral part, an "object-almost subject",able to fix a point, where to start in the future evolutions, and make the man recovering the new place. In this outlook, the possibility to communicate outward and the evolution, is just set on its "net"confirmation, allowing to keep in touch with other "complex systems"of environment, even if deformed.

Unspecificity, Contemporaneity, Continuity and Persistence

The categories of the here defined rule, are like dimensions of the components elements' service of the provisional settlement; the main features must have their reference, their modality in them, so every component ,even the joined one(coming from assets and assemblies), can relate to people. The un-specificity is the object's ability to define its own aim, only inside the usage stage. Consequently, services features, not univocally determined by the not used artefact, represent an "available opening" ,to meet the needs of different services demands. The contemporaneity, is the possibility to use in the same moment, the same artefact for different aims; The continuity is the artefacts' insightful ability to pass in a "fluid" way, without any break during the usage stage, from a functional setting to another one, and changing according the kind of service provided. The persistence is the ability to define artefacts, through a "matching sign" code, producing new meanings, never seen before, and quickly recognising by people.

Conclusion

Even if it is not coherent, we think the first quality we must give to a meaningful system of actions of interventions in case of disaster, whatever they are, is a sort of personality, able to change according to the different conditions of time, place and space, to the different and changeable questions, and the extemporized users; on the whole, a code of conduct, varying outward and, at the same time, conditioning it.

"THE ANTICIPATED PROCESS": PROCESS INNOVATIVE HYPOTHESIS FOR SUSTAINABLE MANAGEMENT OF THE SECOND EMERGENCY

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Abstract

The failures of the past programmes for the second emergency allowed us to characterize, define and value a new process model, that moves 70% of decisional operating activities, or rather the ones referred to spatial and technological request before disaster, using the first ninety days after disaster in order to define the typological and contextual need.

Keywords: process; sustainability: second emergency.

The Hypothesis

My hypothesis is based on the process construction of a system, able to build a rescue artefact, reversible for living aims. Such model, is consistent with the processing of a system and a productive line, meeting the needs of transitoriness and reversibility, characterised by a lot of typological outlets. The declared aim, is a system, planned according to parameters, obtained by the study of sector's experiences, defined on its exigency's invariants by the requisites coming from the transitoriness and reversibility exigencies, and susceptible to create a determined typological demand.

Reasons

The reasons defining the research aim, are different: economic, productive, environmental, and social ones. We noticed that there's an unconscious reticence for the constructive experiences, called "transitory"; certainly, such reticence, has got cultural prerequisites, but also and, above all, economic ones. In fact, the demand absorbing the broader portion of transitory buildings' market, today is represented by the emergency, and involves a lot of "negative" aspects, such as the economic one. The transitory systems, are consistent mainly with the container or prefabricated buildings, running about relatively low costs of the a minimum standard emergency components, to the higher ones of prefabricated abodes, having a higher living level, or corresponding to the permanent residential building .In architecture, one of the problems to solve, in order to engender the spread of transitory systems, is the economic convenience of such interventions, both in the case of living components and for a disaster, for tourism, for fly-wheel ones. Etc The high costs of transitory intervention are caused by different elements; the main ones are: the demand 's fragmentation, the systems' stocking, the production's costs. The parameters regarded in the research are the following ones: the demand 's fragmentation: the research of transitory residential systems is generally connected to particular exigencies, such as emergency, transitory welcome structures in places having environmental bindings, buildings without licence, temporary welcome structures for people

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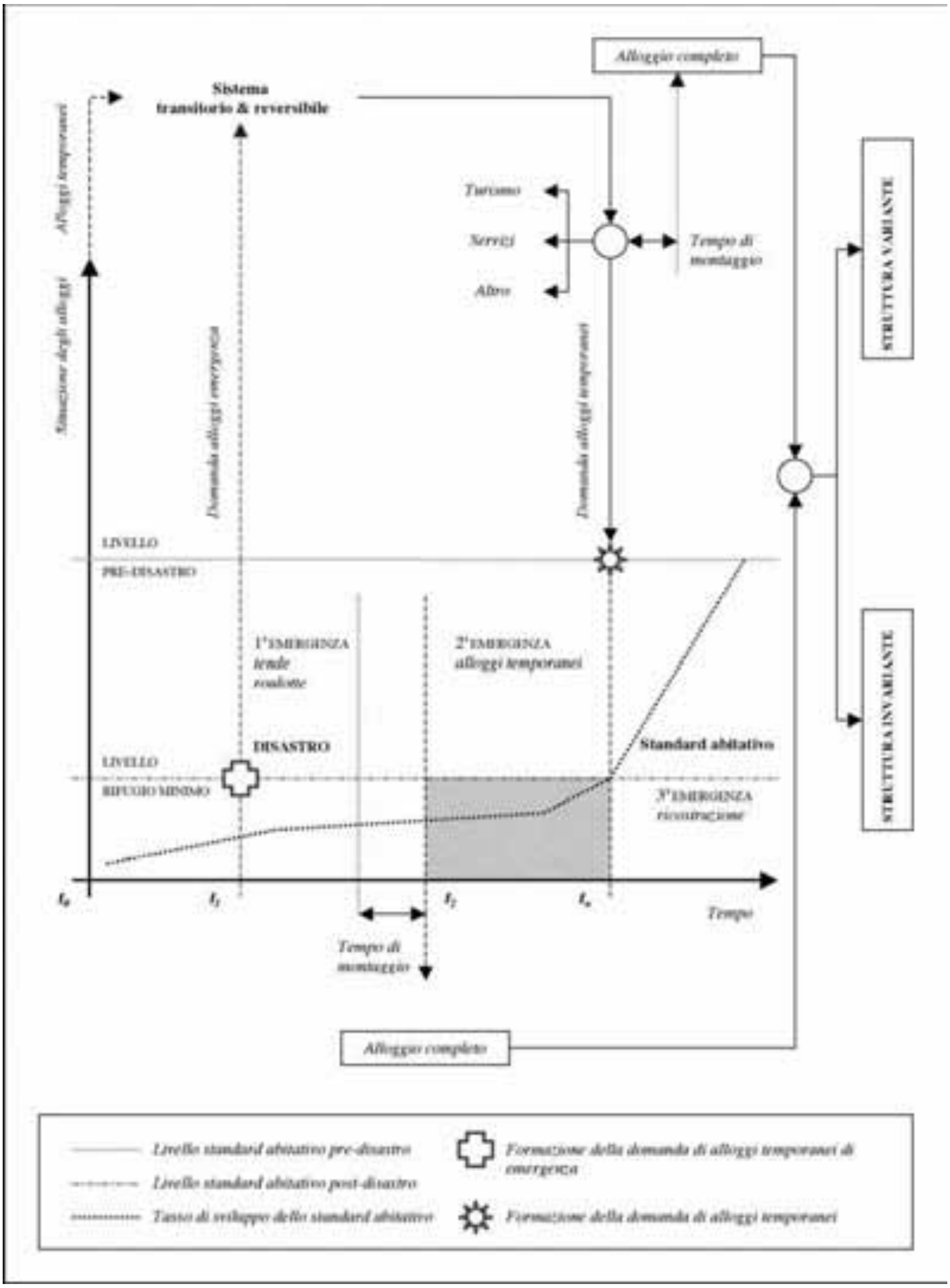
temporary welcome structures for people occupying recovering or maintenance of buildings etc. The fortuity and the peculiarity of every kind of listed demand, don't allow to the different productive structures to have a solid and steady demand in the time(impossibility of economies of scale) .

The Model

The model described, wants to provide an answer to this problem, through a variety of outlets, whose productive process are not of the same quantity, and giving a single product process, according to the fortuity of the demand. *System's stocking*: the temporal fragmentation of the demand, entails the problem of stocking systems and the components in the interval of time before and after the demand, whatever its nature is. The model proposed, wants to restart the line production, and restore the possibility to re-insert the system or its components in further productive cycles. The system, can be used once more on its whole, for the same aim, or for a different one, through the creative stage, expected in this process. *Production's costs*: the offered solutions by market in the buildings' scope, are generally represented in the cases by closed systems, whose productive lines difficultly absorb variation, and, when they do it, spending a lot of money. The proposed system, based on the features characterising the current production, propose an open system; moreover, it's based on the unique line of creatable production. *Enviromental impact*: the building sector shows the higher environmental impact level among the anthropic activities, both in the exercise stage and during all the life cycle, from the recovering of sources to the abandon of the artefact. Altough some of the detectable negative effects are connected to buildings, they can be partly due to the object 's permanence character and the connected constructive techniques. The permanence of an artefact as abode, is an invasive intervention for the environment, as for physical, sensational aspects and sources balance, together with the impact coming from function activities, connected to the productive process, the row materials, the convertion of the same through poisoning procedures, the creation of a yard and the connected manufacturing, till the abandon and waist disposal. *Physical impact*: the "traditional" buildings, are placed with invasive artefacts; in fact, foundation's buildings suppose digging works and land movements, meaningful altering soils' structures (resistance, permeability, etc).

The proposed model, being transitory and reversible, will solve the problem of the land attach for the exigency of soils' new-naturing (areas of emergency settlements, environmental binded tourist areas ,etc). *Sentational impact*: the environmental bindings existing in those areas, characterised by the presence of natural and artistic beauties, in many cases make them extraneous to the tourism, because they lack adequate receptive systems.



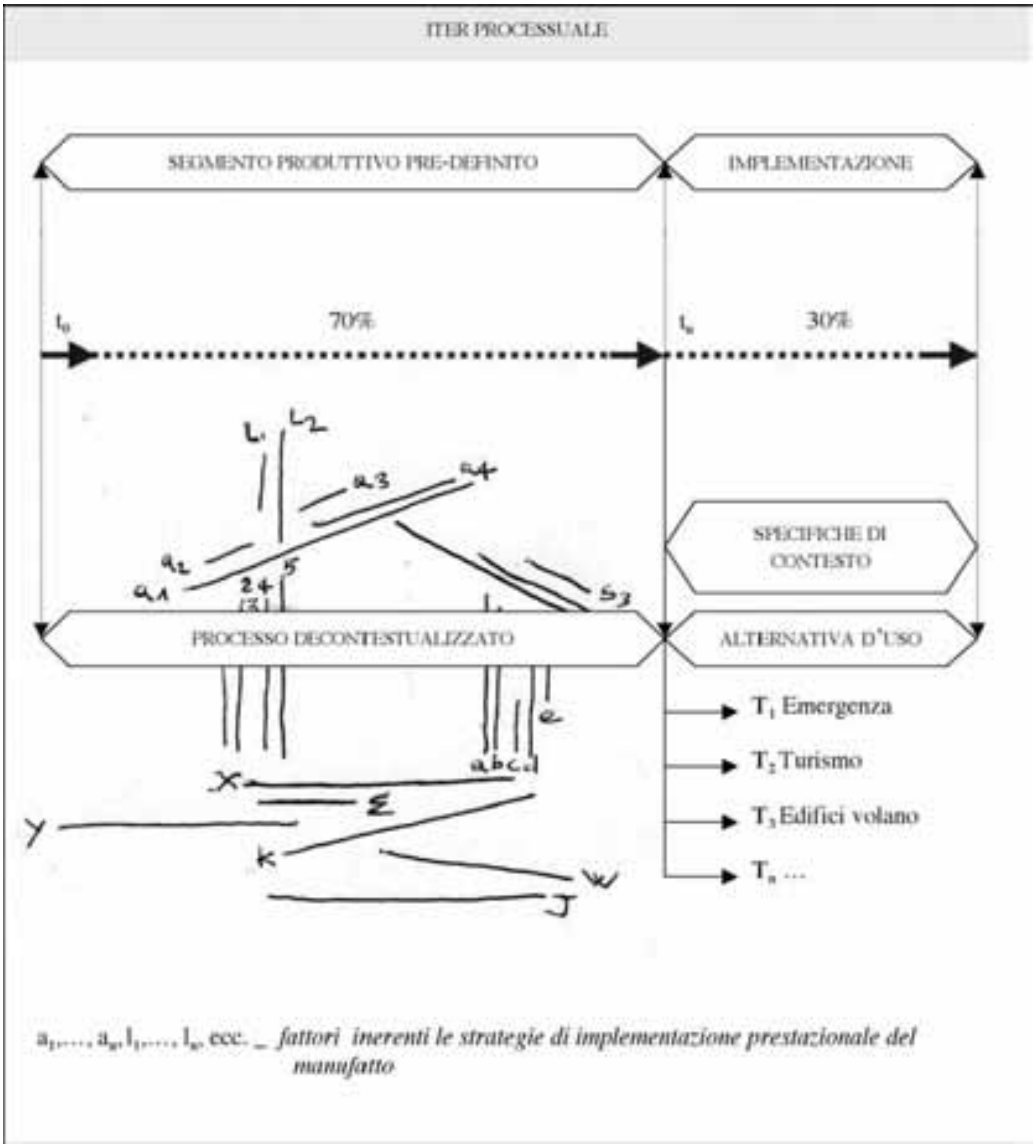
The model proposed can obviate to the problem, realising temporary receptive structures, not altering in a permanent way the places' aspect, and whose image can be inserted in the reference context. *Impact sources*: the field of building is often defined with the word "eater of energy", because it requires a great quantity of energy for its running both for the hygrothermo comfort of the confined spaces, and its transforming of row materials and its execution. The system proposed, gives the possibility to adequate the sources' employment through the possibility of re-use or recycle the parts of the system, thanks to the techniques of dry assemble, that allow the right de-construction of the system and the employment of its compartments. *Social Reversal of the proposal*: the existing dichotomy between the traditional architecture or the "permanence", and the transitory architecture, is often solved in a qualitative judgement, positive and consolidated towards the first one, and extremely negative if addressed to the second one,on the basis of cultural prejudices, mainly caused by users’ dissatisfaction, and, in particular, of a transitory typology, the emergency compartment. The vision leading the artefacts project for the transitory living, has operated more through the “provisory” parameters, than the temporary ones, saving its worse aspects. Thinking to the transitory project, means thinking to the temporariness of the demand, that’s the change determining its running, together with psychological reasons, exacerbated in the case of emergency intervention, connected with the exigency to personalize and catching the object. *Living levels*: the transitory living systems are characterised by a minimum living level, dissatisfactory even in contexts of emergency. The necessity to improve the standard of such system is connected with the possibility to extend the usage destination and fostering their spreading, even outside the traditionally recognised contexts. The system wants to re-build the exigency classes of the residential intervention, according to the transitory parameters, in order to process an artefact, able to provide services compatible with the expected interval of time, and the usage chosen destination. *Flexibility*: with the variation of users, the intervention becomes obsolete, during the stage of exercise. In a closed system, such as the one represented by the completeness of available solutions for the transitory living, such event is solved by the “old age” of the artefact and its dismissing, and the consequent social and economical dislikes. The proposed system wants to face the exigency and service’ problem, not in a static approach, but in a dynamic one, according to the variation of its exigency stage, and through an implementation system of the objects’ services. *Partecipation*: the user ‘s refusal of this particular kind of building, is often caused by the image’s homologation. In fact, the production standards, make user very difficult recognising and catching processes. The system proposed, planned according to the reversibility parameters and opened to the current production, allow to the user to participate effectively to the handmade creation, the project’s choices and the active presence it he execution stage.

Tab.Q.E	**QUADRO ESIGENZIALE**			
	INVARIANTI ESIGENZIALI (Manufatto Transitorio & reversibile)			
Fase di processo	**Classe di requisiti Connotanti**	**Classe di esigenze**	**Fase di Pre-uso**	**Fase d’uso**
Programmazione	Reperibilità delle risorse	Specifica	Attitudine del sistema ad essere realizzato attingendo dalla produzione corrente	
	Trasportabilità	Specifica	Ottimizzazione del rapporto Volume peso	
	Manovrabilità	Specifica	Compatibilità con mezzi di sollevamento e movimentazione ordinari	

Progettazione	Funzionale			Attitudine del sistema a modificare le caratteristiche spaziali e funzionali nel tempo
	Dei sistemi			
	Controllo dell'impatto ambientale		Attitudine del sistema a ridurre l'impatto ambientale attraverso sistemi costruttivi e materiali compatibili	
Esecuzione	Rapidità di installazione	Specifica	Attitudine del sistema a ridurre i tempi di assemblaggio in opera	
	Semplicità tecnologica		Adozione di tecniche e componenti a bassa complessità	
	Assemblabilità		Riduzione del numero di giunti	
Gestione	Manutenibilità	Gestione		Attitudine del sistema a ricevere agevolmente le operazioni di manutenzione programmate
	Durabilità Programmata			Attitudine del istema e delle sue parti a mantenere un comportamento prestazionale soddisfacente lungo il periodo di esercizio stabilito.
	Stoccabilità	specifica	Attitudine del sistema e delle sue parti ad un razionale deposito.	
Dismissione	Decostruibilità	Specifica		Attitudine del sistema ad essere smontato nei suoi elementi costituenti senza compromettere il livello prestazionale delle stesse
	Riciclo/riuso	Specifica		Attitudine del sistema ad essere riutilizzato o all re-immissione delle sue parti in un nuovo ciclo produttivo.

QUADRO ESIGENZIALE(Manufatto Transitorio & reversibile)			
Classe di esigenze	**Classe di Requisiti**	**Requisiti**	**Specifica**
Sistema aperto	Reperibilità delle risorse	Coordinamento dimensionale	Attitudine del sistema ad essere realizzato attingendo dalla produzione corrente
		Stabilità dimensionale	
Mobilità	Trasportabilità	Adattabilità ai mezzi di trasporto	Ottimizzazione del rapporto Volume/peso
			Regolarità dimensionale e morfologica dei componenti
	Manovrabilità	Adattabilità ai mezzi di movimentazione	Leggerezza
			Resistenza agli urti
Compatibilità ambientale	Controllo dell'impatto ambientale	Sostenibilità delle risorse	Attitudine del sistema a ridurre l'impatto ambientale attraverso sistemi costruttivi e materiali compatibili
		Riduzione dell'impatto delle opere di installazione	Attitudine del sistema di attacco a terra di adattarsi alle specifiche fisiche del contesto
Esecutività /posa in opera	Rapidità di installazione		Attitudine del sistema a ridurre i tempi di assemblaggio in opera
	Semplicità tecnologica		Adozione di tecniche e componenti a bassa complessità
	Assemblabilità		Riduzione del numero di giunti
Gestione	Manutenibilità	Riparabilità	Attitudine del sistema a ricevere agevolmente le operazioni di manutenzione
		Sostituibilità	
	Durabilità Programmata		Attitudine del sistema e delle sue parti a mantenere un comportamento prestazionale soddisfacente lungo il periodo.
	Stoccabilità	Scomponibilità del sistema	Attitudine del sistema e delle sue parti ad un razionale deposito.
		Impilabilità	
Reversibilità	Decostruibilità	Tecniche di giunzione non distruttive	Attitudine del sistema ad essere smontato nei suoi elementi costituenti senza compromettere il livello prestazionale delle stesse
	Riciclo/riuso	Integrità morfologica e dimensionale	Attitudine del sistema ad essere riutilizzato o all re-immissione delle sue parti in un nuovo ciclo produttivo
Sicurezza	Stabilità	Resistenza ai carichi	Attitudine del sistema a resistere ai carichi da neve e alle sollecitazioni come quelle esercitate dai venti
		Resistenza alle sollecitazioni	
	Protezione dal fuoco	Resistenza al fuoco	Resistenza al fuoco ed assenza di gas nocivi da combustione
		Assenza di emissioni di gas nocivi	

Sicurezza	Protezione d'utenza	Regolarità morfologica dei componenti	Utilizzo di componenti e materiali innocui per l'utenza dal punto di vista della tossicità e della morfologia
		Impiego di materiali non atossici	
Benessere	Termoigrometrico	Isolamento termico	Attitudine del sistema a garantire condizioni di temperatura e umidità degli spazi confinati, compatibile con la destinazione d'uso
		Ventilazione	
		Controllo della radiazione solare	
	Acustico	Isolamento acustico	Attitudine del sistema a ridurre la produzione di rumori all'interno degli spazi e ad ostacolare la propagazione di rumori provenienti dall'esterno.
	Visivo attenzionale	Controllo del livello di illuminazione naturale	Controllo dei livelli di illuminazione e di introspezione tra ambiente interno ed esterno.
		Controllo del livello di illuminazione artificiale	
		Controllo del livello di introspezione	
Fruibilità	Funzionale	accessibilità	Compatibilità dimensionale e costitutiva rispetto alle funzioni ospitate
		Dimensionamento degli spazzi	
		Dotazione di attrezzature	
		Arredabilità	
	Dei sistemi	Affidabilità	Affidabilità dei sistemi meccanici e impiantistici
		Comodità d'uso	



The Process

The concepts of transitory and reversibility, related in this paper, allow to detect some analytic categories, which are the real exigency classes; sometimes, we must add or overlap the ones detected by the UNI rule, in order to define the reference plan for an artefact's transitory and reversible project. The word "transitory", is referred to the "temporary" one, more often employed in the paper of this sector, because it involves the complex variety of usage destinations. The concept of reversibility, is a logic and methodological support to the global conception of the intervention. The consideration of such factors, is the detection of some indicators, both in the process and in the project and it is full of transitory attributes and reversibility:

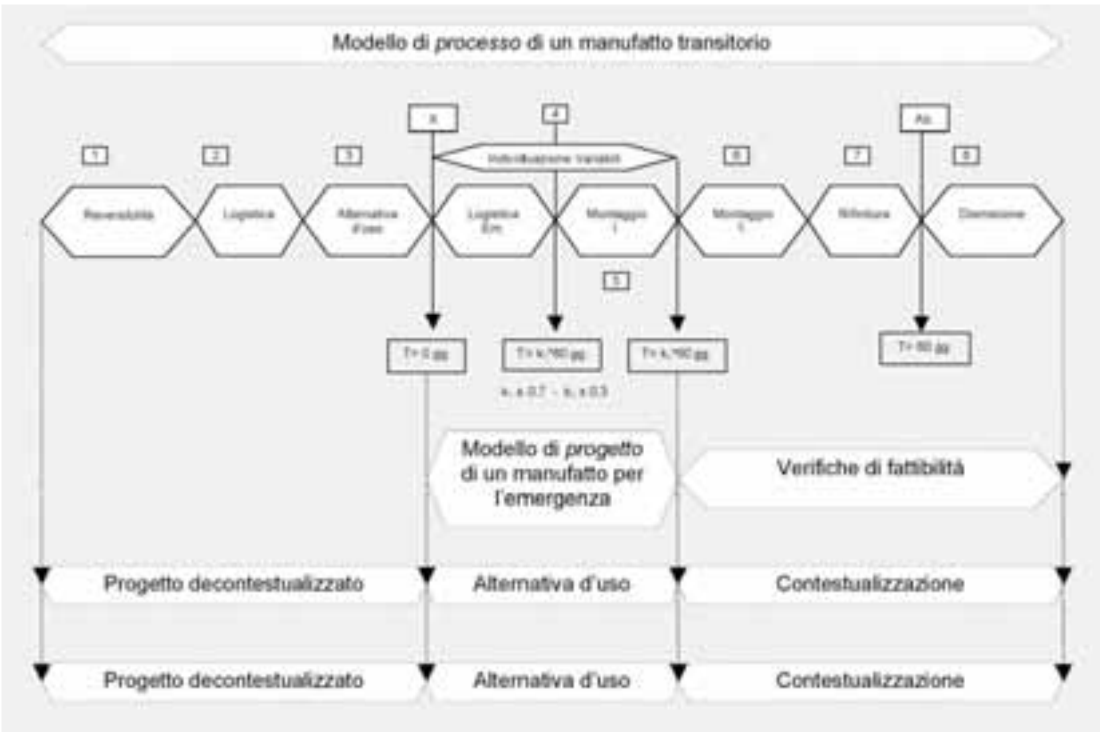
Economical aspects, dry assemble, standardisation, transport, supporting. The first result of this mediated approach, Is the necessity to define the different exigency classes, according to different parameters for the temporal placing of the activities in the project. In fact, the realisation project of an artefact introduces new innovations of complex comprehension, Inside the same project, imposing the regarding of constitutive stages (planning, projecting, execution, management, dismissing), sensing the aspects of transitory and signing-up.

The New Exigency Outlook

The quantity and the quality of effects produced in the contexts and in the process' articulation, in the scope of the transitory project, are the basis of the mutual articulation of the exigency outlook, in the field of another research, providing an exigency classes' definition, different according to the operations' temporal placing, distinguishing the pre-usage stage from the usage one. The requisites, taken off the analysis of the study-cases and realised in the chapter before, provide a quite clear outlook of requisites connoting the examined kind, and their placing in the stages of the process and the exigency classes in the rule.

Temporariness Defined Through the Emergency.

The exigency outlook of reference, provide the exigency's invariants, typical of the intervention, because it meets the needs of the super-transitory categories analyzed and the reversible ones. Such invariants, represent the requisites of the object of study, beyond the traditional kinds. The detection of such aspects, is not sufficient to build a reference outlook of the problem, above all for the correspondence between the product and the process' aim. The declared aim, is setting a balanced process on a production line, whose partial result is a product defined for the 70%, by the reversibility and the transitory part and for the final one, the remaining percentage, despite the alternative of usage and the context. An approach of this kind requires the consideration of binding's conditions, typical of the usage's alternatives. But, while the peculiarities of kinds, such as tourist structures or fly-wheel buildings, till the yard's structures are easily leading to the categories (exigency invariants), the kind of the emergency is characterised by more restrictive bindings, connected to peculiarities of the demand, to the users and the process. So, it's logic and correct for this paper to have a compatible reference outlook, and to keep in mind the analysis of this particular kind. The declared aim, is a system, planned according to parameters obtained by studying the experiences of this sector, defined by the requisites coming from the exigencies of transition and reversibility, and susceptible to the arising of a determined topologic demand. The process segment, derived by the exigency's invariants, is even a first product level, not in the context of a typological point of view, while the following one is the implementation of the system's services aspects, through the functional and technological integration, made on the specific basis of the demand.



References

Bologna R.(a cura di), (2002) La reversibilità del costruire, L'abitazione provvisoria in una prospettiva sostenibile, Maggioli editore, Rimini.
Grasso M.R. (2006) La reversibilità come strumento per la gestione delle risorse nel progetto di architetture transitorie. (tutor: Trombetta C.) DASTEC, Reggio Calabria.

GEO ENVIRONMENTAL INDICATORS IN POST-DISASTER RECONSTRUCTION PROGRAMMES

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Abstract

In order to make sustainable projects of reconstruction in disaster-stricken areas and address the local economy, the environmental and social demands, with the needs and the priorities of the interested communities, it is essential to use the criteria of modern planning. This requires the use of essential parameters to assess the compatibility of territorial transformation activities. The arrangement of these parameters requires shorter or longer times depending on how the basic cognitive framework is developed. A preliminary assessment is required in order to guide, limit and control the intervention decisions. The preliminary assessment needs to be put in relation with the geo-environmental impacts and risks and is based on a screening of all the available information on resource vulnerability and the geo-environmental risks. The screening can be carried out by means of *geo-environmental indicators*, which represent tools giving synthetic information about complex topics. Suggested indicators are those used in the DPSIR framework, used, in Europe, for environmental reports accomplishment. With reference to natural phenomena, the DPSIR framework *must* be supported by the *DHVRR framework*. The first is used to verify environmental compatibility, the last to verify the safety of the interested areas.

Keywords: *sustainable projects of reconstruction, modern planning, geological hazard and vulnerability, geo-environmental impacts and risks, geoenvironmental indicators*.

Rationale and Aims of our Proposal

The objective of this chapter is to describe a means of maintaining the resiliency of environmental systems and improving safety conditions in post-disaster reconstruction programmes.

Natural phenomena are frequently the cause of catastrophes that afflict human populations. Natural disasters bring destruction, death, pain and heavy damages to the economy and the environment, causing lasting affects on the development of many countries. The cultural and scientific pursuit of sustainable development is the basis of any policy which aims to prevent and defend from natural and environmental risks.

The revolutionary concept of sustainable development imposes particular attention towards the natural resources. These are essential to the life of human being (see for example the importance of water, soil, energy and animal kind) but, at the same time, they are limited and hardly renewable. However, such natural disasters as earthquakes, tsunami, tornado, landslides, floods, volcanic eruptions, etc. impose improvement of defence capacity, since it is not possible, as to now, to prevent or stop them. Defence capability is strongly related to both research achievements and enforcement of civil protection measures and services. Many important proposals follow this direction and among these, we want here to focus on the Program IDNDR (International Decade for Natural Disaster Reduction), which was conducted by the United Nations and aimed at inviting the international community to cooperate for the reduction of natural disasters.

The aims of the Program were:

- ound evaluation of the risks related to natural phenomena and its insertion in the development plans;

Post-Disaster Reconstruction : Meeting Stakeholder Interests : Proceedings of a conference held at the Scuola di Sanità Militare, Florence, Italy 17-19 May 2006, edited by David Alexander, Colin Henry Davidson, Andrew Fox, Cassidy Johnson, Gonzalo Lizzaralde, ISBN 978-88-8453-611-2 (online), ISBN 978-88-8453-612-9 (print), © Firenze university press, 2007

- national and/or local mitigation plans, including long term precautionary measures and population awareness;
- quick access to global, national, regional or local warning systems.

Risk analysis, which requires a great technical and scientific effort, must be developed taking into account not only the existing situations, but also the possible growth of a given territory. d) In the scientific community, it is generally acknowledged, that the modern planning is the right tool to pursue sustainable development and for assessing proper natural risks mitigation and prevention. Modern planning should provide:

- detailed information on natural and cultural resources, as well as territorial hazards and risks related to natural phenomena;
- precise choices on the use and territorial transformation that can increase the safeguard of the natural and environmental value, and to the improvement of the environment and the landscape;
- meaningful contributions not only for risks prevention, avoiding urbanisation of dangerous areas, but also for mitigation, programming protective measures for those areas where risks already exist.

In post disaster sustainable reconstruction programmes, addressed to reconcile economic, environmental and social demands with the needs and the priorities of the interested communities, it is essential to use modern planning criteria and procedures. This requires the use of specific indicator of hazard and risk, that can already be available or not, depending on the state of advancement of basic cognitive framework. The times of definition of the cognitive frameworks can affect the time required for reinstatement and reconstruction. Besides, the evaluation of the time required can influence the choices made for the solution of some resiliency problems of the damaged area and, more important, the problem of temporary recovery of population (the use of light-weight prefabricated houses is conceivable when resiliency and reconstruction times are supposed to be quite long).

A screening of the available information, on the resources vulnerability and the geo-environmental risks, can be very useful for the preliminary assessment finalized to guide, limit and control the intervention decisions, in relation to the geo-environmental impacts and risks.

The screening can be carried out by means of geo-environmental indicators which are regarded as tools giving synthetic information about complex topics. By definition an indicator is a parameter, or a value derived from parameters, which points to, provides information about and describes the state of a phenomenon/environment/area, with a significance extending beyond that directly associated with a parameter value.

Suggested indicators are those of the DPSIR framework, used, in Europe, for the accomplishment of environmental reports. They need to be customized to the specific needs, especially with regards to hazards and risks, and simplified, in order to be used in the delicate step that come before reconstruction.

Frameworks and Indicators to Refer to DPSIR and DHVRR

The methodologies of analysis for the state of environment evaluation of a given area, make use of several environmental indicators. The OECD (Organisation for Economic Co – operation and Development) uses three basic criteria to describe "ideal" indicators: policy relevance and utility for users, analytical soundness, measurability. General criteria for selecting indicators can be simplified as below:

- relevance for sustainability and environmental policy activation
- relation with public, international and domestic activities

- scientific soundness
- applicability

In order to develop State of the Environment Reports, indicator sets were used in such a way fixing existing relationships between human activity and environmental changes was feasible.

The PSR (Pressure, State, Response) model has initially been developed by the OECD to structure its work on environmental policies and reporting. It considers that: human activities exert pressures on the environment and affect its quality and the quantity of natural resources ("state"); society responds to these changes through environmental, general economic and sectorial policies and through changes in awareness and behaviour ("societal response").

The PSR model highlights these *cause-effect relationships*, and helps decision makers and the public see environmental, economic, and other issues as interconnected. It therefore provides a means of selecting and organising indicators (or state of the environment reports) in a way useful for decision-makers and the public, and of ensuring that nothing important has been overlooked. Depending on the purpose to use the PSR model, it can be easily adjusted to account for greater details or for specific features. One example of adjusted versions is the Driving force-Pressure-State-Impact-Response (DPSIR) model used by the European Environmental Agency (EEA).

Driving forces are the social, demographic and economic developments in societies and the corresponding changes in life styles and overall levels of consumption and production patterns. The major driving forces are population growth and changes in needs and activities of individuals. The driving forces provoke changes in overall levels of production and consumption and thereby exert pressure on the environment. Indicators, provide a representative picture of pressures on the environment.

Indicators of environmental pressures give information on the pressures exerted on the environment. They are closely related to production and consumption patterns; they often reflect emission or resource use intensities, along with related trends and changes over a given period.

Indicators of environmental conditions (state) are designed to give an overview of the quality of the environment and the quality and quantity of natural resource that can be affected by pressures.

*Indicators of impact***.** The Impact component presents data on the impact of the change of the state of the environment on the foregoing factors.

*Indicators of response***.** Societal responses show the extent to which society responds to environmental concerns. They refer to individual and collective actions and reactions, intended to:

- mitigate, adapt to or prevent human-induced negative effects on the environment
- halt or reverse environmental damage already inflicted
- preserve and conserve nature and natural resources.

The indicators of the DPSIR framework answer to a logical process that starts from the description of human activities and needs (Driving forces) that exert pressures on the environment (Pressure indicators), which can change the state (State indicators) of natural and environment systems, which then impact (Impact indicators) on human health and eco-systems, causing society to respond (Response indicators) with various policy measures concerning any component of DPSIR model.

With reference to natural phenomena, the DPSIR framework **must** be supported by the *DHVRR framework* (Fig. 1). The first is used to verify environmental compatibility, the last to verify the safety of the interested areas. In this case, sets of indicators must be used such that risk and vulnerability scenarios for populated or to be populated areas are set and related to the dangerousness of natural phenomena.

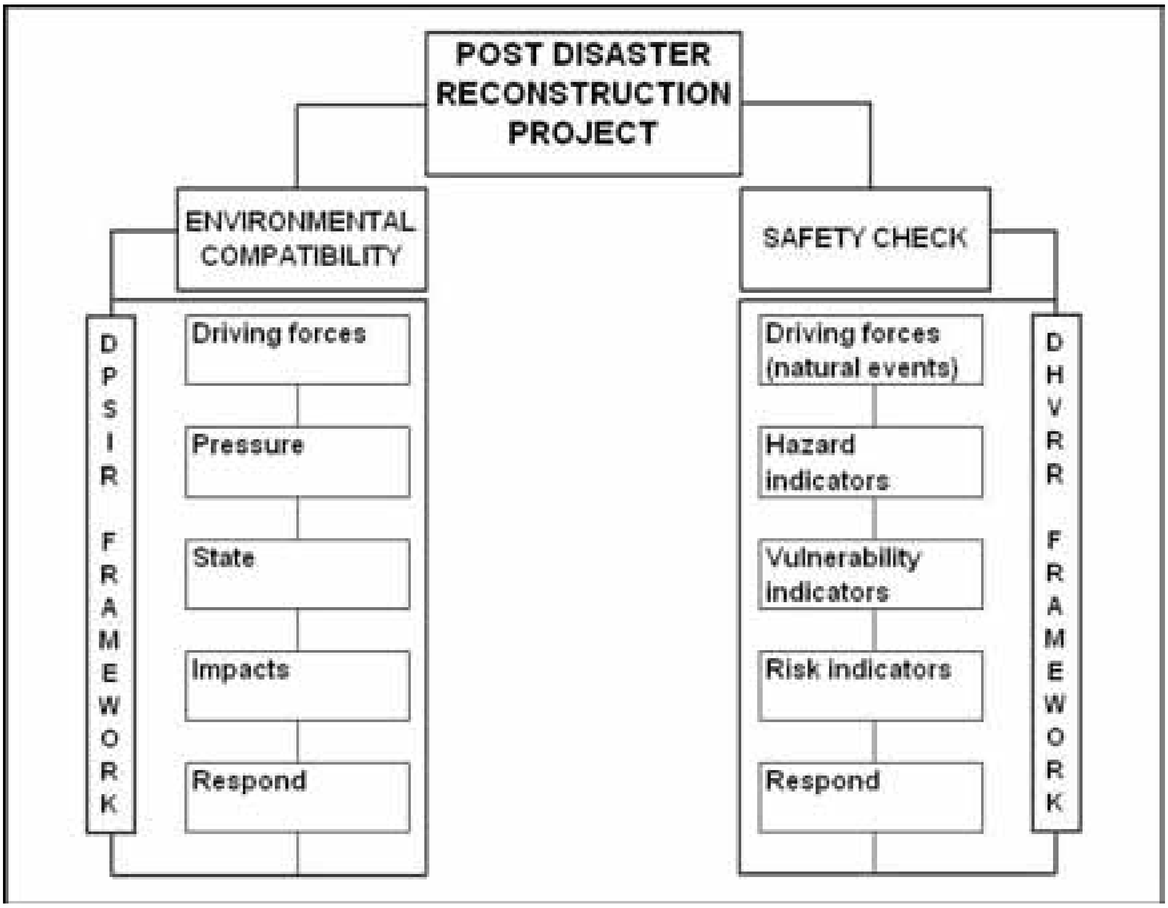

Figure 1. DPSIR and DHVRR flowchart.

Descriptive indicators of the DHVRR framework are: *driving forces*, which refer to natural phenomena related to climatic condition or to endogen or exogenous geological processes that may result in change in the state of the territory.

Indicators of hazard which describe the probability that a certain phenomenon happens in a certain area, in a given lapse of time, with a certain intensity. Indicators have to take into consideration regional dangerousness as well as local dangerousness conditions which can increase the phenomenon.

Indicators of vulnerability of landscape: which are meant as a complex set of population, buildings, economic activities and social organization, like it was configured in reconstruction programs.

Indicators of risks which provide a quantitative assessment of the risk.

Indicators of response, which indicate measures and actions direct to reduce the risk levels. The logical path starts from the individuation of that phenomena that can happen in a certain area (driving forces), than can exert higher or lower negative pressures (indicators of hazard) by striking populated areas, that cause risk conditions (indicators of risk or impact), with the probability of negative effects (damages and victims). The weight of these is linked not only to the level of danger but also to the vulnerability and exposure conditions of the elements at risk (indicators of state or indicators of vulnerability and exposure), and with the need then of responses intended to avoid or mitigate the risk .

Screening for Reconstruction Areas

The sustainable projects of reconstruction of disaster-stricken areas, are addressed to reconcile the economy, the environmental and social demands of the damaged areas, with the needs and the priorities of the interested communities, to whom we need to guarantee security conditions and quality of life.

To this end, the demand to operate with promptness, can not set aside the demand to seek human activities interactions, which will develop after the reinstatement of the population and the territory. This, with the prospect to isolate the principal factors of human activities pressures on the environment or vice versa (environment pressures on human activities), with the purpose to make conscious choices and to find measures and solutions that make the reconstruction operations a sustainable process.

Impacts

It is recommended that the international scientific community draft a check list of specific driving forces related to a permanent settlement of a human community (that exerts pressures on the essential environmental components), and then highlight those pressures which are more difficult to address during the post disaster phase, and those for which a response is easier during the preliminary phase of planning assessment.

The environment analysis of reconstruction areas, made using the available cognitive frameworks, should provide the essential "state indicators" with reference to the principal components of the environment.

With relation to the extent of pressures and to the components of the environment vulnerability, typology and importance of the impacts (impact indicators) will be defined; moreover it is important to point out the mitigation and control requirements to response to (response indicators) during the phase of formulation of the reconstruction process, by means of either appropriate plans or protective measures.

Risks

It is recommended that the international scientific community draft a check list of natural phenomena related to climatic condition or to endogen or exogenous geological processes that may cause problems to human settlements. With reference to these check list it is possible to determine which processes and phenomena are likely to happen in a certain area. Using the available cognitive frameworks, provided by the international or national scientific community, it is possible to evaluate the hazard of the phenomenon and the local condition that can increase the hazard levels. This to evaluate the economic and technical measures that can be taken to give an acceptable answer to the needs of security. Where the level of risk is still too high it is necessary to find alternative solutions.

In practical applications the process can be developed step by step. In the first step the definition of different hazard, risks and damage classes (or set of indicator), can already be a very good result. We have here to remember indeed, that many countries, especially underdeveloped countries, lack any cognitive framework.

Conclusion

Maintenance of resiliency of environmental system and improvement of safety condition, are the basic conditions of any project of post disaster reconstruction. But it is also very important taking into account economic and social demands of interested communities in order to give them the chance to pursuit development after the reconstruction. Modern planning, oriented to pursue the aim of sustainable development, is the right tool to maintain the resiliency, to make conscious choices and to find measures and solution that make the reconstruction operations a sustainable process.

The DPSIR framework, used by national and international scientific communities to determine existing relationships between human activity and environmental changes, provides a means of selecting and organising indicators (or state of the environment reports) in a way useful for decision-makers and the public. The final goal of the DPSIR framework is to assess the environmental compatibility of human activities.

On the other hand, in post disaster reconstruction programmes, it is also very important to take into consideration the need of safety of the population, with particular regard to natural events. The aim of the paper was, then, to introduce a framework that take into account this particular need. With reference to natural phenomena, the DPSIR framework must be supported by the DHVRR framework. The first is used to verify environmental compatibility, the last to verify the safety of the interested areas. The DHVRR framework can successfully be used to this end. This requires the use of specific indicator of hazard and risk, that can already be available or not, depending on the state of advancement of basic cognitive framework.

It is in fact well known that countries differ widely in developing and organizing environment and hazard statistics, so that data availability can be very limited, especially in underdeveloped countries or in countries that are just embarking on the development of environment statistic.

The paper suggests that, in the preliminary phase of any post disaster reconstruction program, the local/national/international scientific community draft a check list of indicator of driving forces (natural events), hazards and risks existing in that particular area. This check list make it possible the evaluation of the time required for reinstatement and reconstruction. This can influence the choices made for the solution of some resiliency problems of the damaged area and, more important, the problem of temporary recovery of population.

References

AA.VV., (1987). "Planning and engineering geology". *Special Publication* N°4. Geological Society, London.

AA.VV., (1990). "Pericolosità geologica, vulnerabilità del territorio e rischio ambientale". *Memorie della Società Geologica Italiana* Vol. XLV.

Bressan G., G. Poli, M. Soni and M. Stucchi (1986). "Preliminary, low cost, urban planning oriented investigation in seismic areas: a methodology and some applications". *Enginering geology problem in seismic areas. International Association of Engineering Geologists* 4 (April), Bari.

Brunetta G. and A. Spaziante(2000). "Valutazione ambientale di Piani e Programmi". *Urbanistica Informazione* 171 (May-June).

Brunetta G. and A. Spaziante A. (2000). "Dalla VIA sui progetti alla valutazione ambientale di piani e programmi". *Urbanistica Informazione* 171 (May-June).

Campo G. (1998). "Rischio sismico urbano e territoriale" *Urbanistica Informazione* 158 (March-April).

Cremonini I. (1998). "Emilia Romagna: un approccio urbanistico alla riduzione del rischio sismico". *Urbanistica Informazione* 158 (March-April).

Gisotti G. and S. Bruschi (1990). "Valutare l'ambiente". *NIS*, Rome.

Lentini F. (1995). "Considerazioni sul ruolo dell'analisi geologica di base nella pianificazione territoriale in aree urbanizzate". *Proceedings of the GNGA Conference "La città fragile"*. Giardini Naxsos (June).

Moraci F. and A. Ziparo (1992). *Le analisi per il piano ambientale*. Gangemi Editore.

OECD (2003). "Environmental indicators: development, measurement and use." Reference paper, Organization for Economic Co–operation and Development, Paris.

Ortolani F. (1984). "Elementi per la microzonazione sismica delle zone colpite dal sisma del 23/XI/80". *Ricerche e studi Formez 37*.

Pizzonia A. and V. Pizzonia (2006). "La geologia nella pianificazione urbanistica e territoriale". Falzea Editore, Reggio Calabria.

Reena S. (2000). "International Frameworks of Environmental Statistics and Indicators". *Inception Workshop on the Institutional Strengthening and Collection of Environment Statistics.* Samarkand, Uzbekistan, 25-28 April 2000.

Regione Calabria (2005) "Linee Guida per l'applicazione della L.R. 19/2002". *G.U.R.C.* 11 January 2005.

Rubellini P. and F. Capanni (1998). "Pianificazione nelle aree a rischio ambientale". *Urbanistica Informazione* 158 (March-April).

Santoianni F. n.d. " Gestione del territorio e calamità naturali: il caso italiano" (www.disastermanagement.it/).

Schmidt P. and D. Friedeberg (1987). *Gli indicatori ambientali*. Franco Angeli, Milan.

Segnalini O. and C. Mercuri (1998). "Ricostruzione post sismica e recupero urbano". *Urbanistica Informazione* 158 (March-April).

Smith, K. (2001). *Envirommental Hazards: Assessing Risk and Reducing Disaster*. (3rd edn). Routledge, London.

Società Geologica Italiana. (1976) "La geologia nella pianificazione urbana e territoriale". *Memorie della Società Geologica Italiana* 14, Roma.

Various authors (1984). "Geologia e protezione civile". *Atti del V° Congresso Nazionale dei Geologi*. Palermo.

RECONSTRUCTION PROCUREMENT SYSTEMS: THE 2005 MATATA FLOOD RECONSTRUCTION EXPERIENCE

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Abstract

One of the key issues to consider in post-disaster reconstruction is the development of a fast and efficient contractual system for rebuilding. The types of contractual systems available post-disaster will vary according to differing factors; such as industry familiarity, previous use of system, and the existence of standardised contractual methods. This paper examines the 2005 Matata floods and the reconstruction and recovery processes following this natural disaster. This event caused major damage to infrastructure, and as a result required reconstruction strategies to be implemented. The study determines the current reconstruction system being used, with particular focus on its contractual arrangements and procurement plans. Detailed analysis of the advantage and disadvantages of the systems used in this case will be made. The paper concludes with recommendations for future development of post-disaster reconstruction contractual systems.

Keywords: reconstruction; procurement systems; floods; New Zealand.

Introduction

Various well-established and widely-applied contractual relationships to procure construction projects are available in New Zealand industry. For reconstruction after a natural disaster, such as in the aftermath of a flood and an earthquake, it is likely that without a comprehensive reconstruction procurement framework specifically designed for this purpose, rapid reconstruction will be significantly hampered. Among various natural disasters that New Zealand is vulnerable to, flood is the disaster with the highest occurrence rate. This paper will first review the procurement systems and some specific government guidelines and regulations about contractual arrangements that are currently being used in New Zealand. A recent flood case, the 2005 Matata floods, will then be analysed with respect to the use of New Zealand procurement systems. Some recommendations will be made for future development of post-disaster reconstruction contractual systems.

Procurement Systems Used in New Zealand Construction

New Zealand procurement systems have been well established and developed following the examples from generally recognised western models, such as traditional, design and build and project management. Like many other countries, a variety of contractual relationships to procure construction projects are widely applied within

Post-Disaster Reconstruction : Meeting Stakeholder Interests : Proceedings of a conference held at the Scuola di Sanità Militare, Florence, Italy 17-19 May 2006, edited by David Alexander, Colin Henry Davidson, Andrew Fox, Cassidy Johnson, Gonzalo Lizzaralde, ISBN 978-88-8453-611-2 (online), ISBN 978-88-8453-612-9 (print), © Firenze university press, 2007

New Zealand construction industry. As defined in Best Practice Procurement (NZCIC,2004), a discussion document recently issued by New Zealand Construction Industry Council, procurement is the phrase given to the process by which clients and users achieve their construction aims but is more than just construction procurement, covering the process from initial concept planning and design, to development, construction, maintenance and ongoing monitoring of performance (NZCIC,2004). Procurement is critical as it determines the overall framework for construction, embracing the structure of responsibilities, risks, and authorities for construction practitioners. The structure of responsibilities, risks, and authorities for construction practitioners are especially important for smooth delivery of post-disaster reconstruction because, if due consideration is given to them, they assist with rapid recovery of damaged communities. A wide range of procurement systems exist in the construction industry ranging from single stage traditional method at one end of the spectrum to Design and Build, together with new forms of contractual systems which are continually being devised to match client and community requirements, such as partnering and alliancing.

Procurement systems can be represented by Broome's model of procurement continuum, according to different contractual relationships among involved parties, especially between the Principal and the Contractor (Table 1).

According to Broome's model, contractual systems can be generally divided into transactional contracts and relationship contracts. "A purely transactional contract is one where the client specifies all the requirements of a project, this will define not only the practicalities of the project such as what is required but also the individual requirements of each project participant will be outlined" (Henderson 2004). This form of contract is commonly termed as "Traditional" or "Multi-point" contract, using, in New Zealand the common standard contract conditions of NZS3910:2003. Compared to this, at the other end of the procurement spectrum are relationship-focused contracts, such as "Project Alliance" and "Joint Ventures" with an emphasis on the way the contributing parties working together to procure the project, and not the contract form (Broome 2002).

Incentives -->						
Traditional contracting	Informal partnering	First generation	Target cost contracts	Project alliance	Strategic alliances	
• selection by lowest price • confront-ational • claims oriented	• little structure • little process	• selection on value and price • work-shop with some cultural change • disputes ladder	• negotiated target • open book accounting and reimburse-ment • sharing of rewards	• supplier involvement prior to sanction • rewards tied to success of project • integrated teams	• inte-grated processes • bench-marking • partners may market 'product' together	Joint ven-tures
Trans-actional	Partnering -->					Relation-ship

Table 1: Procurement relationship arrangements,
adapted from procurement continuum produced by Broome (Broome 2002)

According to NZCIC's report (2004), many problems facing the construction sector in New Zealand, such as a focus on costs over value, constrained innovation, inappropriate risk allocation, unsustainable market, can be addressed with a procurement shift from the left side to the right side of Broome's model.

A recent survey (Henderson 2004) established the proportions of the major forms of contractual relationships being used in New Zealand construction as illustrated in

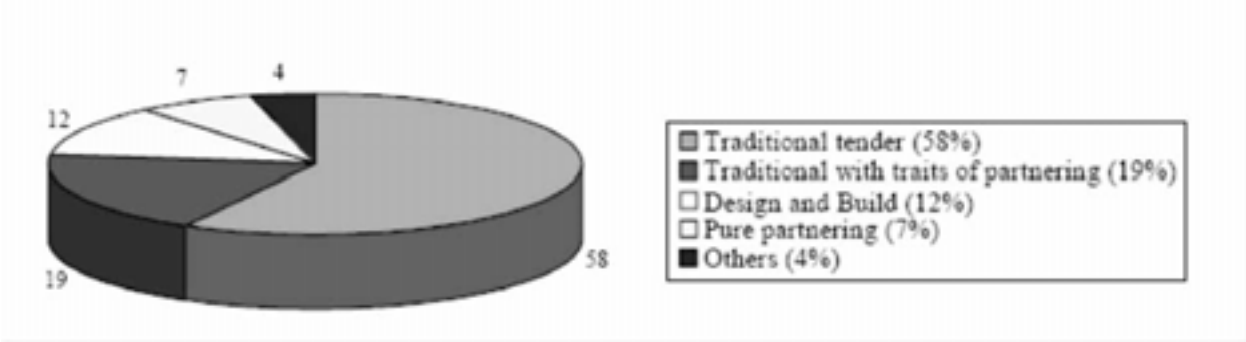

Figure 1. Proportions of the most commonly used contractual relationships in New Zealand's construction industry (adapted from Henderson's survey in 2004)

It can be seen that the 'traditional' contractual relationship is still dominating the New Zealand construction industry. However, the use of pure partnering method and the combination ones with traditional tender are occupying 7% and 19% respectively, which suggest an increasing understanding and use of new procurement forms. Selection of appropriate procurement methods can influence the success or failure of a project and is especially crucial during a post-disaster situation where communities require a rapid response to recovery and reconstruction.

Procurement is important in the reconstruction process after a natural disaster, but generally considered, it can be seen as "a strategy designed to satisfy the client's development needs" (Moore 2002). As for a disaster recovery situation, the 'client' here is most likely to be the government bodies coordinating the reconstruction process. A well-developed protocol or stipulated procedure should be available and clearly understood by the involved government agencies and appointed coordinators in such an event (Moore 2002; Wilkinson et al. 2004).

There are several guidelines that currently exist in New Zealand for Government (central or local) for procurement in normal situations. These are listed out in Table 2.

Government Bodies	Guidelines for procurement
The Ministry of Economic Development's Regulatory and Competition Policy branch	Government Procurement in New Zealand – Policy Guide for Purchaser (July 2002)
Association of Consulting Engineers of New Zealand and the Institution of Professional Engineers of New Zealand (ACENZ & IPENZ)	Guideline on the Briefing and Engagement for Consulting Engineering Services (January 2004)
The Office of Controller and Auditor-General	Procurement – A Statement of Good Practice (June 2001)
Transfund New Zealand	Transfund New Zealand's Competitive Pricing Procedures (CPPs)

Table 2. Guidelines on procurement in New Zealand

The Ministry of Economic Development (MED)'s guide to procurement is the major guideline available in New Zealand for government procurement activities, it is intended "to help government departments and other taxpayer funded agencies to support the government's procurement policy (Ministry of Economic Development's Regulatory and Competition Policy branch 2002) but it "does not provide significant guidance on processes for securing suppliers of large construction and/or building contract.

The ACENZ and IPENZ guideline on briefing and engagement is used for selecting consulting engineers' processes and has a focus on quality-based selection.

According to the CIC (2004), the Audit Office's Guideline assists with "…understanding the importance of a well-structured procurement process, and importance of the 'basics' – careful definition of the specification, cost estimating, robustness and transparency of process, attention to detail in planning and project management etc" (2004). However, compared to ACENZ & IPENZ's guideline, it does not provide guidance on how to embody the quality and value consideration in the actual selection step. The last one, Transfund NZ's Competitive Pricing Procedures, provides guidance in the transport sector, with a range from Lowest-Price Conforming procedures to Brooks Law procedures with an emphasis shifting from price to quality.

Major Standard Contracts Used in NZ Construction

The current basic contract document used in New Zealand construction industry is NZS3910:2003, *Conditions of Contract for Building and Civil Engineering Construction*. NZS3910. The main aim of NZS3910:2003 has been to produce a straightforward flexible document which includes all essential commercial provisions and which may be used for all types of engineering and building work with a variety of administrative arrangements.

The NZS3910 conditions of contract are well established, tested and widely used for most building and civil engineering construction works in New Zealand, typically using traditional procurement. However, there are various other standard forms available in the new Zealand construction market, some of them are variations developed based on NZS3910 for special purpose, some are issued by different industry institutions for use by their own members. One example of variation of the standard forms is NZS3915:2000. This is a standard document for building and civil engineering construction "where an experienced engineer, architect, surveyor or other suitable person (either a direct employee or another person) is not readily available to the Principal to act as Engineer to the contract" (2000). The prompt for establishing such a variation of standard contract was originally raised by the Registered Master Builders' Federation (MBF) of New Zealand to address the contractual situation on "comparatively straightforward" projects where the role of the Engineer is absent (2000). Besides NZS3910 and NZS3915, other commonly used standard forms for civil construction are those issued by MBF and the New Zealand Institute of Architects (NZIA). The MBF standard contract conditions was designed to cater to the needs of small building projects of any nature (Wilkinson 2003). Familiarity with these forms of contract in the construction industry is high, and the use of these with the traditional forms of procurement is common.

New Zealand Reconstruction Efforts: Government Guidelines

"There have been changes in the forms of contract and other types of project relationships used in some sectors of construction in recent years, and some of these maybe more suitable for post-disaster reconstruction projects than traditional systems (Wilkinson et al. 2004)". Such procurement planning should form part of any reconstruction planning for major disasters. However, this appears to be lacking in New Zealand. A series of Recovery Plans prepared by New Zealand Ministry of Civil Defence & Emergency Management (MCDEM) in order to "achieve greater standardisation and equity in central government policies for dealing with the aftermath of disasters" (MCDEM 2005) provide some assistance in the reconstruction procurement process expected to be followed after a disaster event.

The Civil Defence and Emergency Management (CDEM) Act 2002, established a framework for MCDEM to build resilient communities (2005a). As a part of this framework, a national CDEM strategy (2004) was also established, focusing on reducing the impact of emergencies through a sustainable approach to hazard risk management and pre-event recovery planning to cope with the long-term impact of disasters. Four goals have been identified in this strategy and the main interest of this research is to focus on the reconstruction procurement aspect within Goal 4 – to enhance New Zealand's capability to recovery from disasters (Recovery within the '4Rs').

There are various published related documents about the post-disaster recovery issued by MCDEM available, such as "Focus on Recovery", "Preparing a Recovery Plan (2002)", or the above mentioned "National CDEM Strategy". The CDEM Act is the foundation for the CDEM environment upon which the National CDEM Strategy has been developed. "The Director's Guideline and Information Series" in combination with the "National CDEM Strategy" and "CDEM Act" assist in driving the planning processes involved in the development of "CDEM Group Plans" and the "National CDEM Plan" (2005a). Aiming at detailing "the framework and responsibilities for disaster and emergency recovery operations and the principles and existing policies for post-disaster activity (2005b)", the Nation Recovery Plan, does not directly concern itself with the reconstruction procurement process or related contractual arrangements. The plan focuses more on the general aspects of recovery activities and the resilience of the whole community. But there are some points, such as financial matters and insurance arrangements, addressed within the plan relevant to the cost aspect of reconstruction procurement. However, there is a lack of understanding of how construction works will be procured, how the industry will facilitate reconstruction, and who, in the construction industry, will be involved in procuring, and constructing such reconstructed facilities. This is confirmed by the involvement of central government in assistance of recovery which seems hands-off in both financial and physical aspects with the intension of encouraging the local authorities, businesses and individuals to initiate the reconstruction process. Central government would become involved only when recovery is beyond the ability of the community to manage.

A New Zealand Flood Case Study: A Focus on Reconstruction Contracts

New Zealand is vulnerable to various natural disasters, including floods. Disastrous floods have struck most parts of New Zealand and they are the most common cause of a civil defence emergency. Several so-called "100-year" floods can happen in quick succession. Two recent floods that happened in New Zealand are the 2004 Manawatu floods and the 2005 Matata floods (also known as Bay of Plenty Floods). Both these events caused major damage to infrastructure, and as a result required general recovery procedure and reconstruction strategies to be implemented. On 18 May 2005 a band of very intense rain fell in the catchments behind Matata triggered many landslips, and several large debris flows. The destruction in the community of Matata was caused by debris flows. Although debris flows were the primary hazard at Matata on 18 May 2005, it was accompanied by flooding. This intensive rainfall appears to be approximately a 500-year recurrence event. The rainfall caused floods in the area and also triggered debris avalanche landslips, these landslips initiated debris flows causing widespread damage to highways and roads, bridges and housing and railway infrastructure. In response to the Matata disaster, a Civil Defence Emergency was declared 18 May 2005 and remained in place until the end of May. The Recovery structure (used during the Recovery phase after the Matata flood) lists the different parties involved. Five work streams reporting to the recovery manager were:

1. Media
2. Reporting
3. Hazards consisting of: Tonkin and Tailor (leader), Specialist engineering, Environment Bay of Plenty, Whakatane District Council, Department of Conservation, Iwi, Planning staff, EQC (Earthquake Commission)
4. Infrastructure consisting of Whakatane District Council (leader), Opus, Transit New Zealand, Fulton Hogan, Ontrack
5. Welfare.

Other parties involved were Government, Insurance companies (AMI), Land Transport New Zealand (subsidy), Hazard Task Force, Infrastructure Task Force, Rural Task Team, Task Force Green, Smithbridge Limited The role of some of the key construction parties involved in the recovery process are listed below.

Tonkin and Tailor Whakatane District Council (WDC) appointed Tonkin and Taylor Ltd (T&T) to assist with disaster recovery activities and coordinate hazard and risk management investigations following the debris flows, flooding and widespread damage.

Whakatane District Council Programmes were managed by the Whakatane District Council. The district councils was responsible for developing plans and recovering the lifelines such as roading, electrical services, telecommunications etc.

EQC The Earthquake commission is the only organisation that provides cover for land after the disaster of May 2005.

Opus Four engineering companies were contacted to put forward pricing and proposals for recovery of the Northern end of Herepuru Road, which was closed. The companies investigated all options and the costs of each option. Opus Consultants were awarded the tender to investigate long-term roading options for Herepuru Road. They were engaged by Whakatane District Council to progress the options for Herepuru Road.

Transit New Zealand From the moment that the floods occurred in May, Transit worked with Whakatane District Council on roading infrastructure.

Ontrack Ontrack is the owner and manager of New Zealand's railway infrastructure. This team was concentrating on removing debris from Matata and after that they considered longer-term rail infrastructure.

Government The Government was looking for an integrated recovery plan for Matata with Whakatane District Council and other relevant agencies. To facilitate this process the Ministry of Civil Defence and Emergency Management appointed a recovery facilitator. This facilitator worked together with the Recovery manager to rehabilitate Matata and provide an interface between central Government and Whakatane District Council.

Insurance Companies The Earthquake Commission does not provide cover for damage to dwellings or contents caused by storm or flood. If the event is determined to be a storm or a flood then cover will be provided by people's own insurance companies.

Hazard Task Force The original scope of work for the Hazards Team prepared by WDC included the following: -

- To identify what action plans and processes need to be put in place to address the short term and long term risks still facing Matata as a result of the event
- To identify what future land use provisions need to be put in place
- Ensuring further rainfall in the short-term can be managed without causing further property damage
- The Hazards Task Team final report

Infrastructure Task Force The scope of work for this team included the following:

- To clear debris
- To sort out roads
- To get water on and back to a standard for use

Task Force Green Employed twenty-seven workers and three supervisors for three months to clean up public domains and help reinstating sections. The Task Force Green made a significant contribution to the recovery process in Matata.

Smithbridge Limited The contract to construct a new two-way rail underpass for State Highway 2 traffic was awarded shortly before the floods struck in May, but construction was delayed by the flooding. The contractor, Smithbridge Limited, won the contract for the underpass including the construction of the new underpass and a new rail bridge, realignment of the highway on both sides of the underpass, demolition of the old underpass, removal of the traffic signals, and installation of a speed threshold.

The major recovery project owners are: Ontrack, Transit, Whakatane District Council and Environment Bay of Plenty. They are owners of major infrastructural assets and therefore key parties in the recovery effort.

The recovery phase started after one week and parties came into action to clear the roads and the land from rocks, stones and debris. There was no tendering of work during this period. Parties had their own contractors and it was not necessary to involve new parties. When the reconstruction after 4-6 weeks took place, new parties were required. The tendering was fast tracked, but the parties approached were only a few parties of an existing relationship. (Brady, 2005). The work is accomplished by existing contractors and parties and the same contracts can be used during the reconstruction process.

Both Ontrack and Transit own a significant part of the infrastructure in the area affected by the event. It was needed to ensure that both these organisations were working collaboratively with the Hazards and Risks Task Group to identify long-term solutions. There was little difference between contractual arrangements of after-disaster reconstruction and normal time construction in New Zealand industry. Packages of work are tendered where needed. There may have been some expediency and short cutting, but in general terms all work is done within the existing contractual frameworks. The small differences between the normal building processes and the reconstruction process may partially be explained by the fact that the investigated disasters were of a small scale. The parties that are normally involved during the construction projects in the area are also involved during the reconstruction process, and this is certainly an advantage due to the industry familiarity and enhanced level of trust-based collaboration of existing relationships. This lends itself towards the partnering and alliancing arrangements discussed earlier.

Encourage the use of relationship-focussed contracts or procurement methods (e.g. partnering or traditional ones with traits of partnering) in a post-disaster reconstruction to ensure a good collaboration among involved parties and a higher level of industry familiarity.

Conclusion

In this paper, the analysis has focussed on information about procurement systems for reconstruction within New Zealand circumstance. Firstly, the current procurement systems and various standard contracts that are being used in New Zealand construction industry have been reviewed. Several government guidelines on procurement and a national recovery plan issued by Ministry of Civil Defence and Emergency Management based on newly released CDEM Act 2002 have also been introduced to see if procurement strategies are incorporated into the recovery from disasters. The case study showed that due to existing contractual relationships in

Matata, collaboration between the parties was quickly established, and contracts let. This shows some traits of traditional, and some traits of collaborative procurement strategies in use. Extending this research to include other, larger case studies, would assist with an understanding of whether one form is more prevalent. In the case of the Matata floods, relationship-focussed contracting certainly played a key part in the recovery and reconstruction.

References

Anon. (2000). "Conditions of Contract for Building and Civil Engineering Construction (variation)." NZS3915:2000.

Anon. (2003). "Conditions of Contract for Building and Civil Engineering Construction." NZS3910:2003.

Construction Industry Council (2004). "Best Practice Procurement in Construction and Infrastructure in New Zealand (Discussion Document)."

Broome, J. (2002). Procurement routes for partnering: a practical guide, Thomas Telford, London.

Henderson, D. (2004). "The status and potential of alliancing and partnering procurement methods in New Zealand construction." University of Canterbury.

Henriod, and Le Masurier, J. (2002). The contract in successful project management, CAE publications, University of Canterbury, New Zealand.

Henriod, E. (2003). "Evolution of the Engineering Contract." The Contract in Successful Project Management, E. Henriod and J. Le Masurier, eds., Centre for Advanced Engineering, University of Canterbury Campus, Christchurch.

Khalil, A., and M.I. (2002). "Selecting the appropriate project delivery method using AHP." International Journal of Project Management, 20, pp. 469-474.

Kumaran, C. (2004). "The Floods of February 2004." Impact - Ministry of Civil Defence and Emergency Management Newsletter, 17.

Larsen, R., and Munro, M. (2005). "Further Government Assistance for Bay of Plenty Flood Recovery." a Media Statement issued by Rt Hon Helen Clark.

Love, P., Schwab, J., Dalziell, E., Fitzharris, P., Dalziell, E., and Schwab, J. (1998). "Selecting a suitable procurement method for a building project." Construction Management and Economics, 16, pp. 221-223.

MCDEM. (2002). Preparing a Recovery Plan, Information for Local Authorities (IS4/02).

MCDEM. (2004). "National Civil Defence Emergency Management Strategy 2003 - 2006."

MCDEM. (2005). Focus on Recovery, A Holistic Framework for Recovery in New Zealand.

MCDEM. (2005). National Civil Defence Plan Part - Two: Recovery Plan, natural disaster and emergencies within New Zealand.

Ministry of Economic Development's Regulatory and Competition Policy branch. (2002). "Government Procurement in New Zealand - Policy Guide for Purchaser."

Moore, D. (2002). Project Management: Designing Effective Organisational Structures in Construction, Blackwell Science Ltd., Oxford.

Page, I. (2005). "Reconstruction capability of the New Zealand construction Industry." BRANZ Recovery Symposium.

Reid, P., Brunsdon, D., Fitzharris, P., and Oughton, D. (2004). "Review of the February 2004 Flood Event - Review Team Report."

Schwab, J., Topping, K. C., Eadie, C. C., Deyle, R. E., and Smith, R. A. (1998). Planning for Post-Disaster Recovery and Reconstruction.

Titmus, J. (2005). "Bay of Plenty Floods." Impact - Ministry of Civil Defence and Emergency Management Newsletter, 21.

Transit New Zealand. (2005). Long Term Procurement Plan (June 2005).

Wilkinson, S. (2003). "The New Zealand Standard Conditions of Contract." The Contract in Successful Project Management, E. Henriod and J. L. Masurier, eds., Centre for Advanced Engineering, University of Canterbury Campus, Christchurch.

Wilkinson, S., Gupta, S., and Le Masurier, J. (2004). "The development of a contractual framework for disaster reconstruction."

Wilkinson, S., and Scofield, R. (2003). Management for the New Zealand Construction Industry, Prentice Hall, Auckland.

SUSTAINABLE POST-DISASTER RECONSTRUCTION PROJECTS IN REMOTE LOCATIONS, AND THE FIT WITH A CONCEPTUAL DESIGN MANAGEMENT MODEL FOR REMOTE SITES

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Abstract

Reconstruction projects, such as those conducted in Sudan since 2004, need an effective multidisciplinary planning and management framework, capable of responding to transitional and long-term reconstruction requirements. When these sites are in remote locations, the planning and management issues compound further. A preliminary multi-disciplinary framework that design managers can then use to develop better management and design practices, in the context of humanitarian aid and reconstruction projects in remote locations, is discussed in this paper. The future framework will be developed from a validation of a conceptual design management model for remote sites using Sudanese case study data collected from semi-structured interviews, with selected key design decision-makers working in West Darfur, Sudan. The model was developed from a series of commercially - based case studies in the eco-tourism and Antarctic science sectors. This paper identifies how well the collected Sudanese data matched, or added to, the original design management model, in terms of the four key factors of *value generation; knowledge integration; process integration and timely decision-making.* The paper also investigates whether, and how, that model may be developed into a relevant multi-disciplinary framework for reconstruction projects in a non-profit and / or humanitarian aid context. The analysis of the semi-structured interviews, suggests that the original conceptual design management model for remote sites is relevant in a non-profit and/or humanitarian aid context. In addition, the model allows for a blending of traditional and modern management methods. The impact of this aspect of the framework would need to be developed further by future applications of the model and by practitioners in post -disaster reconstruction.

Keywords: *design; management; framework; remote; sustainable.*

Introduction

Project management is concerned with managing the overall project but is primarily concerned with managing the construction stages of the project. Design management is concerned with the management of the design process, and the designers, across all of the design stages and consultant specialists, leading to the commencement of the construction stages. Design management within the disciplines of the built environment is a complex process concerned with *value generation; integra-*

tion of specialist knowledge; critical timing of key decisions; process integration, and managing the overall design process across all affected disciplines.

The design process has become more complex and fragmented over the last few years, resulting in an increasing need for a shared understanding of the project objectives amongst the stakeholders. This becomes increasingly difficult when there is fragmentation, differing political and cultural agendas, and differing expectations of the project outcomes. What is valued in the project, impacts upon how decisions are made on design issues. In the design management field the integration of those who have knowledge that contributes to the design, construction and management, is critical to developing and achieving value on projects (Kestle & London, 2002).

The added dimension of remote site projects, increases the complexity, and makes early decision-making; knowledge integration; logistical implementation planning and implementation, absolutely critical and central to the potential success, or failure, of the project. The project team has to not only address the traditional management problems, but also those that specifically occur as a result of the remote locations of these often environmentally, and politically sensitive sites.

Remotely located sites range from islands several kilometres from the mainland, to thousands of kilometres from major urban concentrations, such as various Pacific Islands, mountainous areas, and deserts. These sites are typically located within previously undeveloped and environmentally sensitive regions (Kestle, London et al, 2002).

In this paper 'remote sites' refers, in particular, to West Darfur in the Sudan, and to:

- the difficulty of physical access to the site in terms of geographical location, as Darfur is in a desertified region which lacks roads
- the significant distance to the site from continuously available logistical support
- the hostility of the environment in terms of seasonally strong winds, and a wide temperature range
- the lack of local materials and specialist labour – virtually all resources needing to be trucked or air-freighted to the site(s)
- remote site projects such as the West Darfur Humanitarian Aid Project in the Sudan require unique management processes, mainly because of the environmental, political, cultural and geographical considerations.

The Conceptual Design Management Model

The conceptual design management model was originally developed in terms of reviewing and synthesizing theoretical published 'production principles' and 'sociological factors' associated with design management, and lean design management. The model was then developed further by reviewing the 'characteristics of remote site projects' from historical case studies in Australia (Fraser Island), New Zealand (Tongariro National Park and Antarctica (Scientific Bases, and the Dry Valleys of the Ross Sea Region).

Design management is fundamentally concerned with value generation, however understanding what constitutes value is a difficult process, particularly where there are numerous stakeholders involved on a project. One of the main challenges is developing a shared understanding of what is valued on the project and identifying, and then agreeing the objectives for a project with the stakeholders. What constitutes value on the project impacts upon how the critical decisions are made on the design and management issues. Further, integration of those who have knowledge that can contribute to the design, construction and management is critical to developing and achieving value on projects, (Kestle & London, 2002).

Much of the lean thinking research falls into the tactical category rather than strategic and theoretical. That is, until the work of researchers Koskela,(1997) and Seymour,(1999). Seymour (1999) suggested a proposal for implementing lean construction at the organisational level rather than just at the operational level. This work was then followed up two years later, by Seymour and Rooke (2001), using an ethnomethodological approach in terms of setting up an organisational culture that established how people may perform their site-work activities in a visibly orderly manner, by changing their mind-set, for instance. Similar findings were published by Howell and Ballard (1998), stating that changes of the mental model needed to be made (Kestle & London, 2002).The lean design principle of 'flow' is relevant from a sociological and environmental viewpoint, as it tends to be focussed on a more holistic approach for theoretical and project development work. In addition, remote sites which are frequently environmentally sensitive, need a more holistic approach. The thinking and principles associated with lean design management, made a significant contribution in terms of informing the development of the Process Integration factor for the conceptual design management model for remote sites (Kestle & London, 2002).

The key factors of design management for remote sites were therefore established as being - 'value generation', 'knowledge integration', 'process integration' and 'timely decision-making'.

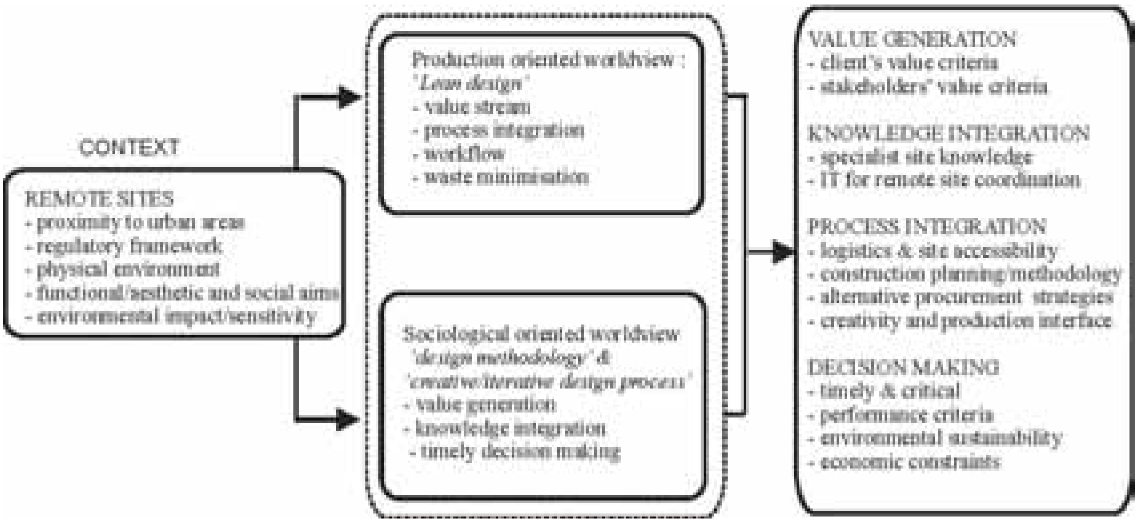

Figure 1. Conceptual Design Management Model for Remote Sites
(Kestle & London, 2002)

Theoretical contributions synthesis

Value generation refers to the value that the client and stakeholders place on the project and site. Value will vary according to the differing clients' and stakeholders' expectations of the projects. Value generation on projects and sites set within an environmentally sensitive context, is primarily concerned with the environmental protection of the site.

Knowledge integration is a complex process concerned with endeavouring to capture, and then integrate, the specialist knowledge of all those personnel involved on a particular project, prior to and during the project phases. Knowledge capital can be either explicit or tacit knowledge, the latter being the knowledge gained from experiencing previous projects, but which remains undocumented. Explicit knowledge is that knowledge that has been documented in some way, and which can be read, or reviewed in operations manuals, or books or project reports and databases.

Knowledge integration, to be successful, requires that all key personnel on the project be involved with the in-depth pre-design briefing, detailed pre-planning, followed by regular monitoring and review of the design and construction processes, as the project progresses.

Specialist knowledge associated with designing for, and working on, remote and often hostile sites is essential on these remote site projects, to ensure the best design solutions and end results, even though frequently working with non-negotiable timelines.

Essentially this means that the project that the client has commissioned is delivered on time and to budget, irrespective of the fact that the site is for example, remotely located, and in a climatically hostile environment.

How this knowledge is integrated, and effectively managed varies from cryptic handwritten memos from verbal conversations, to hardcopy documentation, to specialist IT software programmes installed in the project personnels' offices.

Process integration involves the timely and cost-effective co-ordination and planning of a range of processes across the total project, such as construction planning methodology, logistics, information management, and design / production interface management. In certain instances this may require alternative procurement strategies, for example, design-manage or alliancing arrangements.

Logistical planning and implementation is complex, as well as critical, for remote sites. The timing, costs and restrictions associated with shipping, or air-freighting building components, add to the complexities of the logistical aspects of a design management model for these remote sites (Kestle & London, 2002).

Timely decision making refers in the main to financial and design decisions, which are critical to the successful management of the design and construction of remote site projects. These decisions are made within the context of frequently nonnegotiable windows of buildability, fixed budgetary constraints, and the need for environmentally sensitive development of these remote, and often hostile sites.

The developed exploratory conceptual design management model aims to respond to the need for well integrated specialist design and construction processes. The model has already been examined using three historical case studies, using data from previously conducted research and published secondary data. (Kestle & London, 2002). Case study methodology has been identified and adopted as the primary method for validating and developing the design management model and associated typology, as it involves empirical enquiry that investigates a phenomenon within a real-life context (Kestle & London, 2003).

The testing of the conceptual model's validity, in terms of the realities of managing remote site projects, has commenced. The Cape Roberts Drilling Project in Antarctica (1995-2001), has been examined and retrospectively reviewed, as a result of the data collected from semi- structured interviews conducted with nine of the key personnel on the project. The collected data was tested against the conceptual model under the four factors of value generation; knowledge integration; process integration and timely decision-making, involved reviewing the responses specific to the Cape Roberts Antarctic Drilling project. The results were extensive and generally consistent across all of the selected interviewees. The personnel interviewed unequivocally supported the four key factors of the design management model, as being valid for Antarctic remote sites generally, and accurately represented their experiences on the Cape Roberts Drilling project. The testing and validation of the conceptual design management model for remote sites, in terms of representing the realities of managing the Cape Roberts Drilling Project in Antarctica has been published (Kestle & Storey, 2005).

Present Management Situation in Humanitarian Agencies

There appear to be significant gaps in the understanding of disaster management within the humanitarian aid community. Fitz-Gerald et al (2002), reported that *"The* *humanitarian aid community is also a 'slow follower' in the adoption of management tools and techniques. In some ways this can be explained or defended on the basis that humanitarian aid is delivered in an environment where no two situations are the same. Consequently there is no single model that can be applied and the absence of effective lessons-learned mechanisms that ensure positive and negative experiences are addressed throughout all levels of the organisation encourages reinvention with each deployment."*

Therefore, humanitarian aid organizations are not only slow learners, but also do not have the basis for a learning culture thus giving credibility to the adage that *"a humanitarian worker is only as good as their last assignment".*

In addition, the United Nations High Commissioner for Refugees (UNHCR) guide lines for example are circumspect and state that (UNHCR, 1999) *"There is no single blueprint for refugee emergency management; each refugee emergency is unique. However, experience shows that emergencies tend to evolve according to certain recognizable and documented patterns."*

Thus, the management process applied to each disaster is different, but disasters themselves do have discernable patterns. One would expect there to be a link between the management process and the disaster pattern but this and the identity of the patterns is not explicitly explained. The Handbook works by setting up desired outcomes and then leaves it for the reader to select the management processes required to achieve those outcomes.

The UNHCR Handbook does goes on to say that … *"While emergency management shares many of the characteristics of good management in general, there are a number of distinguishing features:*

- *The lives and well-being of people are at stake;*
- *Reaction time is short;*
- *Risk factors are high and consequences of mistakes or delays can be disastrous;*
- *There is great uncertainty;*
- *Investment in contingency planning and other preparedness activities is crucial;*
- *Staff and managers may be under particularly high stress because of, for example, security problems and harsh living conditions;*
- *There is no single obvious right answer".* (UNHCR,1999).

Thus, the present literature tends to be strong on objectives but weak on how that is achieved and what management processes could be used. Moreover, it suggests that each disaster is different and that there perhaps is no single answer. This paper sets out to ascertain whether that is the case and what if anything can be 'borrowed' from management research in related areas.

The Research Question

The aim of this paper, is to test the validity of the conceptual model's four key factors by focussing on selected aspects, only, of the data collected, from the Sudanese project, in order to answer the following question: "how well do the four key factors of the conceptual design management model for remote sites represent the realities of managing projects such as the West Darfur Humanitarian Aid Project in Sudan ?".

Context

Darfur consists of three states and occupies the western area of Sudan. It is a large area of approximately 256,000 square kilometres with an estimated population of 5 million people made up from a complex tribal mix. Large parts of Darfur are prone to drought and desertification that intensifies demands on its more fertile lands. In recent decades, areas of Darfur have been subject to sporadic inter-tribal clashes over the use of such resources.

From early 2003, fighting intensified in the region following the emergence of two armed groups, the Sudan Liberation Army (SLA) and later the Justice and Equality Movement (JEM), and the commencement by them of hostilities against the Government (Human Rights Report, 2004).

Following a string of SLA victories in the first months of 2003, the Government sponsored a militia composed of a loose collection of fighters, apparently of Arab background, from the Darfur region. This militia become known as the 'Janjaweed' or men on horse back. In certain areas of Darfur, the Janjaweed have supported the regular armed forces in attacking, and targeting civilian populations suspected of supporting the rebellion, while in other locations it appears that the Janjaweed have played the primary role in such attacks with the military in support.

The humanitarian fallout of this situation in Darfur (and the border regions of Chad) was an estimated one million Internally Displaced Persons/People (IDPs) by May 2004, (compared with 250,000 in September 2003) with over half of these (some 570,000) being located in West Darfur. The rest were divided between North and South Darfur (290, 000 and 140, 000, respectively). By July 2004, this had increased to 601,096 in camps in West Darfur (based on estimates from the UN Agency OCHA Organisation for Humanitarian Aid).

Such a large displacement of people also impacts on the 'host' community. Scarcity of water, firewood and animal feed before the crisis inflamed tensions and fighting. Against such a back drop UN Aid Agencies and NGO's work to get aid into remote locations. The organisation and inter-relation of players within the aid community is complex and this is shown in figures 2 and 3 below (Willitts-King & Harvey, 2005) . Figure 3 shows the more operational / field relationships that can exist (Manfield, 2001). It underlines the complexity of the organizational structure that aid is provided through. Moreover, the legal and political status of those to whom aid is directed in conflict situations is critical (compared to natural disasters), in the determination of what aid assistance can or cannot be given.

Thus, with this context interviews of key people involved in both UNHCR, OCHA, and several International NGO's was undertaken, and the same methodology as used earlier by Kestle & Storey, (2005), was applied.

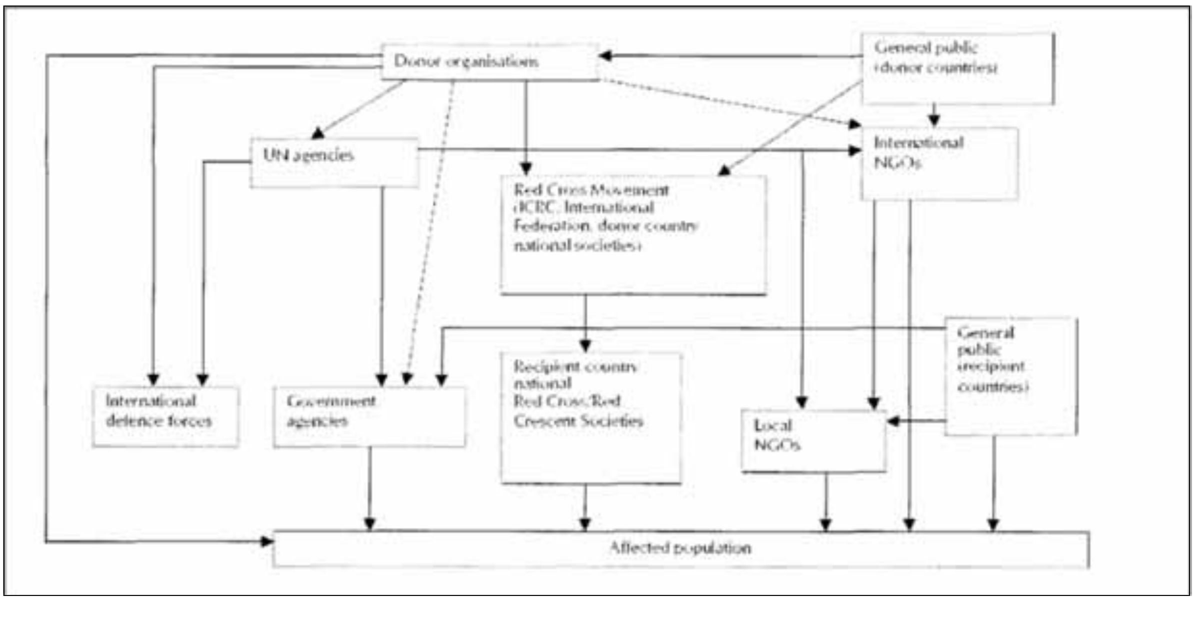

Figure 2. The Relief Response.

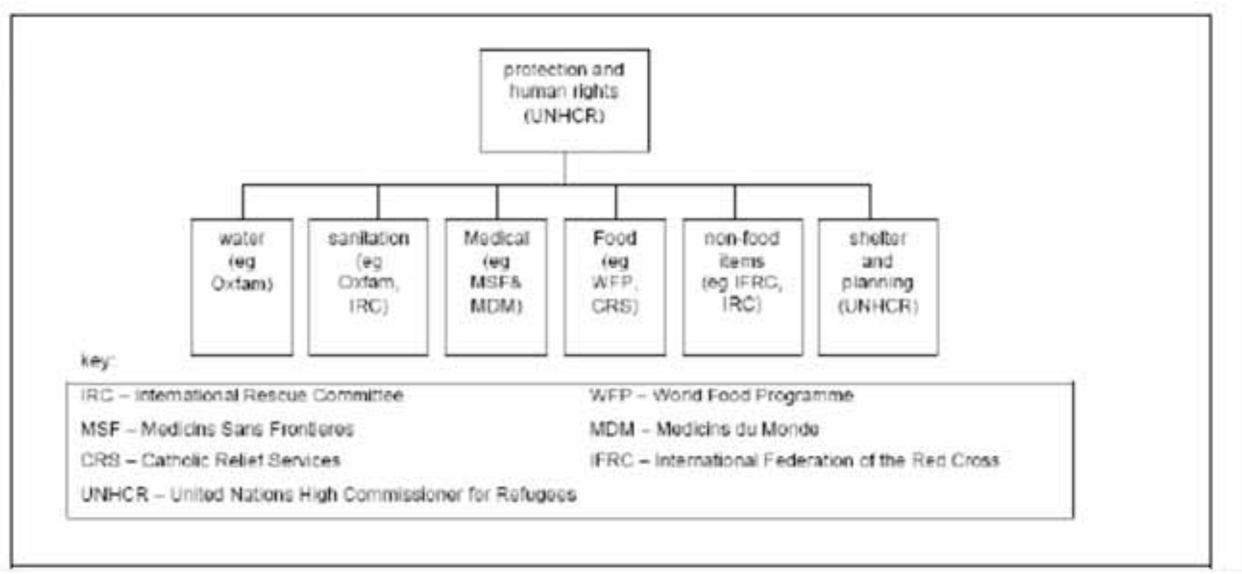

Figure 3. Field and Sectorial Organisation

Methodology

The selection of this case study at West Darfur, in Sudan, was made on its ability to represent the phenomenon of remote site design management. The West Darfur Humanitarian Aid Project in Sudan, was considered to be a remote site project as there was a lack of continuously available logistical support; the site was difficult to access in terms of geographical location, and the site enjoys a hostile local climate. There was also a lack of specialized local labour, and materials. All of the major resources, had to be trucked, or air-freighted into to the camp site(s).

Case study methodology is considered an enquiring and exploratory method that provides rich and descriptive data for analysis (Yin,1994), therefore Interviews were conducted over a period of two months, in 2004. Seventeen senior, middle management, and operational staff were interviewed in terms of their official roles on the West Darfur Humanitarian Aid Project in Sudan, to give a rigorous and representative cross-section of the personnel involved on the project. For the purposes of this paper, the focus was specifically on data collected from eight key interviewees. The aim was to establish whether there was support for the four key factors of the conceptual design management model for remote sites. The four key factors were, *'value generation', knowledge integration', 'process integration' and 'timely decision making'*. The data were then transcribed, collated and analysed in terms of the paper's research question.

Analysis of the 'Key Factor' Findings

Testing the collected data against the conceptual model under the four factors of value generation; knowledge integration; process integration and timely decision making, involved reviewing the responses specific to the West Darfur Humanitarian Project in Sudan. The results were generally consistent across all of the selected interviewees, though some of the respondents appeared to have more autonomy than others, in terms of playing a real part in the decision-making processes.

The personnel interviewed supported the four key factors of the design management model, as being valid for humanitarian aid project sites generally, and as being representative of their experiences, or those that were needed, on projects such as the West Darfur Humanitarian Aid Project in Sudan. The following key points were drawn from the collected data.

Value Generation on the West Darfur Humanitarian Aid Project in Sudan, was singularly concerned with making a difference to the lives of the beneficiaries of the aid, the Internally Displaced People (IDP's). Provision of basic shelter and the necessaries of life, being at the core of the project's aims.

Therefore Value Generation as perceived or needing to be realized on the West Darfur Humanitarian Aid Project, in Sudan was:-

- the effectiveness, and therefore the value was measured on the project, by what was achieved, how many people (IDP's) have been saved and fed; what the mortality rate was. Value was measured quantitatively.
- about keeping a reliable, continuous supply line of food to the displaced people, from a distant donor to the NGO's in the field.
- about making a difference to the living conditions, in terms of emergency water and sanitary assessments in the 'Field', acting on the recommendations, and their timely implementation
- measured in how many built outputs will be achieved, and then seeing the recollection of people; putting the 'village' back together again.

Knowledge integration as perceived or needing to be realized on the West Darfur Humanitarian Aid Project, in Sudan was:-

- that there are definite gaps in the knowledge integration process. No-one wants to trespass on others' areas. This is perceived as a possible hinderance to finding the best solution(s).
- that there's a problem with the planning and the reality.The very specialised personnel who come in, cannot do what they are best at, as they have to
- follow a particular plan, and therefore one does not necessarily see the desired or potential 'results on the ground'.
- that there are consultants, who are not in the UN system, who need to be advised of the potential pitfalls, when involved on these types of projects.
- that there are basically, informal and formal systems of knowledge integration.
- the gaps in specialist knowledge, in terms of the experiences of the people in the field, versus those in the office - they were not always in-line at times.
- that sometimes there is too much specialised knowledge on a project , and what is needed is a more holistic approach.
- a good knowledge of the IDP's cultural and value systems is needed, before commencing the on-site work.
- the high turnover rate of people in these roles, so things were not recorded as much as they could have been. Important though, to understand the context of the project.

Process integration as perceived or needing to be realized on the West Darfur Humanitarian Aid Project, in Sudan was:-

- to try and understand how the IDP's think, and will act / respond, and then to try and set up the best processes and systems.
- in trying to achieve co-ordination at the camp level, and engage in meaningful and useful relationship-building with the International, and IDP Communities. Knowing the other agencies' plans, means better facilitation.
- that little could have been achieved without the Sudanese people and their expertise. They had valuable connections and networks within the community.
- about co-ordination of the various groups, on this project, and helping working groups focus on the task in hand.
- to make sure that assessments are correct. That a thorough, logical and sensible solution to the assessment findings is made. Then prepare a plan to address the challenges within the time-frame and the budget.

Timely Decision-Making

The worst case scenario of late, or ineffectual decisions, on remote site projects, such as the West Darfur Humanitarian Aid Project in Sudan, would be the lack of basic shelter, and the necessaries of life, potentially resulting in increased mortality rates.There are also political implications and drivers associated with these environmentally sensitive sites that can, and do impact on the decision-making process.

Therefore, 'Timely Decision-Making' as perceived, or needing to be realized on the West Darfur Humanitarian Aid Project, in Sudan was:

- that decision-making on this project was quite reactive and prescriptive. The detailed, and bigger picture decisions were fed from the 'Field' back to central, where the tailoring occurred, and the decisions, and plans, were fine tuned.
- a tiered system of decision-making. Consultative decisions were made. The people with the on-the-ground, or with the bigger picture knowledge, worked together to work out the best answers, and decide what was feasible.
- that decision-making involved a group of managers, one manager for each of the programmes, and it was essentially de-centralised.
- that at the organisational level, the decision-making was decentralised. There were considerable levels of co-ordination between West Darfur, Khartoum and the agency's head office. The staff were given almost total autonomy in the 'Field', and dedicated organisational finance personnel to work with.

There was consensus amongst the respondents, that the clients were the IDP's on the West Darfur Humanitarian Aid Project in Sudan, and the agencies' aim was "to make a difference". Measuring the 'differences' made is problematic, as it involves both a level of quantitative, clinical monitoring, and also a range of qualitative, cultural, and psycho-social observations and measurements.

How then do these aid agencies know when they have made an acceptable 'difference' in their clients' lives? And has the 'plan' been achieved once implemented? Has the value been generated?

One of the notable outcomes, from the collected data, was the diversity of views held by the respondents as to who they considered to be the stakeholders of the project, and what contributed to value generation on this project. A range of views also emerged in terms of the preferred and actual process integration in practice on the project, and whether the respondents had to slavishly follow the plan from 'Central' or that local decision-making opportunities existed on the project.

There was recurring criticism of the centralised decision-making process of some of the agencies, and how this hindered progress, timely communications, and the potential for on-the-ground, and informed and improved / relevant, local decisions being able to be made. Others believed, that they had some autonomy in terms of the decision-making, having had the authority delegated to them by their agency(s).

This lack of consistency of decision – making and delegated authority, across the range of agencies, and the ever-changing personnel in the Field and offices, was challenging, frustrating and disorientating for a number of the respondents.

The respondents, almost unanimously, (7/8), noted that, there were significant gaps in terms of specialist knowledge and knowledge integration on the West Darfur Humanitarian Aid project. This resulted from a range of contributing factors, in their view, being:-

- mismatches between the knowledge and experience of personnel in the agency offices, and that of the personnel specifically brought in for the on-the-ground work associated with the project.
- no one wanted to trespass (or offend) other agencies' areas of responsibility, which in reality probably puts limits on achieving the much needed knowledge integration, on these projects.

- too little time being spent on the pre-planning stage(s). Realistic strategies and implementation plans and processes are regarded as essential, even though these are emergency projects.
- continually changing staff, in all areas, means that record keeping, as well as status and improvement report writing (by the specialist consultants in
- particular), should be an essential part of the central and local portfolio resource pool and the pre-briefing / training of affected personnel.

A commonly, and strongly held view was that there was insufficient pre-briefing and associated training, before going into the 'Field'. There was consensus amongst the respondents, that there was a significant lack of effective and timely communication equipment, and systems available for project staff, in the Field and in the offices at the start of the 'in Field' project work.

Reliable and timely communications are considered to be critical on these remote sites, yet mis-communications do occur at times, between the various stakeholders, on and off site, caused perhaps by different interpretations of the issues, or decisions being made remotely from the site itself, and from each other (Kestle & Storey, 2005).

Application and Development Potential of the Model to A Multi-disciplinary Framework

The first stage of the conceptual design management model validation work, involved a retrospective historical case study of the Cape Roberts Antarctic Drilling Project, conducted in 2003/4 and subsequently published, (Kestle & Storey, 2005). The next stage of the validation process involved the collection and analysis of data in 2004, for a case study related to West Darfur Humanitarian Aid Project in Sudan. Therefore the research question, for this paper was specifically concerned with whether the four key factors of the conceptual design management model for remote sites represented the realities of managing projects such as the West Darfur Humanitarian Aid Project in Sudan.

The analysis of the selected data findings from the semi-structured interviews on the Sudanese Humanitarian Aid project, suggests that the original conceptual design management model for remote sites (Kestle & London, 2002), is relevant in a non-profit and / or humanitarian aid context. The conceptual model allows for a blending of traditional and modern management methods, and the impact of this aspect of the framework, needs to be developed further, by future applications of the model, by practitioners in the post -disaster reconstruction field.

Following on from this paper's particular research question, and the associated data collection and analysis, the next question becomes, *"Could a project planning framework based on relatively conventional issues of remoteness and sustainability, be applied to such a context ?"* If such research could be used and extended into, what must be considered, an 'extreme' context, then there would be the potential to provide aid workers with guidance in a situation of apparent 'chaos'.The validation of the conceptual design management model for remote sites, supports a further stage of this research, being the development of a project planning framework specifically for humanitarian aid projects. The proposed humanitarian aid framework would be developed from the conceptual design management model for remote sites (Kestle & London, 2002), and the analysis of the total case study data collected in 2004. The development process would need to ensure that the significant 'GPS' identified by the respondents, and interpreted from the data collected the West Darfur Humanitarian Aid Project in Sudan, are addressed. These 'gaps', and a proposal for a project planning framework will be the subject of future research papers.

Conclusions

The primary aim of this paper was to focus on selected aspects only of the total case study data collected, in order to answer the question of *"How well do the four key factors of the conceptual design management model for remote sites represent the realities of designing and managing projects such as the West Darfur Humanitarian Aid Project in Sudan?"*.The detailed answers to the question are to be found in the analysis of the selected data. The respondents / interviewees supported the four key factors of the design management model, as being valid for humanitarian aid project sites generally, and as being representative of their experiences, or those that were needed, on projects such as the West Darfur Humanitarian Aid Project in Sudan. The selected data findings validate, and support the conceptual design management model for remote sites, which lends significant support to the model and to the associated typology for remote sites. Further analysis of all of the data collected from the West Darfur Humanitarian Aid Project in Sudan interviewees, will provide further insights into the lessons learned and this will have implications for the management and operational personnel involved on future remote site projects In particular, and as a further stage of this research, the development of a project planning framework specifically developed for humanitarian aid projects, on remote sites is planned. Moreover, it is also interesting that the recent major management changes signal by the UN based on what happened in West Darfur also makes this research timely (Humanitarian Response Review, 2005), (IASC, 2005). The Humanitarian Response Review and the consequent adoption and roll out of the Cluster approach in all humanitarian aid situations (including refugee, IDP conflict and IDP natural disaster) as the management frame work runs contrary to what has been suggested in this paper.

Perhaps the old saying mentioned earlier in this paper that "a humanitarian worker is only as good as their last assignment" will still hold true for the future?

References

Ballard, G and Koskela, L (1998) "On the agenda of design management research". *In proceedings of the 6th Annual Conference of the International Group for Lean Construction.* August 1998.Guaruja, Sao Paulo, Brazil.

Commission On Human Rights (2004). "Report of The High Commissioner For Human Rights Situation Of Human Rights In The Darfur Region Of The Sudan". *E/CN.4/2005/3.* 7 May 2004. pp 4.

Fitz-Gerald A, Neal D (2002). "Aid Management: Exploring The Utility Of Generic Management Applications in The Humanitarian Aid Sector". *Journal of Humanitarian Assistance,* Dept of Peace Studies University of Bradford. 2002.

IASC (2005)The UN Inter-Agency Standing Committee Ad Hoc PRINCIPALS' MEETING "Strengthening Humanitarian Response" Sept. 2005 Responsibilities in the Cluster System.

Kestle, L and London, K (2002). "Towards the development of a conceptual design management model for remote sites". *In proceedings of the 10th Annual Conference for the International Group for Lean Construction.* August 2002. Brazil.

Kestle, L., London, K., Bodger, P and Storey, B (2002). " The development of a typology for remote construction projects. *In proceedings of the ARCOM conference* September 2002. UK.

Kestle, L and London, K (2003) "Remote site design management –the application of case study methodology". *In the proceedings of the Post Graduate Construction Research Conference.* July 2003. Melbourne. Australia.

Kestle, L and Storey, B (2005). "The complexities of an Antarctic drilling project, and the fit with a conceptual design management model for remote sites". *In proceedings of the Ist International Conference on Built Environment Complexity.* September 2005. Liverpool. UK.

Koskela,L, Ballard,G and Tanhuanpaa, V-P (1997) "Towards lean design management". *In proceedings of the 5th annual Conference of the International Group for Lean Construction.* July 1997. Gold Coast, Australia.

Manfield, P (2001). "Emergency Shelter for Humanitarian Relief in Cold Climates: Policy and Praxis". The Martin Centre for Architectural and Urban Studies Cambridge University United Kingdom. 2001. pp 16.

Seymour, D (1999) "Lean construction: towards an agenda for research into systems and organization". *In proceedings of the 7th Annual Conference of the International Group for Lean Construction.* July 1999. Berkeley, California. USA

UNHCR (1999) *Handbook for Emergencies* (2nd edn). UNHCR, Geneva, 28 pp.

Willitts-King, Barnaby and Harvey, P (2005). "Managing the risks of corruption in humanitarian relief operations". A study for the UK Department for International Development Humanitarian Policy Group Overseas Development Institute Final Report 31 March 2005. pp6.

Yin, R. (1994). "Case study research-design and methods". SAGE publications. Beverly Hills, California.

MODEL POST-DISASTER RECONSTRUCTION IN THIRD WORLD COUNTRIES: THE CASE OF THE EL NIÑO EMERGENCY PROJECT, KENYA

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Abstract

Following El Nino phenomena that occurred between November 1997 and March 1998, heavy rainfall all over the country caused floods that impacted thirty-five of the seventy-six administrative districts and the provincial city of Nairobi – Kenya. Many parts of the country were isolated due to transport system failure, and many essential services such as water supplies and health facilities were destroyed. There was loss of human lives and thousands of households were displaced. After the floods, there was an immediate need for emergency reconstruction works for vital infrastructure such as health services, water supplies, roads and bridges. The recovery funds were given by the World Bank, African Development Bank and Agense Franscaise de Developpement. A reconstruction management team was set-up in the Office of the President comprising private sector professionals under the special program, Project Management Unit (PMU). The management unit recorded a considerable reduction of implementation time and cost compared to normal project implementation procedures. This management system proved easily adoptable in any disaster situation for provision of immediate needs as well as the long-term reconstruction programs. This paper explores the operational systems that were adopted by the project management unit in the implementation of El Nino Emergency Projects as a basis of post disaster reconstruction model in third world countries.

Keywords: Post Disaster; Reconstruction; El-Nino Phenomenon; Project Management Unit; Kenya.

Introduction

Weather experts blamed El Niño for abnormal rainfall which caused widespread flooding (Fig. 1; DEP, 1998). Approximately 86 human deaths were caused by floods, cattle perished by drowning and thousands lost their homes. Lifeline facilities were destroyed, bridges and roads damaged, cutting off many parts of the country. 124 000 refugees in Dadaab refugee camps in the northeastern Kenya were totally isolated (WFP, 1997) from the rest of the country from mid October 1997. Food and other essential goods were unable to reach northeastern part of the country. In western Kenya, people fleet and took shelter in churches, schools and market centres. The overall effects was reduced crop production, high animal mortality rates (Ndikumana et al., 2000) due to cases of Rift Valley Fever (RVF), which affected both animal and human populations. In general El Niño phenomenon adversely affected food production and distribution, damaged food in the farms and stores. According to FAO (1998) report, the worst affected included the Coast Province, North Eastern Province and parts of the Eastern Province, as shown on the map below, these areas were declared the disaster zone by the Kenya Government which appealed for international assistance to cope with emergency.

Post-Disaster Reconstruction : Meeting Stakeholder Interests : Proceedings of a conference held at the Scuola di Sanità Militare, Florence, Italy 17-19 May 2006, edited by David Alexander, Colin Henry Davidson, Andrew Fox, Cassidy Johnson, Gonzalo Lizzaralde, ISBN 978-88-8453-611-2 (online), ISBN 978-88-8453-612-9 (print), © Firenze university press, 2007

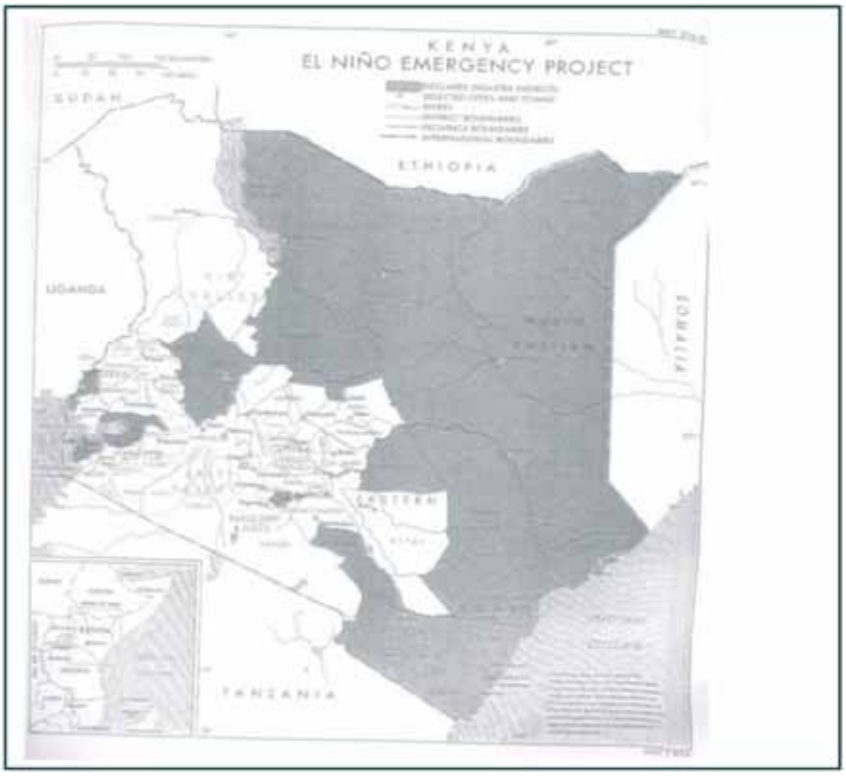

Figure 1. Map showing the severely flood affected area in Kenya
(Source: World Bank Report on El Nino Emergency Project – Kenya).

El Nino also caused outbreak of Rift Valley Fever (RVF), Cholera and Malaria (CARE, 1998). RVF killed approximately 300 people. The impact of La Nina phenomena which followed El Nino almost immediately made the situation worse especially incases of food production (Webber, 1998). According to Sandrasaga (2000), Kenya was one of the harshly affected countries during the 1997/1998 El Nino event. The report stated that global damage wreaked by this event was estimated at between $36 and $96 billion.

Management of El Niño

According to the joint report of UN agencies, Sandrasagra (2000), the major problem involving the response of El Niño event in many countries studied was rivalries among government agencies which create needless delays and problems in reconstruction. The report strongly recommended that each country should create a single agency to coordinate El Niño-related disaster response and preparation. Traditional government practices in many developing countries encompass tedious paperwork and a chain of signatures, which in reconstruction stage, may result to deterioration of the status of the affected society and possible loss of life. In cases where the reconstruction efforts are managed by civil society, there lacks accountability, implementation capacity and professionalism in execution of the works, further to that the close monitoring and evaluation score is usually low. Therefore there is need to have a more elaborate institutional management model which can be easily adoptable in any functional management structure that will ensure timely execution of the reconstruction works, efficient utilization of available resources and quality output.

Basis for Initiation of El-Niño Emergency Project (ENEP)

The El Niño Emergency Project (ENEP) was to support government efforts to mitigate the serious effects of flooding attributed to the El Nino phenomenon. The project aimed to minimize life threatening condition in 35 impacted districts of Kenya and the province of Nairobi by restoring as much of the previously existing potable water supply and health facilities as possible, and to facilitate economic activity through the restoration of key routes into cut off areas. It was also to save economic assets in danger of total collapse such as bridges. Following the disaster assessment and community prioritization exercise which involved those impacted by the flooding, the components that required rehabilitation were: emergency rehabilitation of infrastructure which included rural roads and bridges, water supplies and health facilities; and institutional support, that included engineering consulting services for design and construction supervision. The project was exempted from all taxes and duties under special legislation enacted by the Government of Kenya (GoK). The projects' selection criteria was as stated in Table 1.

Manual of Procedures (MoP)

The broad scope services of the PMU technical staff were contained in the Manual of Procedures (MoP), which was prepared and agreed upon between the financing agencies and the Government of Kenya (GoK). The implementation arrangements was developed to minimize the administrative procedures related to contracting and payments which included the Special Emergency Fund (SEF), where the minister of finance established a special emergency fund which was to be provided with funds by GoK and participating donors (World Bank - IDA, Africa Development Bank - AfDB, and Agence Francaise de Developpment – AFD), and to be used to finance approved sub-projects, based on the application of agreed criteria and operating procedures contained in the MoP. The fund was to be operated as a special fund, separate from on-going GoK programs.

Project Organogram

Fig2. shows the management structure and table 2 outlines the responsibilities of various authorities that were involved in the El Nino Emergency project implementation.

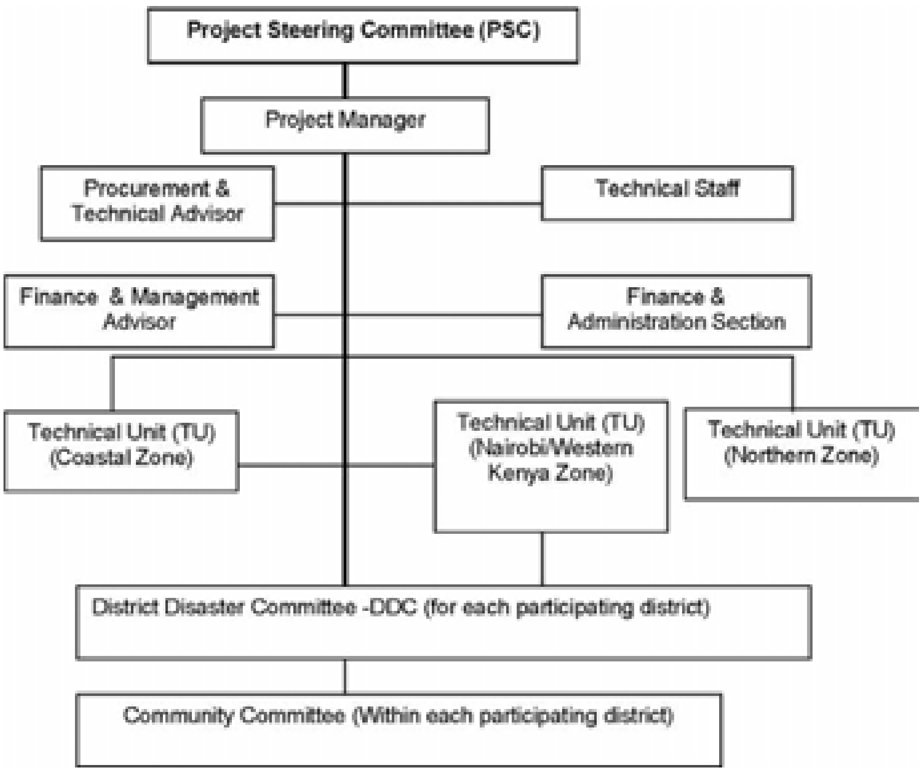

Figure 2. The management structure for the El Niño Emergency Project, Kenya.

Implementation Arrangement, Accountability Mechanisms and Checks

To ensure that the project supports and sustains priority sub-projects/activities, participation of relevant stakeholders was initiated for the purpose of identification, planning and execution, and maintenance of the sub-projects/activities. The participation was achieved by building on existing arrangements at the district/community levels. This also ensured that funds were effectively utilized; and it was achieved through DDC and community committees.

The implementation scheme for ENEP was based on other similar operations tried and tested in West Africa for the carrying out of minor public works through contracting out, and was adopted to the Kenya situation to ensure it functions effectively. The principal difference between the Kenya approach and the approach used in West Africa was the location of the PMU in the office of the president (in West Africa, the PMU were private sector agencies). Delegation of authority to the PMU by the steering committee for procurement and contract awards and other implementation tasks with very rigorous audits of the project's management and its results on the ground.

Local participation was assured through the District Disaster Committees (DDC), which comprised of stakeholders from GoK, local authorities and community members. These communities were also involved in drawing up the indicative emergency program. They were also involved in verifying priorities, in generating new projects and in environmental assessment studies after the PMU was established. Further to that, they were involved in checking on contracted works, as they were furnished with copies of the contracts for works done in their districts and were guaranteed by the PMU access to work sites. General public scrutiny of the project was accomplished through regular publication of the indicative work program, public advertising of tenders and role of the results of the bidding process, publication of the project audit reports, and public inquiries in the event of serious deviation from the expected norms.

The PSC approved the annual ruling indicative work program and changes to it and also approved the administrative budget of the PMU based upon the work program. The PSC was meeting at least once a month to check the progress and more frequently at the behest of the project manager. Since most ENEP rehabilitation works was done in the Northeast and Coast region, two units of the PMU was located there (with technical units based in Mombassa and Garissa) and manned entirely by consultants (with inputs and monitoring by the GoK technical staff). The PMU and one Technical Unit (TU) were based in Nairobi. Any deviation from MoP was to be cleared by the PSC and then approved by the International Development Association (IDA). This model, which has been tested in West Africa, and adopted to Kenya's needs, provids strong assurance that the ENEP works will be done speedily, efficiently, and transparently.

Procurement

The MoP laid out detailed instruction to be followed by the PMU for procurement of all works, consultants' services and goods. Award of the contract up to a certain threshold required the approval of the PSC but subject to prior IDA review procedures. While contracts up to a basic threshold value was directly awarded by the PMU. Contracts of lower values were procured on basis of quotations or shopping.

Environment and Project Risks

During implementation the supervision of environmental aspects and likely mitigation measures formed part of routine work. The main risks were that, it was uncertain whether the special implementation arrangements will work, as there was a shift from normal practices and a potential threat to vested interest in the then existing system. The risks were addressed through clear roles and responsibilities of the PSC, PMU and the pivotal role of the Project Manager and district-level committees/beneficiaries, periodic technical, management and physical audits and close supervision of the works.

Factors that Affected Implementation

There were external factors outside the control of governance and implementing agency, such as ethnic conflicts and banditry that hindered work progress. The GoK was reluctant to abide by certain terms of the agreements reached during credit negotiations such as; selection of project management staff; relationship between the PMU and PSC; and issues relating to the seconding staff. There were also marked delays caused by infrequent replenishment of Special Accounts (SA), thus, delays in payments to contractors and consultants. Delays were also noted in the transfer of funds from the SA to the Project Accounts and remarked delay was noted to start the overall projects implementation. Other factors were: exchange losses due to conversion of currency from one currency unit to another accompanied by cumbersome transactions; in certain instances, the OP and PSC became involved in with the management issues of the project, contrary to stipulated procedure, making the PMU's responsibility and authority unclear at times.

Achievements of the Project

The project demonstrated that streamlined procurement and payment procedures improved the efficiency of project implementation, and that some of these procedures might be adopted in any management institution in the reconstruction phase of a disaster as a mainstream project implementation practices. The overall performance of the PMU's management of the project was rated highly satisfactory. Delivered 116 IDA financed civil works contracts and 26 AfDB financed civil works contracts within a three-year period. Significant reductions in turn-around times for the procurement of consultancy services and civil works contracts were realized. The performance indicators for projects implemented under the ENEP and achievements are contained in table 3.

The average amount of time it took to sign contracts from the time of advertising the civil works bids was reduced from over 400days for conventional procurement process by Kenya Urban Transportation Infrastructure Projects (KUTIP) to just under 200 days for El Nino Emergency Projects (ENEP), this is illustrated from the table below. The Reduction of the length of time to affect payments to the contractors and consultants were realized. Average payment turn around times for ENEP were reduced from 60 days for KUTIP to 44 days under the ENEP management.

No.	*Project sector*	*Number of contracts*	*Average no. of days from contract advertisement to award*
1	*KUTIP Urban Roads*	*11*	*409*
2	*ENEP Urban Roads*	*8*	*197*
3	*ENEP Rural Roads*	*23*	*195*
4	*ENEP Water Supply*	*27*	*193*
5	*ENEP Water Supplemental*	*6*	*54*
6	*ENEP Health Facilities*	*47*	*231*
7	*ENEP Health Facilities Supplemental*	*9*	*57*

Table 1. Comparison of turn around time from bids advertisement to contract award for KUTIP and ENEP contracts

The physical output realized under the El Niño Emergency Project (ENEP) ,included both rural and urban road networks, water supplies, health facilities and related goods aimed at restoring the livelihood of the affected persons. Table 5 gives the summary of what was accomplished under the program.

No.	*Components*	*Output under IDA Financing*	*Output under AfDB Financing*
1	*Civil Works:*		
	1. Rural Roads & Bridges	*23 contracts 1,634 km of roads and numerous bridges and drifts rehabilitated*	*11 contracts*
	2. Water Supply	*31 contracts 45 water supplies rehabilitated*	*13 contracts*
	3. Health Facilities	*54 contracts 112 health facilities rehabilitated*	*Not covered*
2	*Goods*	*2 contracts for water supply chemicals and equipment plus numerous office equipment and vehicles small contracts.*	*2 contracts for water supply chemicals and equipment plus several office equipment and vehicles small contracts*
3	*Consulting Services*	*10 major consultancy services contracts including audit*	*IDA financed*
4	*Operating Costs*	*3 professional staff to manage the project plus other office support such as rent and travelling costs*	*Not covered*
5	*Civil works for Urban roads under KUTIP*	*8 contracts 67 km of urban roads rehabilitated or reconstructed*	

Table 2. Summary of the physical output of the El Nino Emergency Project (ENEP)

Monitoring and Evaluation

Quarterly financial and technical audits were required to be carried out by an independent professional accounting firm. At various time over the period of three years of implementation, technical and financial issues were identified by the audit firm and brought to the attention of the PMU and International Development Association (IDA) for resolution and improvement in the management of the identified contracts. Through this extra layer of quality control, the consulting services were improved and the quality of the infrastructure constructed under the civil works contracts was kept to a high standard for all the 116 IDA civil works contracts. Three consultancy contracts were awarded in the final year of implementation of the project to further independently assess the social impacts of the project investments and the quality of the works constructed. There were therefore four layers of checks on the quality of the contracts: the PMU; their consultants – the zonal Technical Units (TUs); the audit firm; and the monitoring and evaluation consultants. The DDC and community groups also provided monitoring in their respective areas on regular basis. The bank supervision mission also regularly visited the contract sites on a random basis to confirm and verify the information provided from various other layers of supervision.

Suitability of PMU Model

Although direct PMU organizational model structure may not be particularly recommended as a general institutional model, the more efficient delivery of outputs it attained makes it worthy to be replicated within any other formalized contracts delivery institutional framework by simply modifying existing procedures.

Practices to be Emulated

At the operational level, in order to respond to the urgent nature of the assistance required, both the GoK and the World Bank adjusted their standard practices for the implementation and financing of the emergency project. The establishment of the PMU and the PSC proved to be successful, which can be emulated where organizational structures cannot allow public sector reforms, or where the reform process is time consuming and may result in delay for the reconstruction process. The rationale of placing a single centralized PMU within OP was related to the urgent nature of the response time required and not the multi-sectoral dimensions of the interventions. The PMU was allowed to function with streamlined procurement and payment procedures contrary to if it had been placed under the government structure. The open and competitive recruitment of the 3 project management staff from outside the public civil service contributed most significantly to the improved project management and timely output of ENEP; good project management practices. The function of the PSC as an executive body to oversee the functioning of the project management can be replicated in any disaster management structure for efficient administration.

In order to hasten the implementation of the ENEP, it was agreed during project preparation that certain procurement and financial/payment procedures would have to be streamlined within the GoK systems in order to meet the agreed upon implementation schedules. The PMU was given powers to clear all procurement contracts below a given threshold while larger contracts had to obtain approval of the PSC before an award of contract could be made. This allowed quick procurement system. This functional procurement procedure can be set-up in the disaster reconstruction phase to ensure speedy implementation of the reconstruction program. In Kenya this procurement procedure has already been factored into the legislation for Public Procurement procedure and have registered considerable time reduction in the procurement process. Under the ENEP, the PMU was given an Authority to Incur Expenditure (AIE), this reduced the turn-around time for payments and it helped greatly in ensuring that payments were made on time to various consultants and contractors; most projects recorded approximately 50% of the time it took for projects financed under KUTIP. This was facilitated by reduced number of steps required in order to authorize and make payments stipulated in normal government practices.

Since the reconstruction works involve a large number of operations taking place at a time, several layers of quality control should be set out to ensure that works are carried out with high standards in order for the beneficiaries to recognize and appreciate reconstruction efforts. These audits should include financial and technical audits. The monitoring and evaluation tasks should be given an independent consultant so that the technical experts do not comprise this exercise with the day-to-day project management and supervision. During the execution of the project, PMU maintained public relations by informing the beneficiaries about the work progress. This should be adapted to all disaster reconstruction projects since it gives hope to the affected society and help them in planning of their economic activities. The information delivered to the beneficiaries was more important since the public was disillusioned by the pace of the works despite satisfactory efforts that were being undertaken by the PMU. This was because the societies were pressed with damaged transport system, water supplies and health facilities which required hasty rehabilitation.

Conclusion

Although various government have varying procurement procedures, the model that was used in El Nino projects in Kenya, is highly adaptable, through adjustment of existing institutional processes such as procurements, projects implementation and management. It enable utilization of existing personnel within the disaster area by breaking down tasks to different levels with lean top management of experienced professionals in different areas. The delegation of duties to lower level of management ensures group participation, thorough identification and resolution of the problems and thus high quality works. This also ensures belongingness of the executed projects hence accountability and eventual sustainability.

References

CARE (Jan. 1998), El Nino Flooding Part of Equation as Infectious Diseases Spread in Kenya and Somalia, Press Release. http://www.CARE.

FAO Corporate Document Repository (Feb. 1998) Heavy Rains attributed to El Nino Cause Extensive Crop Damage in Parts of Eastern Africa – Global Information and Early Warning System on Food and Agriculture (Special Report from the internet)

Manchester Development Education Project Ltd (1998), Global Express – El Nino. Edition No, 6, http://www.dep.org.uk/globalexpress

Ndikumana J., Stuth J., Kamidi R., Ossiya S., Marambiii R., and Hamlett P., (2000) Coping Mechanisms and their Efficacy in Disaster Prone-Pastoral Systems of the Greater Horn of Africa.

Republic of Kenya (June, 1998), El Nino Emergency Project Report (Technical Annexes) – Report No. T-7248-KE (Document of The World Bank).

Republic of Kenya (October 1999), El Nino Emergency Project (Manual of Procedures).

Republic of Kenya, Office of the President (Project Management Unit), (February 2004), El Nino Emergency Project (AFD Component) – Final Report.

Sandrasagra M. J. (2000) El Nino Report - UN agencies Joint report on El Niño, (Electronic Article from the internet)

Webber J., (1998), Trouble Times: El Nino (El Nino spreads Food Crisis to 37 Countries – FAO). Reuters November 9, 1998, (Electronic Article from the internet)

WFP ((Dec., 1997) WFP Emergency Report – El Nino East Africa; http//www.vita.org/disaster/wfp.

Appendix

There were four main categories of design consideration which were critical during the preparation stage of the El Nino emergency Project as outlined in the table below.

No.	*Category of Design Consideration*	*Main Actors*	*Output*
1	Geographic focus for the possible relief and rehabilitation	Multisectoral specialists (El Niño Disaster Committee) from the ministries of Roads and Public Works, Environment and Natural Resources, Health, Local Government, Finance and Planning and the Office of the President (OP).; District Commissioners, (DDC); the World Bank; and AfDF.	The El Nino Disaster Committee carried out damage assessment caused by the rains and reported that 23 of the sixty districts and Provincial city of Nairobi warranty priority emergency operations; Initial planning for emergency operation in areas most critically impacted by flooding; maintenance of constant liaison between the El Nino Disaster Committee and with the District Disaster Committees (DDC) and District Commissioners; Appraisal and negotiations mission between the World Bank and GoK and AfDF and GoK; Broadening of selection criteria and additional 12 districts found to be eligible for emergency assistance, bringing a total to 35 districts and the Province of Nairobi.

2	Identification criteria and process for selecting beneficiaries	District Commissioners; District Officers with responsibilities for health, food relief, roads, bridges, water supply, and transport and communication; District Disaster Committees (DDC);	Setting up District Disaster Committees; establishment of high priority needs (food and drug supplies); distribution of drugs in cu-off areas; establishment of facilities that required immediate restoration; prioritization of each district projects and targeting of beneficiaries based on: life saving interventions, restoration of essential services, restoration of economic activities, and saving of existing assets; budget allocation based on population density and severity of damage
3	Critical sectors for intervention	DDC, IDA, GoK	Identification of priority sectors of intervention requiring rehabilitation and repairs: rural and urban roads, health facilities, and restoration of water supply services. Presented by DDC to Office of the President (OP), and by OP to IDA for urgent financing.
4	Institutional arrangements for the management of emergency services	GoK -OP, World Bank	Negotiations that led to acceptance of financing El Nino Emergency Project even though Kenya was in a low case-lending scenario by the World Bank due governance and corruption issues; device of ways to direct credit towards assisting only those potential beneficiaries worst affected by the El Nino storm events and how intervention measures will be best operationalized; change of initial GoK proposal of having separate management units by sectoral ministries to the more efficient and quick way of using skilled and experienced project management specialists from the private sector; A greed on management of the project fairly autonomous from GoK entity within (OP); recruitment of officers from private sector with extensive experience to fill the management positions; agreement on secondment of the technical staff from line ministries to manage the projects; full management of ENEP was under control of PMU from May, 1998.

Table 1. Projects selection criteria.

No.	*Authority*	*Responsibility*
1	Project steering committee (PSC), Comprised of: the Permanent Secretary to the Cabinet and Head of Public Service (Chairman), Permanent Secretary in the Office of the President (Alternative Chairman); Permanent Secretaries for participating ministries: OP/Relief and Rehabilitation, OP/Provincial administration, OP/Development coordination, Local Authorities, Public Works and Housing, Water Resources Development, Health and Finance; PMU Project Manager (Secretary); Technical advisor procurement and engineering services, and Finance and management advisor.	1. Provide overall policy and ensure the projects' objectives are achieved, in conformity with an agreed Manual of Procedures (MoP). 2. Identify and take action on the institutional requirements for the projects in terms of physical facilities, equipments and staff, and staff recruitment. 3. Approve project plan of operations, budgets and other activities presented for funding. 4. Award contracts based on procurement guidelines stipulated in MoP. 5. Supervise project implementation at all levels. 6. Report to the participating donors on the project activities.

2	Project Management Unit (PMU), headed by the Project Manager who was regarded as the team leader of the PMU, together with the Procurement and engineering and Finance Controller, were from the private sector; supported by technical staff from the Public Service Commission.	1. Manage the projects' activities: responsible to the Projects Steering Committee (PSC) on the day-to-day operations of the Special Fund including: 2. Receiving and analyzing demands for funding for sub-projects/activities resulting from El Nino floods. 3. Preparing sub-projects, overall project and operating budget for the projects and recommending sub-projects for PSC approval. 4. Preparing bidding documents, calling for evaluation of bids and issuing letters of award. 5. Supervising consultants and contractors and making payments to them. 6. Ensuring that independent technical and financial audits are carried out.
	Project manager	1. Secretary to the PSC and head of PMU 2. Plan, direct, control and coordinate project activities against the broad policies laid down by the PSC, as well as against specific project targets, processes and goals. 3. Reporting to the PSC on daily operations of the project. 4. Oversee the project activities against the laid down guidelines including implementation of management, financial and technical audits. 5. Monitor projects impacts, lessons learnt and budgetary trends. 6. Ensure that there is structured and consistent monitoring of progress of implementation, including the regular reports as outlined in the Plan of Operation 7. Assign and monitor performance of technical consultants in accordance to the agreed contractual obligations.
	Procurement and engineering advisor, and Finance and management advisor; and Seconded staff from Public Service Commission	1. Answerable to the Project Manager for technical inputs into identification, evaluation and prioritization of all sub-projects, and prequalification of contractors to implement the works. 2. Monitor the performance of the Technical Units (TU) and the contractors, and to draw any matters of concern to the attention of the Project Manager. 3. Liaise with the respective District implementation teams and relevant authorities, to help ensure project objectives are being adhered to, through witnessing the taking-over of each sub-project Works on completion. 4. Verify progress reports, extent to which objectives are being realized; with option of forwarding any particular report to the PSC when teemed appropriate.

	Technical Units	This included : 1. Private engineering consultants responsible to the PMU for sub-project assessment and review of submitted priorities, undertake detailed design of rehabilitation or reconstruction works, develop tender documents, support PMU in tender evaluation and supervise contractors from mobilization to completion including defect liability period. 2. Management and financial auditing consultants responsible for identifying shortcomings which were rectified during implementation.
3	District Disaster Committee (DDC) for the each district included in the emergency project. Membership from governmental and nongovernmental organization on equal basis.	Chaired by the District Commissioner and constituting technical officers from line Ministries at district level. Received budgetary envelop to enable DDC prioritize their proposal which were forwarded to the PMU for further review. 1. Responsible for close monitoring of projects in their respective areas on regular basis. 2. Assist in identification, and prioritization of sub-projects/activities
4	Community Committee	Formed as a component of projects monitoring, project identification and planning, took a stake individually or as community committees on the project. Provided their proposal to the DDC.

Table 2. Responsibilities of Various Authorities During ENEP

No.	*Indicator/ Matrix*	*Actual/Latest Estimate*
1	Economic activity restored in 23 impacted districts and the province of Nairobi through the restoration of potable water supply	1. Implementation of 33 water supply contracts 2. Rehabilitation of 45 water supply systems and 1 sewerage system
2	Increased accessibility through restoration/improvement of roads in the non-urban areas	1. Implementation of 23 rural roads and bridges contracts. 2. Rehabilitation and reconstruction of 1,634 km of gravel roads and numerous culverts, drifts and bridges.
3	Minimize the loss of human life through restoration of health facilities	1. Implementation of 54 health facilities contracts. 2. Rehabilitation of 112 health facilities.
4	Increased accessibility through restoration/improvement of roads in urban areas	1. Implementation of 8 urban roads contracts. 2. Rehabilitation of 67 km of bitumen roads in six urban centres.

Table 3. Summary of the performance indicators and the achievements
of the projects implemented under ENEP

SEISMIC ASSESSMENT OF POPULAR HOUSING FINANCED BY THE EUROPEAN COMMISSION FOLLOWING THE EL SALVADOR EARTHQUAKES OF 2001

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Abstract

The European Commission, through the Europe-Aid Cooperation Office (AIDCO) established in 2002 a Co-operation Project with a contribution of 25 million Euro to the Government of El Salvador for the construction of approximately 6000 new houses for the recovery of the population affected by the January and February earthquakes of 2001. The Joint Research Centre (JRC) of the European Commission (EC) offered to the EC Delegation in Managua, who is responsible for monitoring the advancement of the project, scientific and technical support to improve the quality of the project, in particular with respect to the quality of the seismic performance of the new houses. Two models were proposed by the Government of El Salvador: a reinforced concrete block masonry house and a prefabricated house. The present report deals with the prefabricated house, as this construction type is not envisioned by the Construction Norms of El Salvador. The JRC performed incremental nonlinear time history dynamic analysis to model the earthquake response of the different typologies proposed by the NGOs and contractors in charge of the construction. The results show that cracking initiates at 10% of the design PGA, while the shear capacity of the column posts is reached at 80% of the design PGA. A new detailing is proposed to improve the response of the structure, reducing displacements by a third and shear forces in the columns by 40%, with no increase in the initial cost. The experience of the seismic assessment shows that it is important to keep record of all modifications and details proposed by the contractors and to adopt clear and reliable details that can guarantee adequate seismic performance.

Keywords: Temporary housing, reconstruction, prefabrication, seismic.

Introduction

The European Union (EU) is one of the major actors in International co-operation and development assistance, providing along with Member States 55% of total International Official Development Assistance (ODA) and more than two thirds of grant aid. In this context, the European Commission (EC), through the Europe-Aid Cooperation Office (AIDCO) established a Co-operation Project in 2002 with a contribution of 25 million Euro to the Government of El Salvador for the construction of approximately 6000 new houses for the recovery of the population affected by the January and February earthquakes of 2001.

The Co-operation project involves the participation of Institutions form El Salvador Government, namely the El Salvador Social Investment Fund (FISDL) and the Popular Housing National Fund (FONAVIPO), who are responsible for the implementation and execution of the project. The progress and fulfilment of the project is monitored by the EC Delegation in Managua, who is interested in maintaining a high standard of the quality of the project.

In this framework the Joint Research Centre (JRC) of the EC offered Scientific and Technical (S&T) support to the EC Delegation to assess the seismic performance of the new houses constructed under the co-operation project.

Post-Disaster Reconstruction : Meeting Stakeholder Interests : Proceedings of a conference held at the Scuola di Sanità Militare, Florence, Italy 17-19 May 2006, edited by David Alexander, Colin Henry Davidson, Andrew Fox, Cassidy Johnson, Gonzalo Lizzaralde, ISBN 978-88-8453-611-2 (online), ISBN 978-88-8453-612-9 (print), © Firenze university press, 2007

Description of the Project

The designs proposed for the project consisted of two building types, a reinforced concrete block masonry (RCBM) house (Fig. 1), and a reinforced concrete (RC) prefabricated house (Fig. 2), with an area of approximately 36 m2 for a family of four to be constructed in rural and semi-rural areas. The designs were produced at a preliminary stage by FONAVIPO and their construction was contracted to NGOs and other contractors from El Salvador, who were responsible for the production of executive drawings that included construction details and eventual variations from the preliminary design.

The S&T support given by the JRC consisted in assessing the seismic performance of the two building types, in order to determine the level of damage sustained at earthquakes of increasing intensity, and propose eventual modifications and/or additions to improve performance, especially for those houses presently under construction.

The intervention of the JRC is considered of outmost importance, as many of the details and modifications proposed by the contractors are not always reviewed by the Governmental institutions, and construction details are not always executed as indicated in plans.

Figure 1. RCBM House

Figure 2. RC Prefabricated house

The seismic assessment described in the report refers in particular to the prefabricated house, as this building type is not explicitly envisioned by the Construction Norms and thus requires detailed analytical tools to trace its performance at large levels of earthquake intensity. However, the recommendations given at the end of the assessment apply both to the prefabricated and the RCBM house.

Description of the Prefabricated House

The prefabricated house consists of a system made of RC column posts of 15 cm x 15 cm cross section and 50 cm x 5 cm RC panels of variable length (See Figs. 3, 4, 5, 6 and 7). The panels are slid between the column posts through 4 cm deep railings and the horizontal and vertical spaces left at the panel-to-panel and panel-to-column interfaces are filled with mortar after all panels are placed in their final position. The column posts are tied at the top with a crown-beam system, while a light corrugated zinc-aluminium roof is supported by light steel beams connected to the walls.

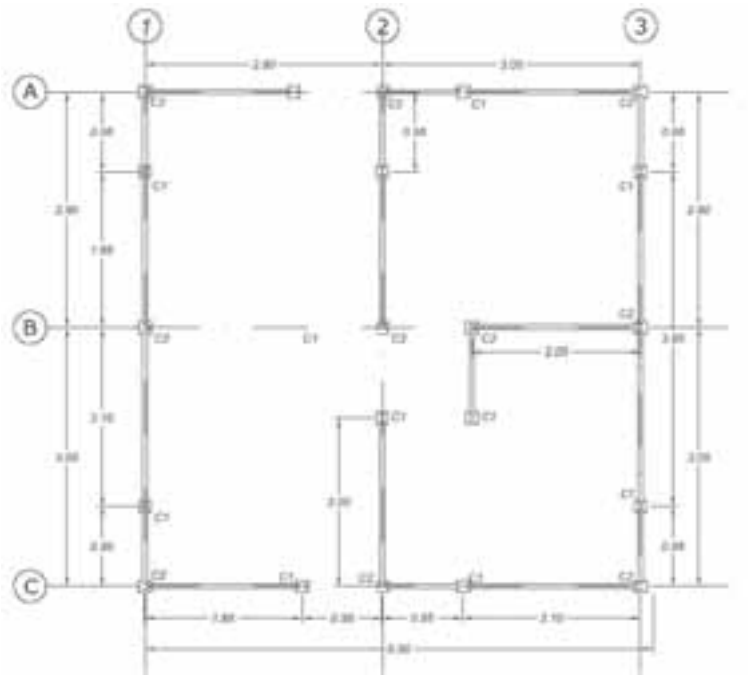

Figure 3 – Plan geometry of prefabricated house

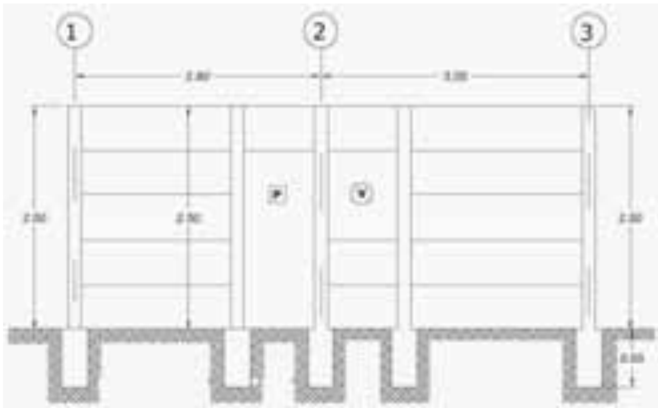

Figure 4. Elevation at axis A

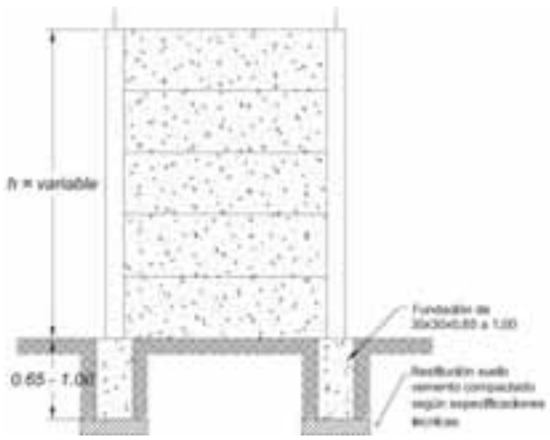

Figure 5. Elevation of panel-column post assembly

Figure 6. Detailed of RC panel

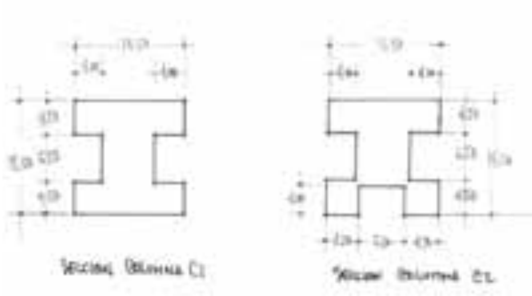

Figure 7. Cross section of column posts

Earthquake Analysis

Finite Element Model. The prefabricated house was modelled using finite elements at the level of detail of members, using frame elements (uncoupled flexural, shear and axial behaviour) and concentrated non-linearity (Fig. 8). The frame elements were used to model the column posts, the panels, the crown beam and the steel beams supporting the roof, while the roof was modelled with shell elements. The non-linear elements were used to model the plastic hinging of the columns at the base, the in-plane relative sliding of the panels and the pounding of the panels with respect to the column posts at the railings.

The analysis was performed for several typologies of the prefabricated house, recognising the modifications proposed by the different NGOs, as well as the construction problems observed in the field, namely, the connection of the steel beams supporting the roof with the wall.

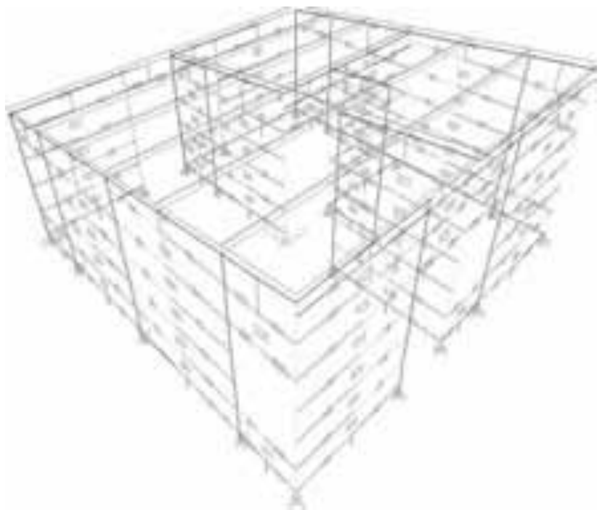

Figure 8. FEM Model

For the tie beam the contractors proposed two solutions: a first solution that considers a RC beam connected to the top of the column posts, and a second one that considers the top panels grouted through a pinned connection with the column posts. For the steel beam supporting the roof the contractors adopted the use of two types of members: a steel joist truss and a channel cold-formed section. Considering all these possibilities, five models were analysed:-

- with roof / joist truss / RC crown beam
- no roof / joist truss / RC crown beam
- with roof / joist truss / pinned panel
- no roof / joist truss / pined panel
- with roof / channel section / pinned panel

The ‘no roof’ label stands for the case were the connection of the steel beam supporting the roof with the panel is not active, while the mass of the steel beam and roof are still present in the analysis. The case of the channel section with no roof was not considered, as the construction of the houses with this solution had not started at the time of the seismic assessment and no problems associated with the execution of the connection of the channel section with the panel, as indicated in plans, are expected.

Basis of analysis. Time-history dynamic analyses, both linear and non-linear, were performed to assess the seismic performance of the five typologies. Push-over analysis was not performed, because the continuous mass distribution of the model did not allow choosing a particular mode shape nor a displacement degree of freedom to be traced.

The capacity of members was derived, where possible, from the Uniform Building Code (1997) and from Eurocode 2 (2003), as well as from available state-of-the-art literature.

The seismic input was represented by three artificial time histories compatible with the El Salvador response spectrum (Norma Técnica para Diseño por Sismo 1994) and equivalent to a peak ground acceleration (PGA) of 0.4g, corresponding to a return period of 475 years (Fig. 9); each time history was contemporarily imposed in the two orthogonal directions of the model to excite the torsional modes of the structure and to reduce the number of cases of the study. The most adverse result from the analyses performed with each of the three time histories was used for the seismic assessment.

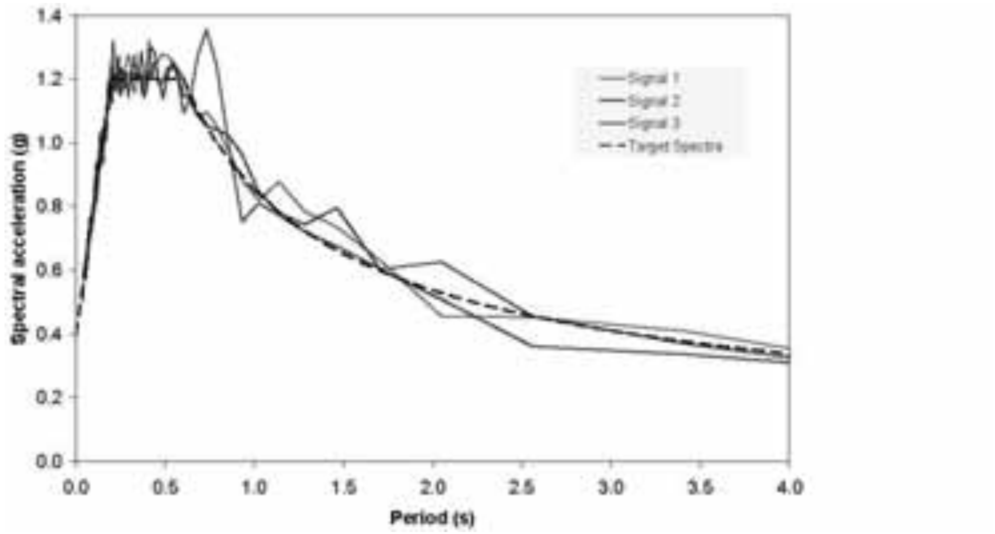

Figure 9. Response Spectrum of the three time histories

Linear Analysis. Linear analysis was first performed on all typologies considering that the grout linking all panel-to-panel and panel-to-column posts filled from 25% to 100% of the joint, in order to determine at what level of PGA the capacity of the grout joints was exceeded. It was found that the level of PGA that causes first failure of any panel-to-column post joint ranges from 0.007g to 0.071g, while failure of the pane-to-panel joints (considering that all panel-to-column post joints have reached their capacity) ranges from 0.098g to 0.223g. These results indicate that for large levels of PGA the grouted joints can be considered to have reached their capacity of transferring shear, thus activating shear friction between panels and pounding between panel and column posts, as considered by the non-linear model.

Non-linear Analysis. Non-linear analysis was performed incrementally at PGA levels of 0.08g, 0.16g, 0.24g, 0.32g and 0.40g (20%, 40%, 60%, 80% and 100% of the design PGA) for all the five typologies, considering 5% Rayleigh damping assigned to the first mode frequency of the model and to a frequency of 40 Hz (representing the higher modes in the in-plane direction). The first mode of the model varied from 5 Hz to 2.5 Hz, depending on the level of damage and the typology considered.

The non-linear analysis was performed incrementally to trace the load-displacement envelope of the structure and to assess performance at lower levels of the design PGA, corresponding either to a lower reference time or a higher probability of exceedance of the earthquake event (i.e., lower periods of return of the earthquake event) (Fig. 10).

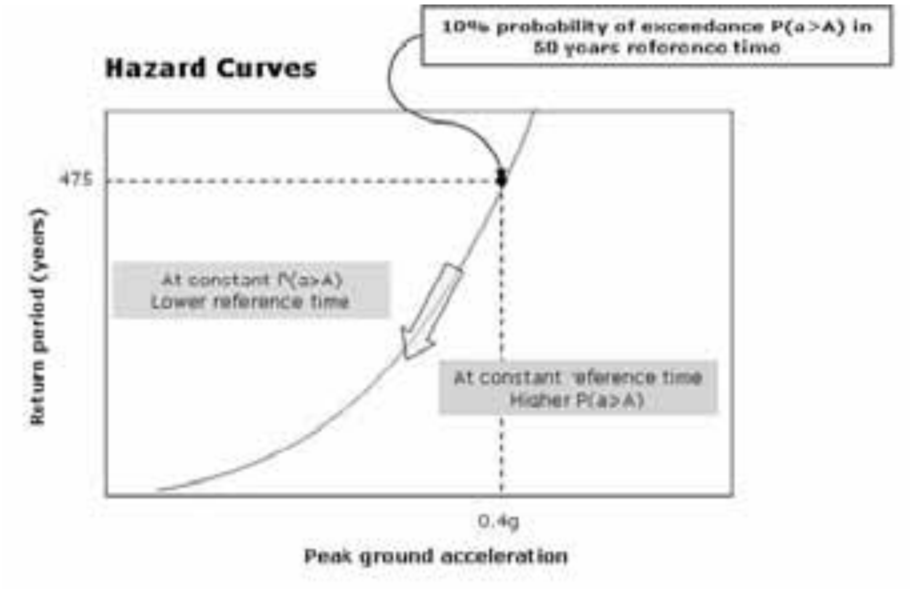

Figure 10. Force displacement demands for all typologies

Interpretation of the Results. The force displacement envelopes, damage states and failure modes, for increasing levels of acceleration are summarised in Fig. 11 for all the typologies considered, in terms of the SRSS of the maximum base shear and of the maximum displacements of any node in the model in the two orthogonal directions. The envelope of the “no roof / joist truss / pinned panel” typology is not shown, as it is equal to that of the “with roof / joist truss / pinned panel” typology, where the connection of the beams supporting the roof with the wall fail before reaching 0.08g.

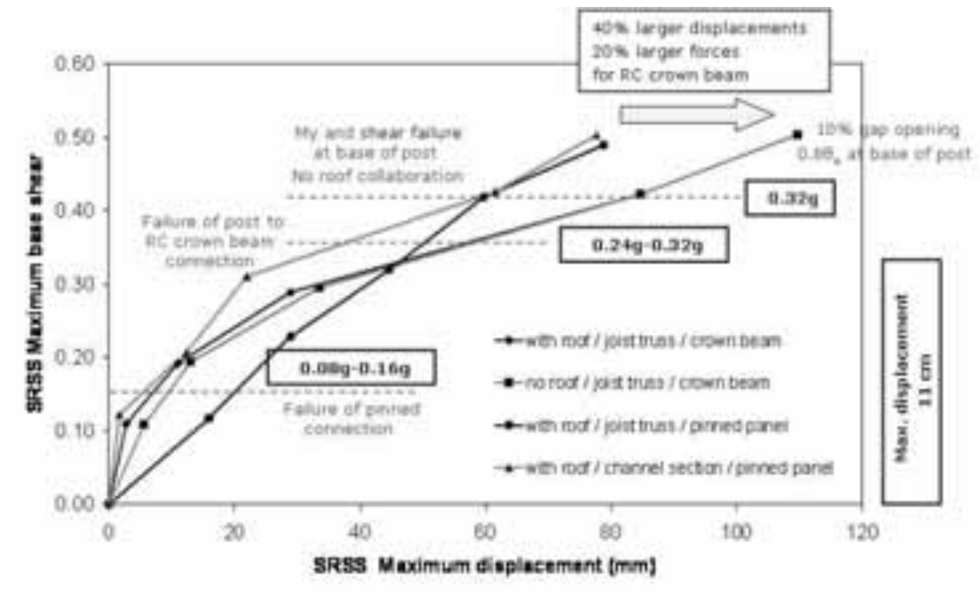

Figure 11. Column post to RC crown beam connection

The results show that the role of a good connection of the roof with the panel is important at low to medium levels of PGA (up to 0.32g), limiting displacements and the level of cracking. Above this level of PGA the connections of the roof with the wall panels fail (failure takes place at a higher PGA for the channel section connection) and the roof is no longer able to limit damage of the structure.

At low levels of PGA (between 0.08g and 0.16g) and at medium levels of PGA (between 0.24g and 0.32g), the pinned panel-to-column grouted connection (Fig. 12) and the column post to RC crown beam connection (Fig. 13), respectively, reach their capacity, thus loosing any in-plane connection between the panels and the column posts. The transfer of the out-of-plane inertial loads of the wall panels to the structure is ensured by direct contact of the panels inside the railings of the column posts.

Figure12. Pinned panel-to-column post grouted connection.

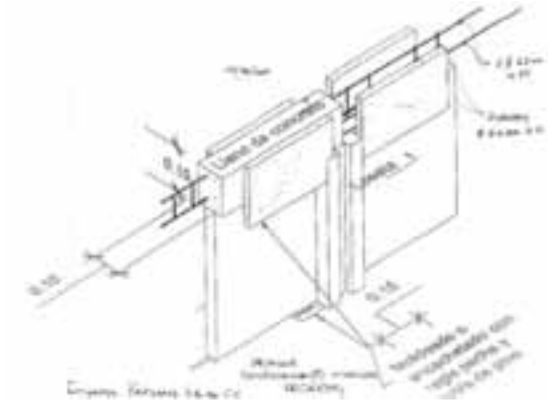

Figure 13. Column post to RC crown beam connection.

At large levels of PGA, equal to 0.32g and above, it was found that the shear capacity of some of the column posts (especially at the "T" intersections) was exceeded (Fig. 14).

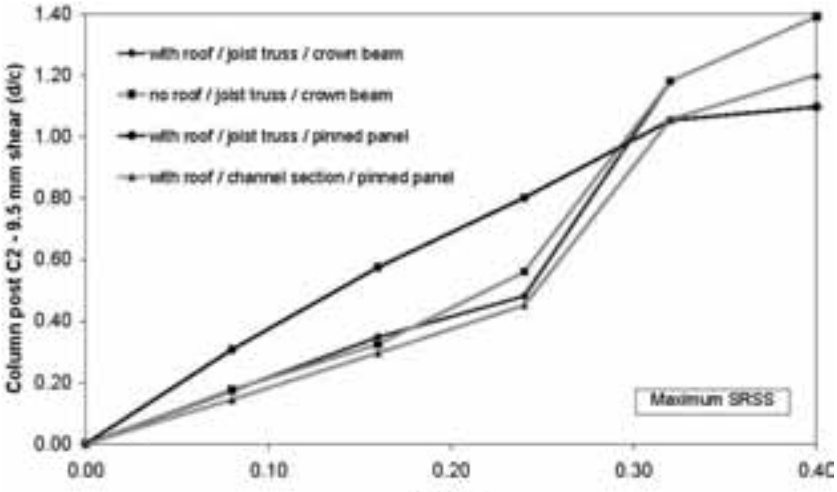

Figure 14. Column post shear demand/capacity rations for all typologies.

The typology with the RC crown beam had force and displacement demands 20% and 40%, respectively, larger than those of the typology with the pinned panel-to-column grouted connections; the worst performance of the first typology was due to the larger mass of the RC crown beam at the top of the structure.

Concerning the non-linear effects due to friction and pounding, at large levels of PGA, all wall panels slide with respect to each other, while nearly 10% of wall panels exceed the available contact of 2 cm inside the railings of the column post. At the base of column posts the yield rotation is reached for all typologies at a PGA of 0.32g, while plastic rotations are kept below 80% of the ultimate capacity at a PGA of 0.40g.

Although the results from the analysis show that the performance of the five typologies is not satisfactory at the design PGA of 0.40g, it may be possible to consider a lower value of 0.32g as the PGA associated to the ultimate limit state of the structure, if a lower reference life of the structure or a higher probability of exceedance of the earthquake event are accepted by the stakeholders involved in the project (See Fig. 10).

Proposed Solutions

In view of the results obtained from the analysis, two solutions were proposed to improve seismic performance. The first solution corresponds to the typology with the roof supported by the joist truss beam, whereby the RC crown beam is replaced by a 9.5 mm diameter steel reinforcement bar welded to vertical bars extending from the top of the column posts and from the top-centre of the wall panels.

A similar solution is proposed for the typology with the roof supported by the channel section, whereby the column posts and the top wall panels are linked by a 5 cm x 5 cm "L" cold-formed section. The connection of the "L" section with the channel section supporting the roof and with the column posts and wall panels may be realised by either welding or by bearing of the vertical bar extending from the column posts and wall panels through holes pierced on the flanges of the cold-form sections.

In both solutions no pins are used to connect the top panels to the column posts. The analysis showed that the performance of both solutions is notably improved with respect to the typologies presently under construction, with displacements reduced up to a third and shear demands on the column posts reduced by 40%.

The main factor owing to the better performance of the proposed solutions is the lower mass (light steel element, as opposed to a RC crown beam) and the more effective connection linking in-plane the column posts and wall panels (welded steel bar or "L" cold formed section) at the top of the structure. The solution comes at a reduced cost with better control on the quality of construction.

Simplified Model

A simplified linear model is proposed as an alternative to the more detailed non-linear model, whereby only the column posts, the elements linking the top of the column posts and the elements supporting the roof are modelled.

The wall panels and the roof are considered in the model only by their inertia contribution: the out-of-plane mass of the panel is concentrated at the column posts, while the mass contribution of the roof is concentrated at the nodes connecting the elements supporting the roof with the elements linking the top of the column posts and wall panels. The model assumes that the in-plane inertia of the panels (not accounted by the model) is directly transferred from panel to panel to the ground.

The results of linear analysis, assuming a damping of 15%, show good agreement with the results from non-linear analysis.

Conclusions

The results from the seismic assessment on the prefabricated house indicate that:-

- Cracking initiates at approximately 0.10g PGA, with adequate performance of the structure up to a maximum PGA of 0.32g.
- At and above 0.32g PGA the structure reaches its ultimate capacity, due to shear failure of the column posts at some of the "T" intersections and to excessive opening of the joints between the column posts and the wall panels.

- A solution to improve seismic performance with no increase in the initial cost is possible, whereby the RC crown beam is replaced by a light steel element that reduces the inertial forces and allows for connections of higher quality.
- A simplified linear model that disregards the stiffness contribution of the wall panels and roof is capable of adequately representing the seismic behaviour of the structure.

Recommendations

From the experience gathered, it is possible to identify several aspects that are crucial for achieving a good quality of reconstruction projects similar to the type described herein:-

- Where non-standard typologies are proposed for the construction of new houses, a conservative, simple design check should be performed disregarding all possible mechanisms not envisioned by the Construction Norms.
- It is necessary to keep a record of all the modifications, changes and details proposed by the different contractors adopting a basic preliminary design; these changes should be checked against the National Construction Norms.
- All details must be clearly indicated in the design drawings in order to avoid interpretations in the field; moreover, the details must be simple and achievable in the field, with good quality and minimum inspection.
- Improved seismic performance can only be achieved by developing reliable, sound and clear detailing.

References

Eurocode 2 (2003). *Design of concrete structures – Part 1-1: General rules and rules for buildings*, European Standard prEN 1992-1-1.

Norma Técnica para Diseño por Sismo (1994), *Reglamento para la Seguridad Estructural de las Construcciones*, Ministerio de Obras Públicas, República de El Salvador, El Salvador.

Uniform Building Code (1997), *Volume 2*, International Building Code Council.

HARMONISATION OF PROCEDURES AND POST-DISASTER SETTLEMENT PROPOSAL IN PIEDMONT

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Abstract

The paper discusses the methods for the planning of temporary accommodation operations following natural emergencies in a diversified territorial setting (Piedmont, Italy). The research was carried out by Turin Polytechnic and the Piedmont Region and focuses on the prevention aspects. The output of the research is a pilot project with proposed constructive system (residential/productive units) for use in two towns in Piedmont, Pinerolo (Torino) and Castelmagno (CN). It emphasises that the application of preventive measures requires a review of the methods applied in accordance with the way in which the territory is inhabited and the local context, with the use of appropriate technology and spatial distribution that takes the new user requirements into account.

Keywords: seismic risk; civil protection; temporary emergency accommodation technologies; requirements; residential/production units.

Introduction

Preventive measures make up the fundamental basis of civil protection operations. Programming with a view to reducing and mitigating risk has always been regarded as the reference policy and philosophy, whose application has frequently come into conflict with territorial and town planning approaches that dedicate insufficient attention to environmental safety. Civil protection has therefore had to tackle a number of critical points in its attempt to achieve its ambitious aim of transforming an emergency into a routine event (Bocchi, 1985). This approach, adopted within models based on the theory of risk, has made it possible to draw a distinction between *programming* and *planning*.

While risk is a function of the probability of occurrence and the vulnerability of the people (Catarinussi and Pelanda, 1981) and property exposed to an event, the role of civil protection by its very nature is damage limitation. Vulnerability, which can be broken down into *susceptibility and resilience*, therefore takes on a strategic connotation. S*usceptibility* expresses the fragility of the elements exposed to the risk and may be quantified. *Resilience* takes into account the various fragility factors and enables us to plan and dimension the response that civil protection has to provide. The planning of the response requires the availability of a detailed list of the material resources necessary to deal with the events. This preventive activity is significant and of a determining nature not only with a view to providing and managing resources and materials, but also becomes essential when areas have to be set up for the shelter of the population.

Experiences of recent years with complex events requiring a response in terms of accommodation have emphasised the need to review the overall sociological, environmental and technological nature of emergency accommodation. We should recall the impact and shortcomings which have emerged from recent aid operations in which widespread use was made of obsolete accommodation structures that are un-

Post-Disaster Reconstruction : Meeting Stakeholder Interests : Proceedings of a conference held at the Scuola di Sanità Militare, Florence, Italy 17-19 May 2006, edited by David Alexander, Colin Henry Davidson, Andrew Fox, Cassidy Johnson, Gonzalo Lizzaralde, ISBN 978-88-8453-611-2 (online), ISBN 978-88-8453-612-9 (print), © Firenze university press, 2007

able to satisfy 'evolved' requirements. Methods of prevention in this area therefore have to be reviewed on the basis of the historic stratification of ways of living, as well as the new developments in user requirements. For this reason, there are a number of questions that have to be answered if we are to identify a new approach and a new planning strategy.

Can the building standards currently adopted in emergency situations apply in different environmental and cultural contexts? (Foti, 1989)

Social and functional models consolidate rules and customs. Are the prefabricated buildings used in emergencies able to guarantee that continuous, often unexpected transformations of behaviour will be able to take place in adequate and suitable physical spaces? (Mango, 1984) Are construction and plant technologies capable of offering service levels compatible with the immediate response capability required of the civil protection forces?

DINSE and a number of civil protection experts from the Piedmont Region have set up a temporary emergency accommodation research group to consider the various seismic risk situations and draw up an emergency accommodation plan that will be able to respond to new accommodation requirements, while at the same time harmonising the public solidarity response and guaranteeing the economic sustainability of the operations.

The Area of Application

Many disastrous events, such as flooding and avalanches, remain fresh in the memory of the population of Piedmont. By comparison with these, the risk of earthquake may appear to be of secondary importance.

A rational acknowledgement of the real situation has however brought to light that there have been earthquakes in Piedmont in relatively recent times. From 1276 to the present time, no less than 23 'powerful earthquakes' (Guidoboni *et al.*, 1995) have been documented by the National Institute of Geophysics with epicentres in the region or surrounding areas.[1] In the recent review of the chart of seismic risks in the region, the high level of monitoring of terrestrial movement has shown that the territory potentially at risk is greater than was originally suspected. 38 settlements are currently subject to earthquake risk level 2 and another 154 are at level 3, while 1000 are classified as low risk areas. In percentage terms, the area is limited, and is concentrated above all in the south western piedmont and mountain zone of the Maritime Alps and the Cozie and Graie ranges, where the movements of the earth's plates are however of low intensity (maximum magnitude 3.2), but continuous and relatively regular.[2] On the basis of the above, we selected Pinerolo in the province of Turin and Castelmagno in the province of Cuneo as specific case studies for the testing of the temporary structure project.

The demographic, morphological, environmental and socioeconomic features of these two locations are radically different. Pinerolo is a medium sized town (population 35,331) in the piedmont zone with a temperate climate of hot summers and cold winters, a high density of population, a metropolitan style social structure and an important architectural heritage, located in a zone at earthquake risk 2, while

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[1] Particularly significant are the two 1808 episodes (2nd and 16th April), when a force 8 movement on the Mercalli scale with epicentre in Luserna San Giovanni struck the Pinerolo area, with around 15,000 settlement shocks that continued for several months. There were 2 victims and many injured, but the damage was enormous and the social implications were severe for the entire area around the town of Pinerolo, here the risk levels are still high and classified as level 2, the highest in the region. See GUIDOBONI, E., *op.cit*.

[2] See *www.ingrm.it.* The *recent earthquakes* entry lists all the episodes that occurred in 2002 and 2003. From this information, we can see that the plate movements affect the Maritime Alps, Cozie and Graie zone virtually every month.

Castelmagno is a small mountain village with a population of 163 spread over a wide area, located at altitudes ranging from 800 to 2,000 metres above sea level. It has recently been revitalised by the official recognition of the locally produced cheese, and is in a zone at earthquake risk 3.

The Project Philosophy

The fundamental objective of the operation is to set up an accommodation module to be applied in emergency situations. The formal and technological aspects are based on past experience in this sector (Donato,1983), and the aim is to offer a significant quality upgrade with respect to the proposals currently available on the market, which will ensure that the structures are compatible with the different situations that could emerge in the earthquake risk areas of Piedmont (EDIL-PRO,1983).

More specifically, in a region with a particularly delicate mountain environment, it is important to ensure that the solutions are valid for zones of this kind, while at the same time ensuring a uniformity of construction elements, assembly and erection methods, to enable the protection organisation to simplify the operations in a highly complex situation as far as this is possible.

In the event of catastrophes, the emergency accommodation installed has to take into account not only the residential problem, but also the continuation of a series of productive operations that make up the backbone of the local resources. Consequently, one of the objectives of this proposal is to ensure that the structures can adapt to non-residential requirements.

The general objectives can therefore be summed up as follows:-

- maintenance of the levels of quality of life by providing spaces in which the
- traditional ways of living and working can continue
- adaptability to settlements of different sizes
- adaptability to different functions
- adaptability to the environmental context through different structural solutions
- focus on the control of thermal flows from winter to summer and vice versa, by separating the technological subsystems and differentiating the services provided
- structures which are easy to assembly, dismantle and store, by ensuring that the pre-assembled module is of compact volumes
- dry assembly methods
- use of technical elements based on existing production and available on the Italian market
- interchangeable technological subsystems, with particular reference to plant and equipment or furnishings
- minimum impact on the site.

General Principles for the Selection of the Areas

The first stage of the project involves the selection and organisation of the areas in which the emergency settlements are to be built. The variable nature of the environmental and social situations makes it necessary to assess each single case and the specific responses to it (Bologna, 2005). However, we have taken into account a number of fundamental requirements that have influenced the selection of the areas and the structuring proposals for these (Zaffagnini, 1981).

For the selection of the area:-

- absence of hydrogeological risks
- dimensions suitable to achieve a good level of urban organization without creating excessive congestion

- close to the historic settlement
- close to infrastructures.

For the organisation of the area:-
- grouping into settlement subsystems in which neighbours are familiar with each other
- grouping of the outside spaces into private, semi-private and collective areas
- differentiation of the settlements, with service structures and areas in which local businesses can continue to operate.

Specific Criteria

Pinerolo (TO). In accordance with the terms of article 15 of law 225/92, in December 2002 a Civil Protection Plan for Aid in the Event of Natural or Man-made Catastrophes was drawn up for Pinerolo, in which 7 muster areas were identified for use in the various stages in the evolution of the emergency (holding, recovery and assembly, helicopter landing pads and areas for the accumulation of rubble).

These are all on flat ground. Some are near the town centre, while others are on the outskirts, in diametrically opposite positions with respect to the urban mass. Among these, the local government has indicated two which it believes are particularly suitable as emergency accommodation areas, with dimensions in proportion to the town's population.

The final selection of Piazza d'Armi, currently used as a trade fair, circus and equestrian event area, is the result of a comparison of various factors, of which the following were of a determining nature:-
- the absence of hydrogeological risk, as confirmed by the National Cartographic Gateway,[3]
- the dimensions of approximately 26,400 sq. m (see table 1). By applying the National Civil Protection guidelines (Italian Prime Minister's Office, Department of Civil Protection), it will be possible to obtain a settlement capable of housing 200 people, with good levels of urban organization without creating overcrowding
- the position near the town centre, where there are medium levels of congestion and strong links with the historic and more recent built-up areas the infrastructures. Two roads, Strada Fenestrelle and Via Don Minzoni, run along the edge of the area, the helicopter landing pad is nearby, there are water and electricity supplies and full connections to the sewage network can be easily made.

AREA	m^2	%
Overall (SC)	26400	100%
Common green areas	9240	35%
Asphalted (B)	5280	20%
Gross residential area (SLR)	7920	30%
Services (S)	3960	15%
Gross area (SL)	17160	

Table 1. Pinerolo (TO): dimensions in accordance with ministerial guidelines

Castelmagno (CN). This area occupies part of the space indicated by the local government in the civil protection plan as a helicopter landing zone. Near the Sanctuary

[3] The National Cartographic Gateway (www.atlanteitaliano.it) was set up following the agreement between the state and the regions of 12 October 2000, and currently contains the hydrogeological risk charts.

of San Magno (1800 m above sea level), this zone is currently used as a car park during the tourist season.

It is regarded as suitable because:-

- there are no hydrogeological restrictions
- the presence of the Sanctuary means that the area is connected to the road and service network
- on the basis of National Civil Protection guidelines, 17 structures can be built on the site, to house 34 people, with 3 units to be dedicated to cheese production and 3 for common services (shops, first aid posts, etc)
- the presence of the Sanctuary also creates a planning challenge, as the situation is delicate not only in environmental terms but also because of the presence of this historic religious site
- as the area in which the emergency structures are concentrated, all requirements are catered for, Given the history of territorial settlement in the Castelmagno area, further constructions will be required in the livestock and pasture zones.

AREA	m^2	%
Overall (SC)	5400	100%
Common green areas	1890	35%
Asphalted (B)	1080	20%
Gross residential area (SLR)	1350	25%
Gross production area (SLP)	270	5%
Services (S)	810	15%
Gross area (SL)	3510	

Table 2. Castelmagno (CN):
dimensions in accordance with Ministerial guidelines

General Plan for the Layout of the Areas

Pinerolo (TO). The area will be mainly used for residential purposes, but provision will also be made for the church and markets, which will be at the service of the entire population. The layout will be based on the mediaeval plan (Casalis,1833), with the church in a central position, surrounded by the markets, an arrangement that will be familiar to the community.

The *accommodation units,* consisting of the dwelling zone itself and the entrance, car parks and the common areas in which a number of outdoor activities may take place – eating, agricultural and other manual tasks, storage, and so on – are based on groups of 18, of varying capacities, which make *neighbourhood units,* with common parking and social areas for the users of the modules. These small urban nuclei surrounding a central courtyard create a suitable balance between the public and private, increase a sense of belonging and encourage the development of solidarity. The presence of family groups of different sizes and types of interpersonal relationships should further encourage exchanges and cooperation among the generations.

The 3 neighbourhood units make up the entire district, and are laid out for ease of movement of pedestrians and vehicles and in such a way that the residents can easily recognise the various residential units and their relation with the collective spaces.

In this way, spaces are hierarchized in private space (“living unit”), semi-private space (“neighbourhood”), public space (church, open-air market, streets for vehicles and pedestrian).

Castelmagno (CN). The emergency structures in Castelmagno have to take into account the continuation of cheese production in the area, which takes place in the vicinity of the pastures.

The emergency structures will therefore cover an area smaller than the overall size the location permits, with 5 residential units (4 with two rooms and 1 with four, housing 14 people), in whose vicinity a further 3 modules for cheese production and 3 service units will be erected.

The service structures will take into account the presence of the Sanctuary and the tourists it traditionally attracts during the summer. The structures will be installed in such a way as to blend into the natural environment and reduce their impact to the minimum.

PROPOSED AREAS	Pinerolo (TO)	Castelmagno (CN)
Total SLR (m^2)	7920	1350
SLR/inhabitant (m^2/inhabitant)	40	40
No. of inhabitants (SLRtot/SLRab)	200	34
SC/Ab (m^2/inhabitant)	133	159

Table 3. Pinerolo (TO), Castelmagno (CN):
gross residential area and number of inhabitants housed.

NUCLEI	%	Pinerolo (TO)		Castelmagno (CN)	
		Inhabitants	No. of nuclei	Inhabitants	No. of nuclei
Total nuclei[7]	100%	200	55	14	5
2 persons U.A. B.	12,5%	26	13	8	4
4 persons U.A. T.	75%	150	38		0
6 persons U.A. Q.	12,5%	24	4	6	1

U.A. B.: two room accommodation units
U.A. T.: three room accommodation units
U.A. Q.: four room accommodation units
U.A. P.: production unit

Table 4. Pinerolo (TO), Castelmagno (CN):
total potential number of inhabitants divided up by residential nuclei

The Module and the Residential/Production Units

The size of the module is determined by comparing the analyses of residential constructions for special uses,[4] the existing structures, the transport situation and the adaptation of spaces to the requirements of the users.[5]

On this basis, the standard area is 17 sq. m per inhabitant[6] and the module size is 34 sq. m (480 x 720 cm). Consequently, the smallest residential unit making up a module is designed for 2 users.

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[4] WE have taken hotel and student accommodation, units for temporary site workers and accommodation for post-catastrophe emergency workers.

[5] The net residential area per inhabitant various from 8 sq. m (site containers) to 18 sq. m for student residences. The maximum overall dimensions of a land transport vehicle are 700x240 cm.

[6] The net residential area is defined as the square metres of residential structure per inhabitant. The gross residential area also includes private green spaces and the private parking areas.

While aware that some nuclei consist of a single individual, we did not take this fact into account, partly because a single individual requires substantially the same space as two, given that the services and minimum furnishings must in any case be guaranteed.

For nuclei of more than 2 persons, the module will be doubled up or tripled to house 4 or 6 units respectively.

Because of the composition of the family groups in the areas selected, there is no need for larger residential modules. The solution proposed will however be able to adapt to any exceptions by simply adding on extra modules.

The production structure at Castelmagno is a single module whose dimensions are compatible with the cheese making operations that take place there.

Residential units	**Users**	**Modules**	**Sq m.**
U.A.B.	Up to 2	1	34,5
U.A.T.	3 to 4	2	69
U.A.Q.	5 to 6	3	104
U.A.P.		1	34,5

Table 5. Dimensions of the settlements (net residential area).

As far as the technology adopted allows, each residential unit will provide the minimum space necessary for the furniture and fittings required by the users. For this purpose, a specific planning schedule has been prepared for each type of unit (see tables 7 and 8).

U.A.B. two rooms	U.S. B01: bedroom	U.A.Q. four rooms	U.S. Q01: bedroom 1
Residential unit			**Unit of space**
	Unit of space	**Residential unit**	
	U.S. B03: bathroom		U.S. Q02: bedroom 2
	U.S. B02: kitchen/living room		U.S. Q03: bedroom 3
		room	U.S. Q04: kitchen/living
			U.S. Q05: bathroom
			U.S. Q06: bathroom
U.A.T. three rooms	U.S. T01: bedroom 1	U.A.P. production	U.S. P01: production
	U.S. T02: bedroom 2		U.S. P02: sales
	U.S. T03: kitchen/living room		U.S. P03: maturing area U.S. P04: bath-room
	U.S. T04: bathroom		

Table 6: residential units and the space provided

The technology was chosen following a comparison of the products available on the market, which we assessed on the basis of the social, cultural and environmental requirements of the project areas (Campioli, 1993).

The base module dimensions are 240 cm, which is also the size of the structural base, the openings of the door and window frames and the sub-multiple of the vertical panels. In this way, we obtain net dimensions for the base modules of 480x720 cm, which make them easy to handle and transport while limiting the number of component parts in the system. In non-emergency periods, the system components can be easily stored in the regional Civil Protection warehouses located throughout Piedmont. The openings are on the longer sides, diagonally opposite to each other, and one of these is also the access door. In this way, the bedrooms also have large windows. In each room, the equivalent of 1/8 of the area is taken up by ventilation and natural lighting space.

The bedroom and living areas are kept separate from each other. The kitchen-living room area is entered directly from the outside by a 3-step stairway, which can be replaced by a ramp in the disabled access version. The attic is inclined and open to all the rooms, and contains the bathroom area.

By combining a number of modules, accommodation for larger groups can be obtained. Accommodation units of this size have two entrance doors, for ease of access. The system is assembled on a prefabricated basis, and can be easily erected by non-specialist workers or the end users themselves. The simplicity of the assembly and dismantling operations is based among other factors on the reduction to the minimum of the components parts of the system.

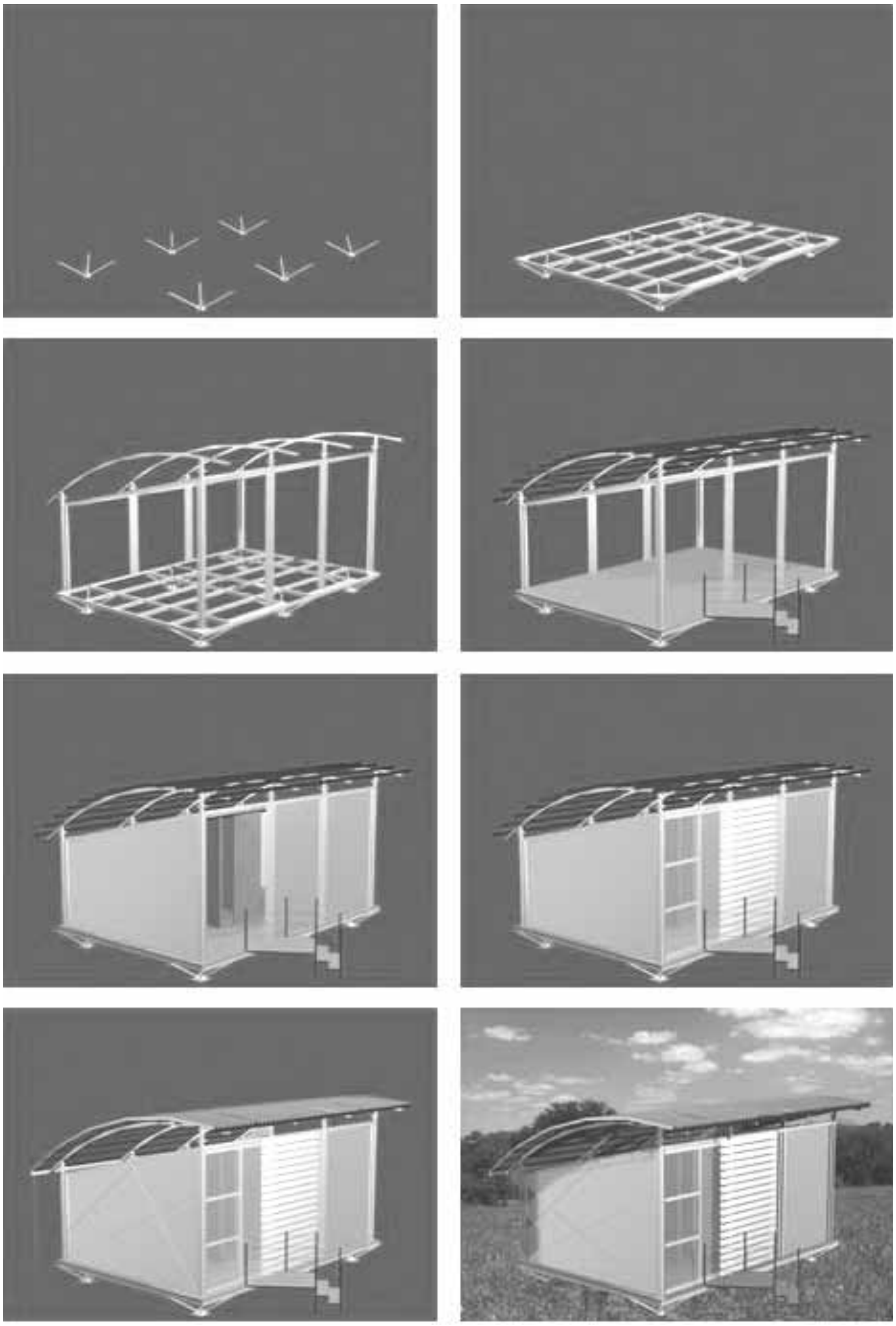

Figure 1. assembly of the base residential unit.

Two roomed unit	**U.S. B**		
Bedroom	**U.S. B01**		
Standard area	**14 m2**		
Users	**2**		
	Single individual	With others	At the same time as other activities
Sleeping			
Washing			
Cooking			
Eating			
Study			
Communication			
Personal leisure time			
Collective leisure time			
Furnishings			
Bed			1
Desk 120x80 cm			1
Wardrobe			2
Chair			2
Bedside cabinet			2
Bookshelves			1
Bedside light			2
Standard lamp			1
Supplies			
Electricity			
Telephone			
Fire fighting terminal			
Drainage			
Extractors			

Table 7. Two roomed unit: planning analysis schedule

Conclusion

Experience built up so far has enabled us to assess the problems relating to temporary accommodation and propose new spatial models based on a careful planning analysis and technological solutions geared towards reducing the quantity of elements necessary, ease of transport and assembly, and forms that will blend in with the environmental nature of the site while at the same time guaranteeing maximum possible levels of comfort. However, a number of technological problems remain, especially with regard to the adaptation of areas which are not entirely suitable for settlements of this kind and which have not yet been taken into consideration in the local civil protection plans, and the installation of equipment to ensure self-sufficiency in terms of service supplies. It is only when these problems have been overcome that it will be possible to give an adequate response to the requirements of the single users in terms of environmental and practical living quality at individual and collective levels, with a view to guaranteeing acceptable standards of economic sustainability.

References

Bocchi, Gianluca and Ceruti, Mauro (ed) (1985). *La sfida della complessità*, Feltrinelli, Milan.

Bologna, Roberto and Terporilli, Carlo (ed) (2005). *Emergenza del progetto e progetto dell'emergenza, Architetture con-temporaneità*, Federico Motta Editore, Milan.

Bologna, Roberto, (2002). *La reversibilità del costruire, l'abitazione transitoria in una prospettiva sostenibile*, Maggioli Editore, Rimini.

Campioli, Andrea (1993). *Il contesto del progetto, in Il costruire contemporaneo tra sperimentalismo high-tech e diffusione delle tecnologie industriali*, Franco Angeli, Milan.
Casalis, Goffredo (1833/56). *Dizionario Geografico, Storico, Statistico, Commerciale degli Stati di S.M. il Re di Sardegna*, Turin.
Catarinussi, Bruno and Pelanda Carlo (ed) (1981). *Disastro ed azione umana. Introduzione multidisciplinare allo studio del comportamento sociale in ambienti estremi*, F. Angeli, Milan.
Mango, Roberto (et al.) (1984). *L'abitabilità transitoria. La ricerca architettonica per nuove strategie abitative,* Guida, Naples.
Davis, Ian (1978). *Shelter after disaster*, Oxford Polytechnic Press, Oxford.
Donato, Franco (et al.) (1983). *Abitazioni per l'emergenza: ricerca per un sistema residenziale trasferibile*, Veutro, Rome.
EDIL.PRO./IRI-ITALSTAT, SAPI (1983). *Sistema abitativo di pronto impiego,* Eliograf, Rome.
Emergency Services Division (1994). *Emergency lodging service,* ESD, Ottawa.
Foti, Massimo (ed) (1991). *Progetttare per l'autocostruzione*, Clut, Turin.
Foti, Massimo (ed) (1999).*Tecnologie povere per l'emergenza*, Agat, Turin.
Fromonot, Francoise (ed) (2002). *Glenn Murcutt: tutte le opere,* Electa, Milan.
Gausa, Manuel (1998). *New alternative housing. New systems*, Birkhäuser, Basle.
Mango, Roberto (1988). *Abitare l'emergenza: studi e sperimentazioni progettual*i, Electa Napoli, Naples.
Guidoboni, Emanuela (et al.), (1995). *Catalogo dei forti terremoti in Italia dal 461 a.C. al 1980*, ING-SGA, Bologna
Hall, Edward (1966). *La dimensione nascosta*, Italian translation by Bompiani,Milan.
Kitchell Corporation (1995). *Emergency housing: a search for quick solutions,* KC, Phoenix.
Latina, Corrado (1988). *Sistemi abitativi per insediamenti provviso*ri, BE-MA, Milan.
Malighetti, Laura (2000). *Progettare la flessibilità. Tipologie e tecnologie per la residenza*, Clup, Milan.
Richardson, Phyllis (2001). *XS: Big Ideas, Small Buildings*, Thames & Hudson, London.
Prime Minister's Office, Department of Civil Protection (1998). *Insediamento di emergenza in Umbria e Marche, Crisi sismica 1997-98*, Protezione civile editrice, Rome.
Platania, Michele. (ed) (1999). *Abitazioni istantanee: un sistema abitativo per l'emergenza*, Ditac, Quaderno no. 8, Pescara.
Platania, Michele. (2001). *Prontuario di Protezione Civile 2001,* Edizioni Nazionali, Milan.
Vassalli-Eandi, Antonio Maria (1808). *Rapport sur le tremblement de terre qui a commencé le 2 avril 1808 dans les vallées de Pelis, de Cluson, de Pô,* Turin.
Vigliano, Gianpiero (1990). *Carta delle aree ambientali antropizzate e dei Beni Architettonici Urbanistici*, Piedmont Region, Turin.
Zaffagnini, Mario (ed) (1981). *Progettare nel processo edilizio*, Luigi Parma, Bologna.

POST-DISASTER MEDICAL EMERGENCY: PROJECT FOR THE REALIZATION OF AN ADVANCED MEDICAL STATION

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Abstract

Today, the AMS - Advanced Medical Station has a well-defined role in Italy in the post-disaster relief services and in the post-disaster first aid chain, but, in practice, it cannot rely on an appropriate organizational model, which is able to cope with the different factors characterizing it. From this perspective, the objective of this study is the systematic definition of the functions, procedures, organization and technology required by health emergency situations, as well as the synthesis of the system requisites which the advanced medical station must satisfy. Finally, it is our intention to propose a project solution meeting the requisites identified. In the first stage, the investigations on literature and legislation concerning health emergency conditions and the direct consultations with in-field experts have underlined the existence of a series of typical problems, producing many difficulties that the operators have to cope with. With the application of a meta-designing methodology for a functional and spatial analysis, starting from the systematic collection of the basic activities referring to an Advanced Medical Station, the second stage of the research has been the analysis of the potential basic environments, and, upon consistency and advisability considerations, the definition of spatial units, which have subsequently been ordered according to a specific functional organizational pattern. The ultimate stage of the study coincides with the elaboration of a project solution for the realization of an Advanced Medical Station meeting the underlined needs. The study marks the passage from the need of adapting the specific health service activities to the market non-devoted systems to the possibility of exploiting a shared-knowledge system for the definition of a new projected functional structure.

Keywords: Advanced Medical Station; health emergency, rapid deployable shelters, mobile buildings, design requisites.

Introduction

The research activity has been carried out in the form of a final degree paper within the framework of the CESPRO (Civil Protection and Risk Management Research Centre, University of Florence) multi-disciplinary program; from this perspective, Prof. Boncinelli's indications have been extremely useful to understand the relevance of the AMS - Advanced Medical Station in the first-aid chain and how this station is not sufficiently studied today in organizational and spatial terms. Upon these considerations, the research activity has commenced with a survey on the available materials/resources, as the headway for future developments.

Cultural And Scientific Background

Reference to legislation. Although the medical science has produced a huge quantity of literature regarding the role, the equipment and the functioning of an advanced medical station and although the topic is in Italy a topical issue, there are only a few legislative references or regulatory provisions defining the usage and the spatial-functional characteristics of an AMS:

Post-Disaster Reconstruction : Meeting Stakeholder Interests : Proceedings of a conference held at the Scuola di Sanità Militare, Florence, Italy 17-19 May 2006, edited by David Alexander, Colin Henry Davidson, Andrew Fox, Cassidy Johnson, Gonzalo Lizzaralde, ISBN 978-88-8453-611-2 (online), ISBN 978-88-8453-612-9 (print), © Firenze university press, 2007

Act of the Prime Minister's Decree of 13th February 2001. The Decree includes the following definitions and features:

> *Advanced Medical Station:* Functional unit for the selection and treatment of the casualties/victims, situated beyond the external perimeter of the security area or in a central area with respect to the disaster frontline. It may be both a structure (tents, mobile containers) and an area functionally devoted to become a casualty gathering place, where first-aid resources are collected and the evacuation of the wounded individuals is organised.
>
> *Mobile First-Aid Unit:* is a mobile structure characterized by a prompt mobilization, fitted out to work as an Advanced Medical Station, including 2 (max. 3) air-inflated tents; light stretchers for 50 casualties; power generator plants (electricity and compressed gas); medical material divided into differently-coloured cases on the basis of the final usage.

The units deployed in the field must have the following characteristics:-

- rapid mobilization, complete autonomy for at least 3 days for the execution of their function (materials, drugs, power, etc.) and for the support to the employed staff and means of transport (food, water, clothing, fuel, etc.), intervention in all territory typologies and under all whether conditions, as normally foreseeable;
- use of a suitable tele-/radio-communications system, able to assure connections outside normal usage area.

Document n.139 "General criteria for the supply of drugs and medical devices to a 2nd level advanced medical station….".

The document specifies the difference between a first and a second level AMS, where a second level station:-

- is ready to be used in the shortest alert time (3-4 h.)
- is able to treat a total of 50 patients with red-yellow severity code in less than 24 hours and for a period of 3 days
- has an operative autonomy of 72 hours.

In addition to providing instructions on the optimal siting of the structure and to specifying that the structure "may be constituted by tent bodies at least for the triage, stabilization and evacuation operations", the document clarifies that the structure must:-

- be easily identifiable through signs
- have a separated entrance and exit to channel the victims flow along one direction
- have adequate lighting
- have a complete autonomy of at least 3 days in implementing its function and in supporting the first-aid personnel and means of transport.

The document also describes the functions pertaining to an AMS:-

- clinical evaluation and triage (more complete than the general evaluation carried out at the disaster frontline on the part of the rescuers),
- stabilization of victims,
- definition of the evacuation towards the hospitals.

Upon these considerations, it is evident that the shortage of functional indications and the absolute lacking of distributive and dimensional guidelines leave a wide margin of subjective interpretations and points out the necessity of in-depth studies on the definition of the criteria.

Reference to the Post-Disaster Emergency Medical Literature

Though it represents the basis for further investigations, the generic information reported in the official publications underlines the need for further insight analyses from different points of view; besides, this early survey has added new generic criteria emerging in the scientific literature and in the literature concerning the emergency architectural studies.

An Advanced Medical Station is required to:-

- be adequately air conditioned
- provide for adequate hygienic conditions
- have good soundproof standards (in order to auscultate patients)
- be transportable through the use of a wide range of means of transport in relation to the mission typology
- be dismountable into modular units with the dimensions and the weight required to be easily transported by hand without the use of mechanical lifting tools
- be designed in a way as to allow the manual installation and assembly without the use of mechanical tools.

Generally an AMS is divided into 3 areas:-

- *The Triage Area*: where the secondary triage is carried out
- *The Treatment Area*: which divides into 2 sections:-
- *Therapeutic Section*: for seriously injured patients (Red or Yellow code), where emergency operations are carried out;
- *Waiting Section*: where less seriously injured patients are gathered (Green code) together with the survivors and the persons needing psychological aid.
- *The Evacuation Area*: constituted by a station where patients are collected for a short period of time until the arrival of the rescue squads for their evacuation in the most appropriate means of transport, on the basis of their clinical conditions.

In addition to the above said functions, other accessory functions must be complied with by the Advanced Medical Station in case of emergency as follows:

- Casualty and resource gathering point
- Coordination of rescuers
- Subsistence of rescuers.

With the help of the post-disaster medicine theory, it is possible to describe in detail the operations which the AMS must implement, contributing to the definition of the overall needs.

Clinical evaluation and triage. The AMS requires a secondary triage area, also used as a reception point for the storage of the patients' personal effects. The triage area requires a series of simple diagnostic tools, such as a portable echograph device, instruments for dry chemistry tests and analyses, instrumentation for telemedicine.

Stabilization of victims. In the Advanced Medical Station, the stabilization techniques of the Basic Life Support (BLS) are applied together with specific procedures coping with post-trauma lesions, as identified in the ATLS - Advanced Trauma Life Support treatment.

Definition of the modalities of evacuation. AMS should not include hospitalisation rooms, except for short periods, because the philosophy of the "stay and play" only provides for an onsite emergency treatment before evacuation to another hospitalisation centre.

Particularities of the Italian situation

In most of the European Countries, civil defence and protection is the responsibility of one or few public institutions/organizations. In Italy, this function is instead assigned to different public organizational bodies, at a national and at a territorial level. Civic organizations are also involved in the civil protection, especially through the numerous volunteers organizations.

The use of the AMS can therefore involve a wide range of individuals, including those having no experience at all of post-disaster medicine: those in charge of transporting the structure, those who install it, those in charge of the AMS management, and those who finally use it. It is therefore important to underline as a fundamental requisite for the entire AMS system, as well as the capacity of COMMUNICATING with simplicity and clarity its own content, function and usage modality.

The AMS can foreseeably be used for different purposes, stretching from the mere "prevention" in case of large concourse of people to severe post-disaster emergency: the requisites of RAPID MOBILIZATION, RESPONSE MODULARITY, FLEXIBILITY and INTEGRABILITY to other structures are therefore essential.

Experience And Needs Compared

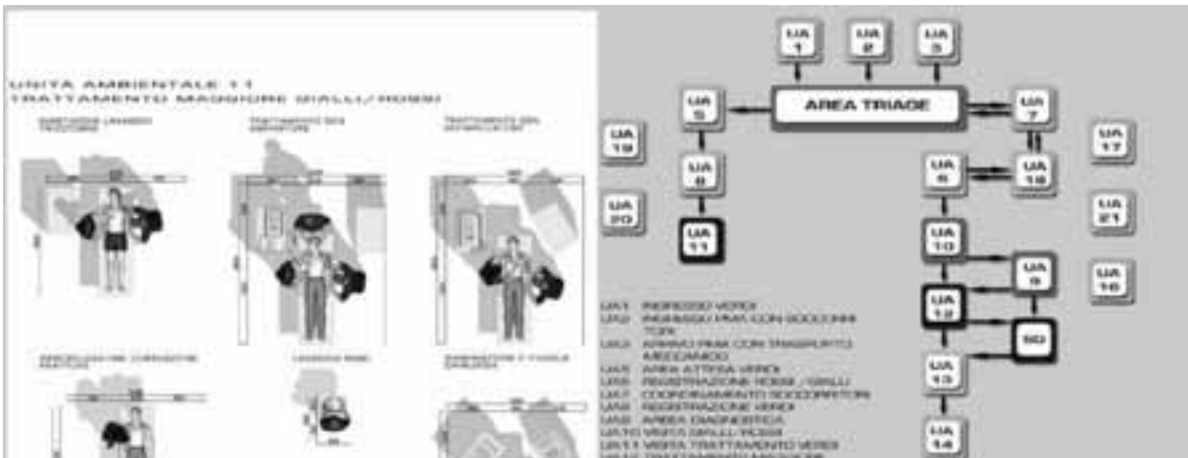
Considered the shortage of sufficient information on the subject, a direct discussion with those who in Italy are personally engaged in the AMS management is crucial to find solutions to the various problems in terms of organization, technology and logistic. For this purpose, we have conducted a survey on the different Italian structures and the different approaches to the issue and we have interviewed the directors/managers of high-excellence emergency organizations in Italy. In most cases, the contacted structures/organizations have proved to be sufficiently efficient, at least in relation to the working conditions; under these circumstances, the functions are adapted to the structures available in the market and are optimised through experience; but these structures are not specific for, or devoted to a specific intervention, and thus they present some limits as follows:-

- the necessity of re-assembling the AMS configuration, cablage and electric plant during every intervention/operation
- the difficulty of installing and positioning the technological equipment and the plants, which are placed on the ground or hung from the structure or walls, due to the absence of a specific housing/location
- the large space available and the limited function paths
- undifferentiated spaces, including the use of tents with no dividing walls/panels, which may result over- or under-size if compared to the usage needs
- the general chaotic and unstable working conditions characterizing the entire structure
- the huge time required to set up the internal workstations
- the impossibility of an adequate internal air-conditioning system due to the difficulty of closing the entrance and exit doors/ways
- the difficulty in managing the consumable material stock, both in the non-operational and in the operational phase
- the resources are stored in smaller packages/parcels which are divided on the basis of their content and not for their function. Hence the stocking is very disperse, and makes it more difficult to select the material for every mission, as well as the resources loading and distribution operations

In general, there exists a wide a range of AMS realizations in the practice; this underlines the lack of a precise correspondence between spatial configurations and functional needs; this aspect makes it absolutely necessary to carry out a precise analysis of the basic activities, the required spaces/facilities and the possible aggregations in order to achieve the projecting of a specific *strategy* for the management of the spatial system which creates the structure and the *system of instruments* which makes it efficacious.

The Meta-Designing of an AMS

Due to the absence of specific information, the meta-designing process has commenced with the research and classification of the basic activities implemented by the main AMS units, as specified above. The work approach has adapted to our purposes what was already consolidated in the hospital meta-designing and has looked for information directly from the filed experts/operators' experience. We have thus defined in detail what was already reported, up to the definition of the single ATLS operations, which amount to 95 basic activities as a total, divided among ordinary and one-off activities. The basic activities have been grouped on the basis of their functional affinity, identifying 21 spatial units; the spatial units represent a sort of general "zoning" of the activities within the Advanced Medical Station, according to criteria of localization as per homogeneous contexts. Starting from a non-structured system of basic activities, we have then achieved a structured system of Spatial Units (SU). These categories represent groups of activities which are consistent among each other in spatial terms and which are strictly interrelated on the basis of the behavioural patterns gathered from the discussion with the experts/operators. As it is composed of inseparable basic activities which are steadily defined in their functional and spatial characteristics, each SU represents a structural component of the system. To achieve a definition of spatial unit, a fundamental step is the study of the spatial dimensions of each basic activity, and then to group it into one SU and placed into relation one with another in a system of relations.



The Organization of the Functions: the Content

The 21 spatial units have further been aggregated into 13 functional units, starting from the analysis of the spatial implications and upon further compatibility considerations. Each of this functional unit has been defined considering the space and equipment required to operate with the maximum efficiency. Once this phase has been concluded, provided the complexity of the topic, we have divided the possibilities of intervention on the main AMS system into 2 action fields: *content* and *container*. The AMS is essentially a functional area which includes a series of actions to carry out, a container hosting these actions and an organic system of relations between the different functions. In other words, the intention has been to separate the different aspects and to focus on the main function/action: *the supply of the functions*.

We have thought it appropriate to organize the system-required material for the 13 functional units into 13 lots of equipment. Some spatial units have therefore been incorporated into larger compatible categories. We have assumed to store the material of each functional unit in separated "cases" (boxes, trunks) equipped with lighting, cablage and all the required operational facilities. In this way, the stored resources could be easily inspected and controlled during peacetime, and be ready for the usage and rapidly deployed in case of intervention. The objective is naturally that of speeding up the decision-making process, the load and download operations and the setting up of the AMS. The assumed organization also implies a significant reduction of the time required to supply the first-aid services, which are currently subject to the setting up of the whole AMS and to the activation of all its functions. With an organization into single "fully equipped" modular units, it is possible to rapidly install a medical unit for early ambulation and to start the supply of the first-aid services before the setting up of the whole AMS is completed. In addition, every pre-wired unit only needs the connection for the execution of the function/s in the camp, significantly reducing the cablage bulk and the time required to install the electric wiring plant. Another advantage of this modular organizational pattern is the possibility of adapting the structure to the specific needs and, above all, to the quantity of the operative personnel. Here below, per each function, are the containers, differentiated for their colour, to which other optional containers/functional units have been added. These units are not an integral part of the AMS, but, according to necessity and in case of prolonged emergency, they could be added to the AMS camp and require an integration to the whole system:

1. triage area (green grey)
2. rescuers coordination (kaki green)
3. red-yellow patients/drugs registration (pink)
4. red-yellow patients main treatment (red)
5. diagnostics (purple)
6. evacuation waiting area (orange)
7. evacuation (yellow)
8. rescuers area (turquoise)
9. material deposit (cyclamen)
10. toilets (blue)
11. green patients waiting and registration (grass green)
12. green patients treatment (wood green)
13. corpses deposit (dark grey)

Optional:-

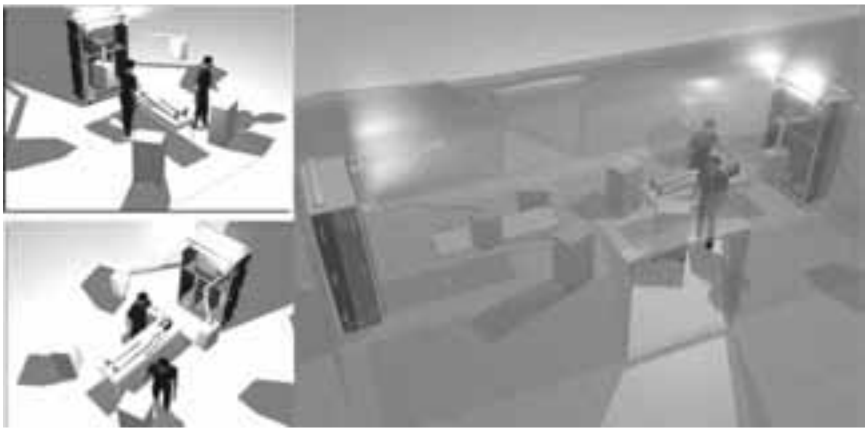
14. junction module (lemon) 15) operating theatre lobby (beige) 16) operating theatre (white)

For each container, the analysis also reports the required material/resources:

From this analysis of materials, it is evident that each unit requires "cases" of different dimensions, but, in order to define only one case to be used for all the functions, an ideal case size has been designed. The designed Case - inspired by the so-called flight-case used for the transport of fragile equipment and technologies - is made in extruded aluminium and includes anodised aluminium caps and details in ABS - Alkyl Benzene Sulfonate.

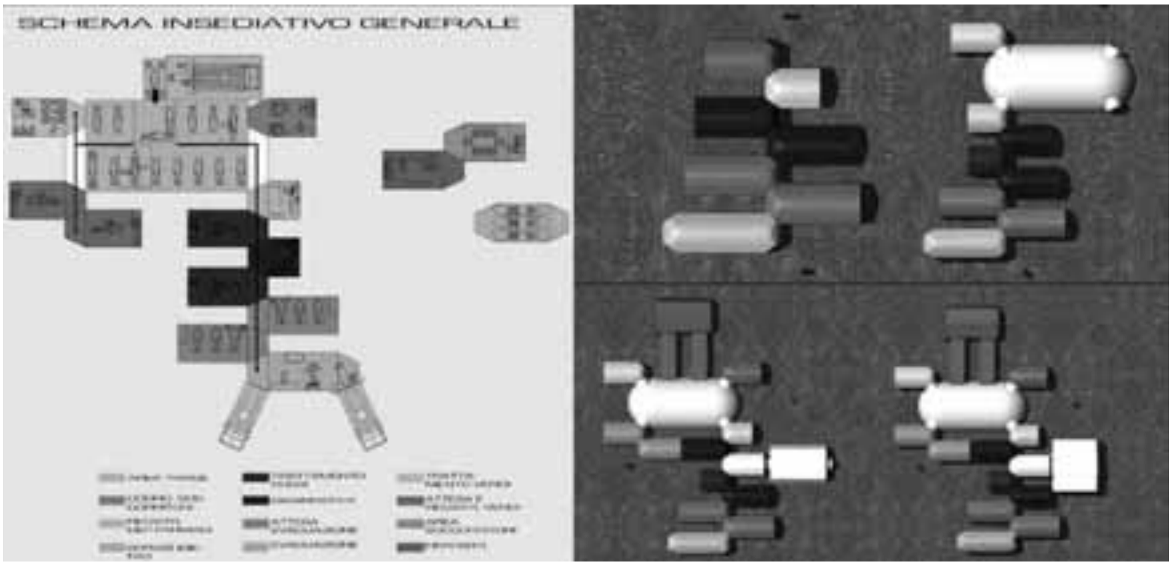
To explain it better, we now consider the most qualified meta-design for the case of the materials required in the area RED-YELLOW PATIENTS MAIN TREATMENT. This functional unit has been analysed in depth as it represents the most complex function which responds to the strictest distributive instructions, in addition to being the most advanced unit in terms of technology. The case has been designed to house the medical material available in the market. The dimensions have been determined on the basis of specific objects, of which we have given our preference to the objects with the smaller dimensions; a further optimisation of spaces could be achieved through the study of medical instruments and equipment devoted to this typology of organization.

The case so designed can be used in any circumstances apart from the typology of the container; from the gymnasium to the traditional tent, from the French to the German model. Obviously, as seen from the analysis of the existing marketable structures, it is recommendable to consider the AMS as structured at least into 3 pneumatic tents, as those normally available in the market. This system can fit a wide range of transport modalities given its overall dimensions. It can be stowed in most vans and is equipped with appropriate handles: where the territory does not allow for transport on vehicles, 6 persons can easily transport it by hand.



The Overall System

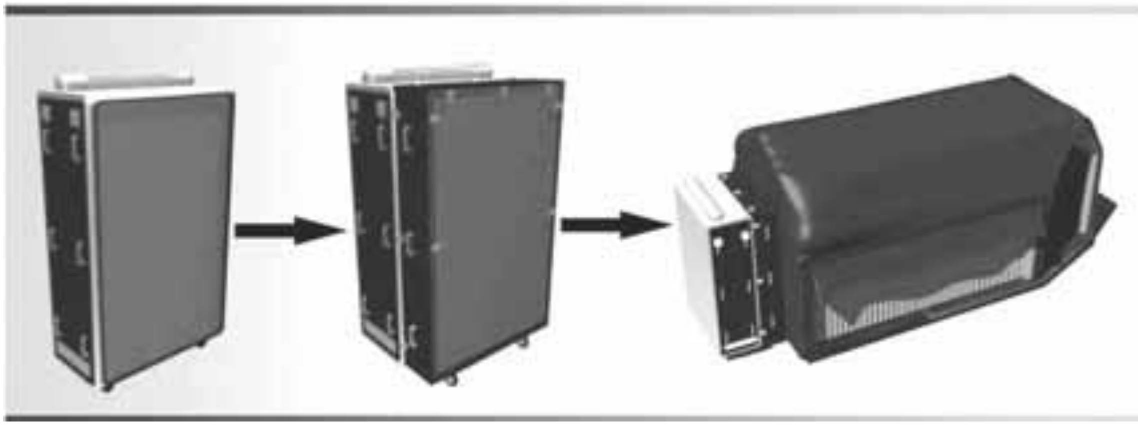
Starting from the functional modular structure, it has been assumed a further step forward in the general management of the AMS camp: to supply every functional unit with a specific case designed on the basis of the lay-out obtained from the analysis of the spatial units, and then to separate the functions from shared paths on a conceptual basis.



The result is a system which can potentially be realised with the use of different technologies: traditional, pneumatic, geodetic or pantograph tents; this system puts the function into relation with a part of the first-aid path, which is completed only if connected to the other tents composing it. The solution is extremely flexible as it can be configured in function of the event and of the available resources. Besides it can be integrated to other typologies of structure which may eventually be installed in a subsequent phase. The tents have a variable length and a width of 2.75 meters (about 9.02 feet) to host all the required resources.

The Meta-Design of the Container

Once the overall modular system has been elaborated, the following step has been to develop a meta-design combining all the properties of a pneumatic structure and, at the same time, representing an additional element of the case. A sort of accessory item or tent bag which can be hooked to the main case for the supply of an easily installable tent. The tent is located in a bag also containing its folded floor plan; if the mission requires for its usage, the tent bag can be hooked to the main case in the warehouse with a simple operation and is ready for its usage once you arrive at the mission camp. The tent is composed of a main pneumatic frame (coated polyamide polyurethane fabric), a second tubular pneumatic layer to insulate the internal environment (in cotton polyester) and a higher leak tightness layer connected to the subgrade layer (EMC reinforced plastomer fabric, PVC coated polyester) as in a traditional tent, which covers the whole structure surface and is separated from the insulating layer. The tent pressure is kept constantly through a junction tube connected to a compressor housed in the main case. The compressor automatically starts inflating when the pressure falls under a certain level. The operation is made easier thanks to the reduced dimensions of the tent.



In general, the advantages of this solution are:-

- speeding up of the material selection and management
- reduction of the time required to upload and download the material
- reduction of the time required to setting up the AMS
- reduction of the time required to supply early ambulation and first aid services before the installation of the AMS is completed
- rationalization of the work areas and the operational paths
- an easier cablage installation
- an extremely modularity of the system as a whole, fitting every mission typology
- the differentiation of the work areas and a quicker understanding of the system functioning.

Conclusions and Prospects

Undoubtedly this study does not represent an executable project, but rather it is a meta-designing initiative aimed to widespread a systematic and shared awareness of the issue. At this stage, the objective is that of supplying the designer with a series of useful analytical data for the development of different architectural solutions. However, we have elaborated a hypothesis of configuration as a possible solution trying to meet the existing needs. The proposed architectural solution has been determined on the basis of the available technology with a good degree of technical feasibility. At this point, the engineering of the solution has not been taken into consideration yet, as this activity should be carried out in strictly cooperation with private companies/organizations considered the particular nature of the technology applied. Without pretending to be exhaustive, the study intends to mark the passage from the tendency to optimise the existing products to the designing of new solutions; for this purpose, new contacts have been established with the Regione Toscana to examine, verify and spread a new model of first-aid intervention.

References

Angelucci, F. "Abitare in emergenza" *dossier in Costruire n. 246, novembre 2003.*

Becattini, Giovanni (2003) "Il soccorso sul campo, caratteristiche e limiti." atti del convegno "I Grandi rischi ed attività di di protezione civile" *CISPRO.*

Bologna, R. (ed.) (2002) "La reversibilità del costruire, l'abitazione transitoria in una prospettiva sostenibile" *Maggioli editore*

CISPRO Comunicato N. 116 "Criteri di massima per l'organizzazione dei soccorsi sanitari nelle catastrofi" *pubblicato su G.U. n. 109 del 12 May 2001.*

D'Elia, B. "basic life support" *materiale didattico del corso di rianimazione e anestesia della facoltà di medicina di Firenze.*

de Saint Mihiel, Claudio Claudi a cura di (2003) "Strategie integrate per la progettazione e produzione di strutture temporanee per le emergenze insediative". *CLEAN edizioni*

Echavarria, P. (2004) "Architettura Portatile ,paesaggi imprevedibili" *Structure.*

Egidio Patrizi (2003) "Il posto medico avanzato" dagli atti del convegno "I Grandi rischi ed attività di protezione civile" *CISPRO* documento N.139 "criteri di massima sulla dotazione di farmaci e dispositivi medici di un posto medico avanzato di II livello utilizzabile in caso di catastrofe". *Pubblicato sul supplemento ordinario alla Gazzetta Ufficiale n.196 del 29 August 2003 serie generale*

Falasca, C.C. (2000) "Architetture ad assetto variabile, modelli evolutivi per l'habitat provvisorio" *Alinea Editrice, Firenze*

Fontanari, Paolo (2003) "Aspetti organizzativi del soccorso nelle grandi emergenze". atti del convegno "I Grandi rischi ed attività di di protezione civile"

Fontanari P, Lorenzi P, Boncinelli S.(1999) "Maxiemergenze e pianificazione sanitaria", In "La protezione civile verso gli anni 2000*", CNR, area della ricerca fiorentina. CISPRO.*

Fontanari, P., V. Gori, I. Corsini "le maxiemergenze" *materiale didattico del corso di rianimazione e anestesia della facoltà di medicina di Firenze.*

Gasperini, Chiara (2003) "Il ruolo del Posto Medico Avanzato nella Catena dei Soccorsi, Ipotesi Progettuale." *Tesi di laurea alla facoltà di medicina e chirurgia di Firenze*

Morra A, Odetto L, Bozza C, Bozzetto P. (2002) "Disaster Management - Gestione dei soccorsi sanitari extra e intraospedalieri in caso di catastrofe". *Regione Piemonte settore protezione civile* pp.11-54

Nardin, M. "sapere, saper fare, saper essere" materiale didattico del corso di rianimazione e anestesia della facoltà di medicina di Firenze.

Nardin, M. "ALS: supporto vitale avanzato" materiale didattico del corso di rianimazione e anestesia della facoltà di medicina di Firenze.

Richardson, P. and L. Dietrich (2002) "XS. Big ideas, Small buildings" *Universe publishing, Rizzoli International*

www.aimcnet.org

www.anpas.org/PROTCIVI/indice.htm

www.aresmarche.it

www.cri.it

www.gcupisa.it

ww.med.unifi.it/didonline/anno%2Dvi/emergenze%2Dmedchir/dispense/indice%2 0figura.htm

www.misericordiaonline.net/procivile/welcome.html

www.protezionecivile.it

www.ugis.it

Acknowledgements

The authors would like to thank Captain Toti from the Eighth Mobilization Centre of CRI Firenze; Prof. Evangelista of the Emergency Surgery Team in Pisa; Dr. Esposito from ARES – Ancona; Dr. Nicosia from the Azienda Ospedali Vittorio Emanuele-Ferrarotto-S. Bambino in Catania.

GUIDELINES FOR EMERGENCY SETTLEMENT SYSTEM SELECTION

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Abstract

The aim of this work is the development of emergency temporary systems strategies and criteria for housing demand in post-disaster phases. The study involves selection and evaluation of emergency site structures process and logistic approach provided through a planning criteria, standard and normative aspect. The results define site selection strategies related to the territorial and urban environment; on-site standard temporary systems solutions right-sizing; quality criteria to be followed during the 'suitable site identification' phase; site qualitative and quantitative indicators identifying the temporary settlement system compatibility for emergency phase. Analysis results provide guidance to put in place new planning strategies in order to help operators involved in logistic management planning. Data processing provides supporting information for the definition of the standard emergency housing phases: pre-emergency, emergency and post-emergency. The process described and the flexibility of the standard dimensions provides a set of processes adequate to guarantee the reliability of housing aid and to assist operators involved in the logistic management planning.

Keywords: flexibility; planning criteria; settlement strategies; temporary selection of emergency settlement; system process.

Research Field

Different needs characterize temporary settlement systems, like post disaster emergency or immigration phenomenon. The main issue, which have determined the development of this research work, are listed below: *Uncomfortable users:* The housing discomfort of the emergency settlement is an indefensible constant event in our country; *Urban and territorial decay: t*emporary structures existence for unplanned longer timeframes has created the equation: 'temporary' equals 'environmental incompatible'; *Civil Protection operators needs to select and plant sites:* The often changed configuration of the local Civil Protection Centers, the lack of specific planning for operators activities and lack of guidelines for territorial emergency planning system, increase challenges for the Civil Protection efficiency.

Figure 1. Example of emergency settlement system in Umbria for post-disaster reconstruction (località Forcatura – Foligno).

The construction of a not programmed settlement system to relief needs evidences a common factor in our country and in international context: the definition of settlement sites. The absence of planned sites binds the logistic solutions to the site availabilities at the moment of the emergency and doesn't allow the appraisal and the verification of site suitability.

The lack of predefined sites and planning standard to built temporary settlement system, actually, produces precariousness conditions of territorial and anthropic system. Pre-disaster planning is a process composed by variable elements, complex management and operative phases. Research work focuses on selection and evolution of site and settlement typology in order to guarantee an effective answer to housing demand in post-disaster phase. Actual urban planning doesn't provide a flexible typology of urban structures that could guarantee the ordinary use of the settlement structures and a the same time represents a solution for emergency housing demand. Usability and flexibility are the strategic key elements taken in account in this research work focused on the developing temporary settlement system for emergency housing.

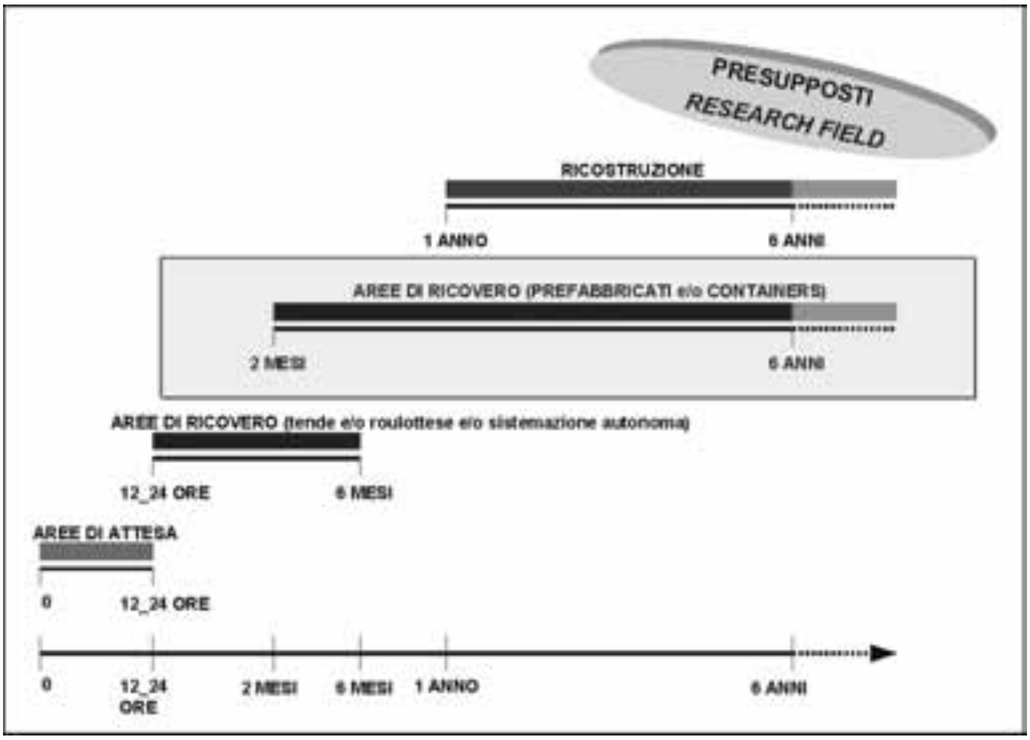


Figure 2. Settlement System life Cycle.

Two main items are driving the research activity: the culture of temporary settlement planning and the emergency planning procedures and Guidelines for shelter after disaster.

Aims, Application Field And Users

The general aims are to confer instruments in order to adopt alternatives technical solutions to area's use, applying new standards to guarantee sustainable quality life and psychological satisfaction of the user. The general objects were: to define an urban system for emergency housing demand to guarantee the reliability of housing aid; to organize guidelines in order to assist operators involved in logistic management planning; to define qualitative planning criteria for an improvement of environmental and anthropic quality of the sites. The objective is to elaborate the logical organization planning process guidance to manage aids in emergency phase. It is an integrated instrument for the development of the activities listed into the *Emergency*

Local Plan. It describes adapted criteria and necessary resources to be followed by National Civil Protection Operators in order to co-ordinate and organize housing demand in pre-emergency activities.

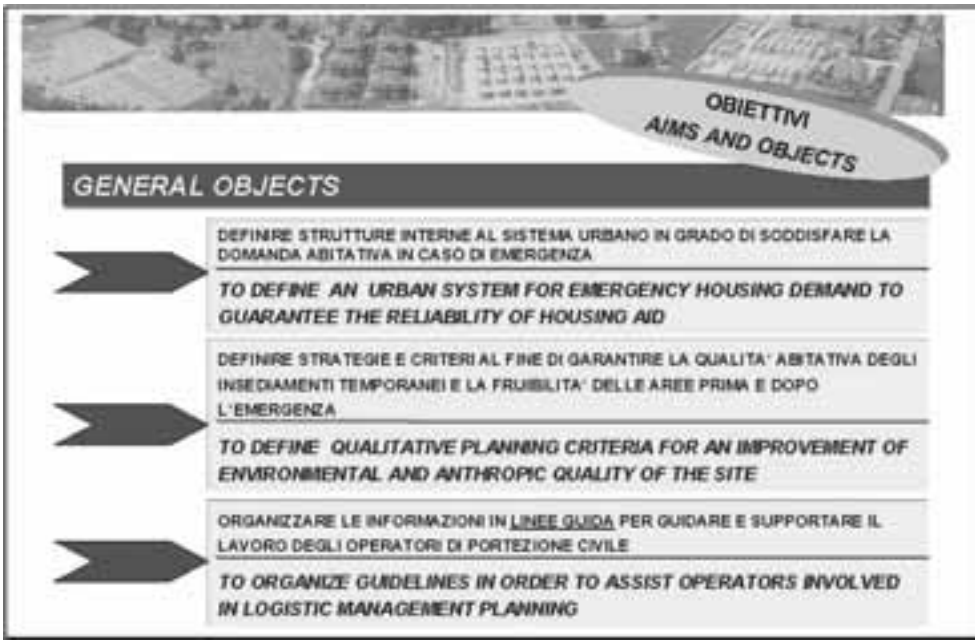


Figure 3. General objectives of the research.

Development Methodology

The problem complexity required an analytic multidisciplinary phased approach. The research analytic phase is made by two parts: analysis of literature and scientific documents and analysis data with case studies, questionnaires and interviews. *Analytic knowledge of site phase*: urban planning and culture of temporary conditions; historical experience in shelter after disaster; emergency planning procedures in national and international contest; guidelines for site selection and organized shelter after disaster *Case studies analysis*: interview to operators in order to define the critical points of the planning process; case studies selection for morphological analysis and post occupancy evaluation; case studies selection for critical analysis during site selection and organization phases.

Elaboration analysis result and definition guide process outcomes.

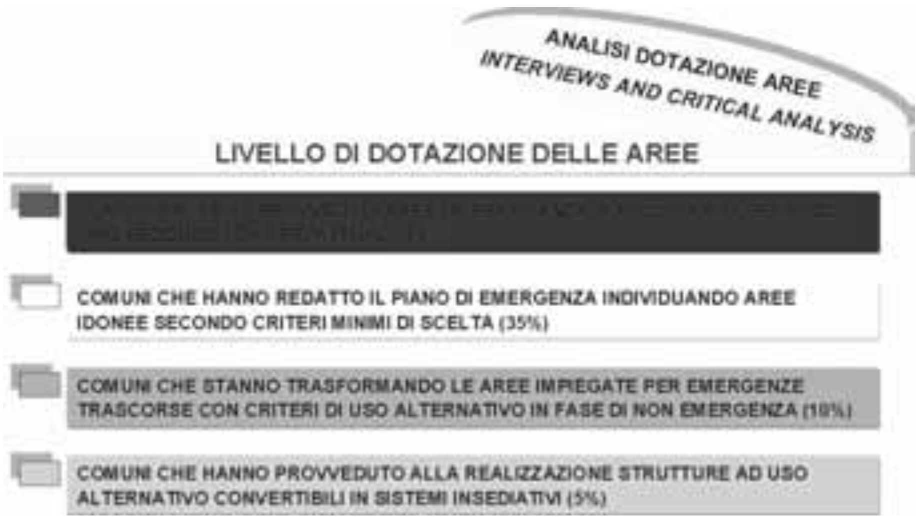


Figure 4. Case studies results analysis: application of emergency planning criteria – typologies.

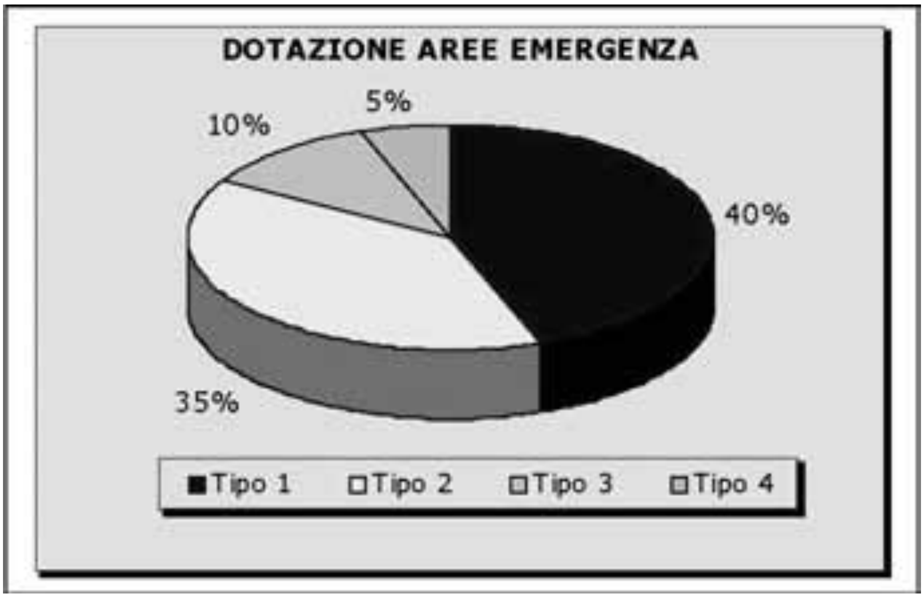


Figure 5. Results Case studies results analysis: application of emergency planning criteria – state of art.

Figure 6. Example of type 4 – Giarratana (RG).

Research Outcomes: Planning-Criteria And Contents Structure

The set of processes for the selection and evaluation of emergency site structures offers a solution to logistic problems through a common evaluation of technical and normative aspects. It has been structured in order to have a phased approach, describing work –team, roles and tasks. Every phase is supported by: calculation grid for pre-dimension demand; standard calculation models; indicators to define the environment; area selection parameters evaluation; alternatives uses. Selection area strategies are related to appropriate system infrastructure right-sizing; the set of processes therefore are organized in two parts:-

- Quantitative tools (infrastructure right-sizing evaluation based on population, temporary house needs, time and costs).

- Qualitative instruments (to site selection related to the urban and territorial environment, to fulfill area accessibility and security requirements respecting hypothetical alternative use).

The qualitative and quantitative tools and criteria are necessary to get:
- Identify sites in order to fulfill the environmental characteristics requirements
- Sites right-sizing
- The best localization fto guarantee structures quality
- Possibility of alternative use of settlements system structures and areaa too.

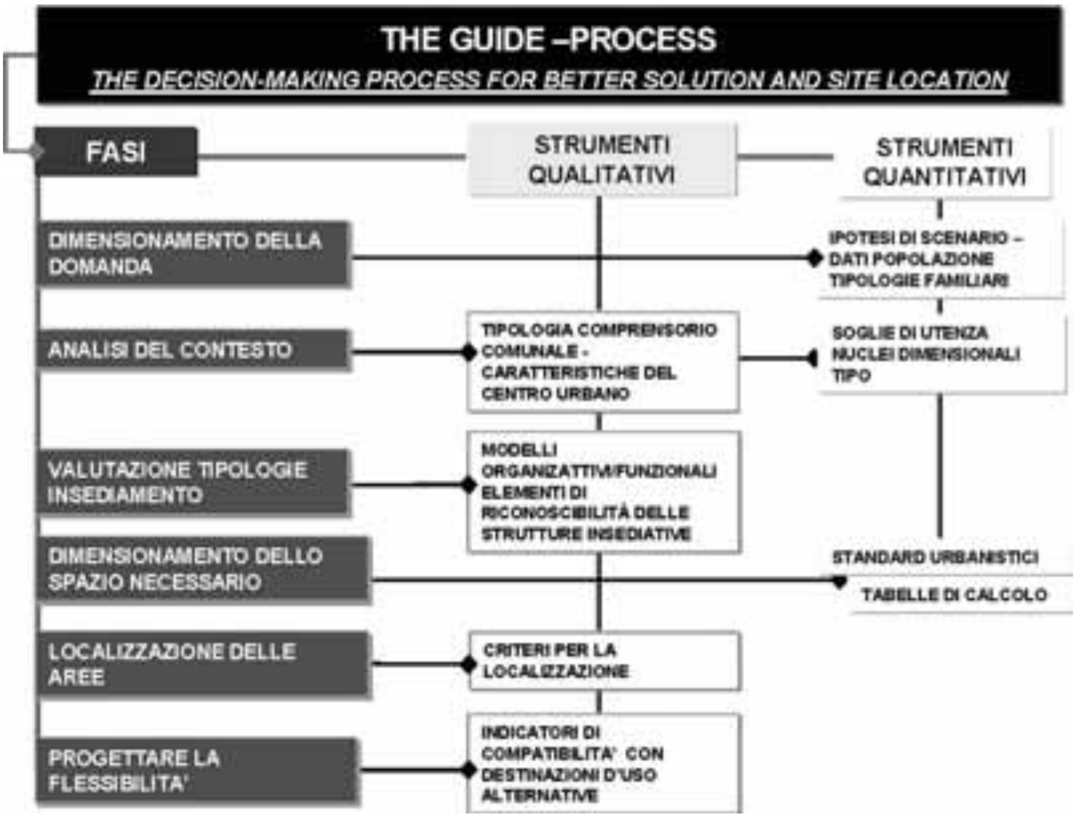


Figure 7. Guideline structure: the decision making process for site location identification.

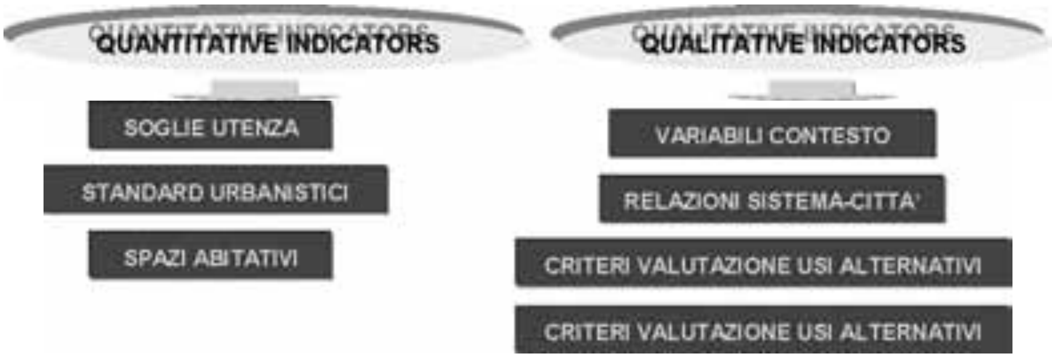
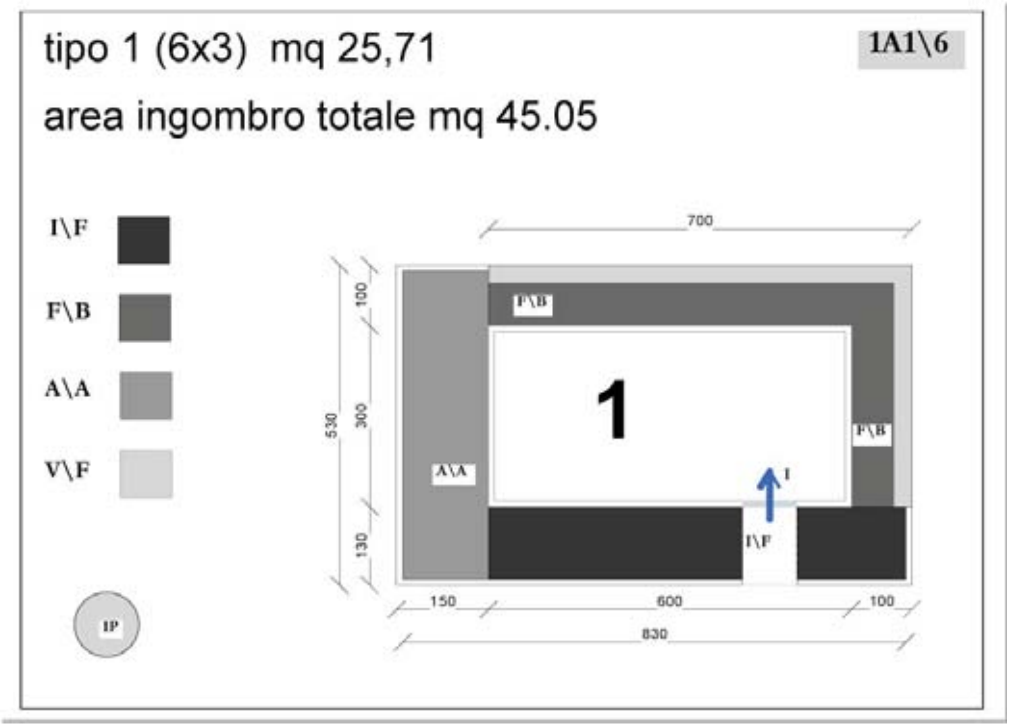


Figure 8. Qualitative and quantitative indicators to define compatibility versus temporary settlement system-urban space requirements and alternative use destination.



SPACE TIPOLOGY	PERTINENZE ML			TOT.
	WIDTH		DEPTH	
I/F	7,00		1,30	9,1
F/B	7,00	3,00	1,00	10
A/A	5,30		1,50	7,95
Total optional spaces				**27,05**
Total portable building type				**18**
Total necessary space				**45,05**

Figure 9. Example of quantitative indicators – standard “type one”.

Structure, indicators and standard offer:-

- selection site related to territorial and urban environment characteristics;
- standard right-sizing for different solution of temporary infrastructures;
- Quality criteria to be followed during the ‘suitable site identification’ phase;
- Qualitative and quantitative indicators to define compatibility versus temporary settlement system requirements and alternative use destination while using the site infrastructure in no-emergency phase.

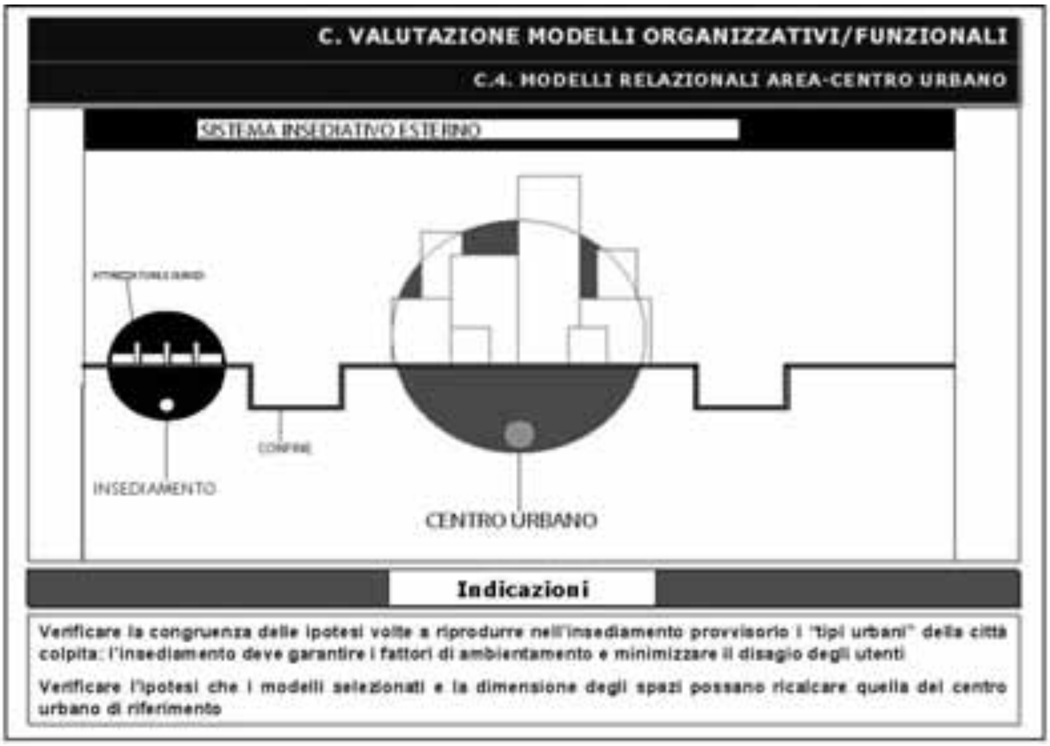


Figure 10. Example of qualitative indicators-functional models housing settlement evaluation – urban typology

In order to verify that the criteria and standards are valid and correct, it has been tested on a standard-test settlement system (150 users thresholds).

Possible Developments of the Research

Research results show various development opportunities:-

- urban standards in relation to the different territorial needs to verify their effectiveness.
- database definition for communal requirements analysis during the planning phase.

Civil Protection operators requirements taken in account in the calculation grids can easily be transferred on digital support and, through an hyperlink, into a database; this can be a simple tool to be used by the operator, which can visualizes the criteria of the most suitable solution selecting the characteristics of the territory.

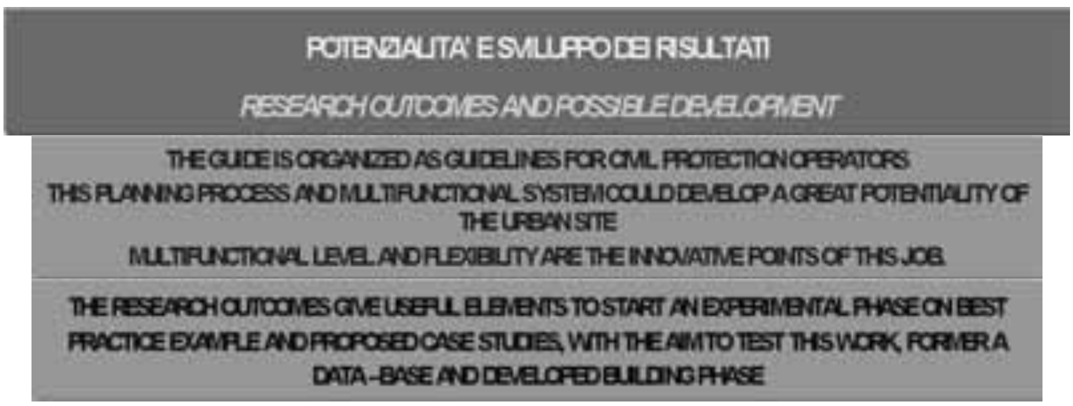


Figure 11. Example of qualitative indicators –functional models housing settlement evaluation – urban typology.

- organizational characteristics catalogue definition, requirements and models through all the Italian territory.
- control instruments adopted in order to verify the suitability of the carried out choices.

Conclusions

This guide describes the decision-making process for the best site solution and location identification. It is organized as guideline for Civil Protection operators. This planning process and the multifunctional system could use in the best way the urban site potential. Multifunctional level structure and flexibility are the innovative key items of the guide and offer a new planning system able to guarantee a lifelong space maintenance.

References

Anon. (1986) “Questione sismica: compiti e nuovi ambiti operativi dell’architetto” Associazione Intercomunale area fiorentina, Firenze

Anon. (2003) “Ciudad posibles”, Escuela Contemporànea de Humanidades, Ediciones Lengua De Trapo SL, Madrid.

Amendola, G. (2000) “La Città Postmoderna – Magie e paure della metropoli Contemporanea”, Editori Laterza, Bari.

Alto Commissariato delle Nazioni Unite per i Rifugiati (UNCHR) (2001) “Manuale per le Emergenze”, Agenzia di Protezione Civile Edizione Italiana, Roma.

Atti del convegno "Prepararsi all'Emergenza", convegno-seminario per Amministratori e funzionari degli Enti Locali, palazzo del podestà, Pescia, 16 ottobre 2004.

Bilò, F. (a cura di) (2004), Antologia di testi su Bigness, progetto e complessità artificiale, Edizioni Kappa, Roma.

Campo, G. (2000) “Città e territori a rischio, analisi e piani di protezione civile”, Cangemi, Roma.

Claudi de Saint Mihiel, C. (a cura di) (2003) “Strategie integrate per la progettazione e produzione di strutture temporanee per le emergenze insediative”, Clean Edizioni, Napoli.

Clementi, A. (a cura di) (1996) “Infrastrutture e piani urbanistici”, Collana Quaderni Blu, Fratelli Palombi Editori, Roma.

Davis, I. (1975) “Skopje Rebuilt. Reconstruction following the 1963 earthquake” *Architectural design,* volume XLV November.

European Commission (1999) “Vademecum of civil protection in the European Union”, Bruxelles.

Di Sopra, L. (1998) “Il Modello Friuli - Gestione dell'emergenza del Friuli dopo il sisma del 1976”, Istituti di Studi Territoriali - Amministrazione provinciale di Udine, Grafiche Filacorda, Udine.

Dufour, L., Raymond, H. (1990) “Dalle baracche al barocco – la ricostruzione di Noto, il caso e la necessità”, Arnaldo Lombardi Editore, Sicilia.

Latina, C. (1988) “Sistemi abitativi per insediamenti provvisori, BEMA Editrice, Milano.

Lynch, K. (1998) “L’immagine della città”, Marsilio, Venezia.

Lynch, K. (1990) “Progettare la città” *la qualità della forma urbana*, Etaslibri,Milano.

Ministry of Civil Defence & Emergency Management in conjunction with the New Zealand Police, New Zealand Fire Service, St John Ambulance and local government representatives (2003) “Safety Planning Guidelines for Events: Forms - Shelter after Disaster: Guidelines for Assistance" Office of the United Nation Disaster Relief Coordinator (UNDRO), Ginevra, United Nations.

THE UNEXPLORED NEXUS: ENVIRONMENTAL MANAGEMENT AND EMERGENCY MANAGEMENT IN POST-DISASTER RECONSTRUCTION

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Abstract

The disciplines of environmental management and emergency management share many of the same concepts, issues, processes, and concerns. Yet they interact more by accident than design. This paper explores the contributions that environmental management can make to the theory and practice of emergency management – from preparedness and response through recovery and reconstruction. It explores the concept of "disaster" in the contexts of both environmental management and emergency management, and it addresses the significance of environmental degradation as both a contributing factor in disaster effects and an important criterion in setting priorities for long-term reconstruction. Research and planning in many areas of the world are serving to embed emergency management solidly in the practice of environmental management, and vice-versa. The paper notes the growing consciousness of environmental justice/equity issues that figure significantly in the impact of disaster effects and in the decisions to be made throughout the process of long-term recovery and post-disaster reconstruction. It concludes by identifying areas where environmental management and emergency management can and should interact more positively to support long-term recovery and reconstruction.

Keywords: Environmental management; environmental quality; recovery and reconstruction; survivability; sustainability; performance measurement.

Introduction

The disciplines of environmental management and emergency management share many of the same concepts, issues, processes, and concerns. Yet they come into contact only rarely, and then it is usually by accident rather than design. Parts of environmental management include risk assessment, hazard identification, spill response, and emergency/contingency planning – all activities that are central to the practice of emergency management. Other parts of the field address such issues as water quality, protection of flora and fauna, and general health of the ecosystem – all of which may be affected by decisions and actions taken in the pursuit of emergency management.

Many practitioners in both fields tend to focus more on planning and immediate response and have only recently begun to consider the requirements and opportunities inherent in long-term mitigation and reconstruction. Environmental management professionals are now concentrating more on the sustainability of environmental quality and environmental improvement; emergency managers and planners are re-focusing their efforts more on the survivability of systems, organizations, and communities. Sustainability and survivability are, in truth, two aspects of the same concept, namely: how to encourage and achieve continual improvement in ecosystems, the built environment, and human society. Both environmental management and emergency management have much to contribute to, and to gain from, the planning and implementation of post-disaster reconstruction.

The complex and multi-faceted processes of post-disaster recovery and reconstruction extend well beyond the immediate period of restoring basic services and life support infrastructure. While immediate restoration of services can be a matter

Post-Disaster Reconstruction : Meeting Stakeholder Interests : Proceedings of a conference held at the Scuola di Sanità Militare, Florence, Italy 17-19 May 2006, edited by David Alexander, Colin Henry Davidson, Andrew Fox, Cassidy Johnson, Gonzalo Lizzaralde, ISBN 978-88-8453-611-2 (online), ISBN 978-88-8453-612-9 (print), © Firenze university press, 2007

of weeks, full recovery can stretch out 10-15 years. What will happen during that period? Will the emphasis be on re-creating what was there before? Or on improving the built environment, the larger physical environment, and the quality of life? Or, perhaps, on enhancing the ability of the community to mitigate and survive future disasters? Will the community leaders evaluate recovery success through sector-specific performance measures (restoration of economic activity; construction of old vs. new buildings and residences; repopulation of devastated areas), or will they engage in "an ongoing search for a 'new normal'" (Vale and Campanella, 2005). Environmental management professionals and emergency managers must have an integral part in creating that new normal in which a community not merely returns to what it was before but becomes a more environmentally sustainable and physically survivable community.

Understanding the Terms

Environmental management is somewhat of a portmanteau term that comprises many of the more academically accepted disciplines. It brings together elements of science, engineering, policy, assessment, and auditing, as well as basic down-in-the-dirt/air/water analysis and action. At one end of the spectrum lies the realm of environmental policy and regulation; at the other end lies what has been described as "blue-collar science." As opposed to the specific definitions of ecology or environmental science/engineering, environmental management is the planning and implementation of actions geared to improve the quality of the human environment. It embraces both public and private organizations actively dealing with environmental issues on a daily basis.

Environmental" in the Disaster Context

The environment is often seen as the agent/cause of a disaster or perhaps as the carrier. In an earthquake or a flood, for example, the "environment" behaves in ways that bring harm to the communities affected by them – one suddenly finds the environment sitting in one's living room. However, people make choices (e.g., farming practices, use and procurement of fuels, selection of building materials and sites, etc.) that significantly affect their vulnerability to environmental disasters (Aptekar, 1994; May, et. al. 1996). This view mirrors the idea that disaster is a social construct formed by the interaction of human development with natural processes.

An earthquake is a disaster only when it impacts the human infrastructure (Mileti, 1999; Cutter 2001; Burton, 1993; Varley, 1994).

But the environment also interacts with human society and the built environment in complex ways. Floods may damage natural habitats and ecosystems; forest fires may harm forest ecosystems and damage the biotic stock in an area. Yet, floods are necessary to renew and enrich riparian corridors and wetlands and to recharge aquifers; forest fires thin out undergrowth that could fuel larger fires, and they can revitalize biodiversity (Sauri, 2004). In fact, natural disturbances or perturbations over geologic time shape the ecosystems, species composition, and species interactions within the environments they impact.

Floods can clog wastewater treatment plants, causing the release of untreated sewage into water bodies; floods can also mobilize contaminants and industrial chemicals that then flow downstream and possibly into those same aquifers. Thus, an "environmental" hazard may be difficult to define, and there can be a fine distinction between an environmental hazard (i.e., water out of control – a flood) and an environmental resource (i.e., water in control – a reservoir). It can often be a matter of perception regarding deviations about the norm – too much rain is a flood; too little is a drought (Smith, 1996).

There is a growing understanding of environmental degradation as a contributing factor in disaster effects – i.e., an exacerbating factor in damage, it worsens impact on victims and makes recovery more difficult. One example: although the largest danger facing Turkish urban areas is earthquake, numerous other hazards exist. Improper handling of solid wastes causes explosive methane build-up, endangers the physical environment, reduces property values and destroys the scenic and tourist values of highly visited areas…. Near the larger cities, many bodies of water are so polluted that they are no longer suitable for recreational use. High levels of heavy metals are found in harbor catches, and massive fish kills are common. Marine accidents release massive, toxic discharges, sometimes causing explosions that destroy buildings and facilities. Dangerous chemicals enter the urban food chain…urban rivers are polluted…agricultural chemicals and waste water have contaminated precious aquifers… (Parker, Kreimer, and Munasinghe, 1995).

A recent example occurred in the South Asian tsunami – long-term damage to coral reefs and degradation of mangrove swamps in some areas reduced the capacity of natural systems to absorb or cushion the kinetic energy of the tsunami surge. In Louisiana, flood-control damming and associated upstream sedimentation created a situation in which – over many decades – the Mississippi delta regions failed to aggrade as they might have under less-aggressive development.

Deleterious effects of degraded environmental conditions are felt most keenly (though not exclusively) by the poor, residents of shantytowns, "favelas," and other marginal or hazardous areas. They are clustered on steep slopes subject to flash floods and erosion, in dwellings built of substandard materials, with poor water and waste disposal systems. Natural disaster effects can be greatly magnified by the poor environment in which these people live.

According to Pelling (2003), there is a tendency to focus on technical and engineering issues in addressing environmental problems or issues and to discount the influence of social characteristics on susceptibility to environmental risk. This bias toward technological and physical solutions (e.g., flood walls, or leachate mitigation systems) can encourage development in hazard areas when, in fact, hazards can surpass the margin of safety provided by technological solutions.

"Disaster" in the Environmental Context

The field of emergency management tends to focus more on harm to the human environment and the built environment and to pay less attention to the larger environment in which humans and structures exist. Also, the emphasis is on the more acute disasters (like earthquakes or chemical spills) and less on the slow-developing problems with chronic effects (e.g., Minamata or acid rain) or on acute events with long-lasting consequences (e.g., Bhopal, or the Tisza River). This no doubt reflects the understandable orientation of emergency management professionals to the needs of planning for and response to the immediate effects of a disaster and the desire for speedy restoration to something approaching the *status quo ante*.

Environmental professionals take a somewhat more comprehensive view, considering not only the human and built environments but also the matrix in which they exist. Environmental concerns include not only humans but also plants and animals, water and air quality, the fate and transport of environmental contaminants, the toxicology of human and animal effects, and the exposure and vulnerability (both acute and chronic) of the affected biota. The environment is also seen as an economic resource to be protected and preserved: oil spills affect fisheries; toxic run-off into streams kills fish; volcanic eruptions affect timber, fish habitat, and land use. All of these concerns can and should contribute in positive ways to the practice of emergency management before, during, and – especially – after disasters.

Environmental management confronts the full range of disaster effects, in one manner or another, and brings the full range of scientific, technical, and managerial skills and techniques to bear on preventing, mitigating, responding to, and recovering from their effects. Of course, the definitions of "emergency" and "disaster" are a bit different in the environmental field: "An environmental emergency is a tanker truck full of acid overturned and spilling in the middle of town. An environmental disaster is that same tanker spilling into a wetland or a river."

Environmental hazards are not independent of other types of hazards, and one may lead to the other or make the other worse. For example, floods can degrade water quality, release chemicals and other contaminants from impoundments or containers (or even float off the containers themselves to lodge in someone else's backyard). Earthquakes can cause transportation spills, industrial chemical releases through infrastructure damage, or damage to containment. Destruction of the World Trade Center released asbestos, respiratory irritants, polycyclic aromatic hydrocarbons (possible carcinogens), pulverized metals, and god-knows-what-else into the atmosphere, affecting rescue and recovery workers and undoubtedly contaminating the surrounding area (Mattei, no date). As we have seen in the example from Turkey, environmental hazards may only be waiting for a triggering event to make a natural disaster even worse.

Recent Illustrations of Environmental and Disaster Intersections

The City of New York re-opened the Fresh Kills Landfill to dispose of all the demolition debris from the World Trade Center. As that landfill is now permanently closed, the Office of Emergency Management is working with the State environmental regulators to identify suitable future disposal sites, establish environmental operating criteria, and prepare advance agreements for the use of these sites in future disasters. Demolition and reconstruction of 130 Liberty Street (vacant since 2001) will be conducted in accordance with strict environmental quality criteria and subject to intensive monitoring for lead, asbestos, and other hazards (Marrocolo, 2005).

Disposal of disaster debris is a major problem in the recovery from Hurricane Katrina. The Louisiana Department of Environmental Quality initially mandated the incineration of construction and demolition wastes but ran into resistance from the USEPA, FEMA, and environmental interest groups. As a result, debris is being placed in landfills; given the interaction of land use, topography, and water tables in Louisiana, this may not be the most environmentally-sound solution over the long term. Research and an analysis of alternatives is needed, during re-construction and prior to future disasters, to identify effective waste/debris disposal methods that will meet recovery and reconstruction needs without degrading environmental quality (Meyers, 2005).

The World Conservation Union has addressed the recovery of communities from the South Asian tsunami, in part through a workshop on "Applying the Ecosystem Approach to post-disaster reconstruction and restoration," by stressing the performance and importance of coral reefs for coastal protection, and by developing a series of 14 "Best Practice Guidelines" for reconstruction in Sri Lanka that stress the use of environmentally sound principles. These guidelines include: "Materials For Reconstruction," "Restoring Coastal Wetlands," "Environmental Policies and Laws," and "Learning to Prepare for Natural Disasters" (IUCN, 2005).

Exploring the Nexus

Considerable research and analysis has been done by the European Union and the United Nations to illuminate the connections among environmental hazards, sustainable development strategies (especially in the poorer countries), and disaster response and management. *Living with Risk* (2004), produced by the UN International Strategy for Disaster Reduction, puts it most succinctly:

The environment and disasters are inherently linked. Environmental degradation affects natural processes, alters humanity's resource base and increases vulnerability. It exacerbates the impact of natural hazards, lessens overall resilience and challenges traditional coping strategies. Furthermore, effective and economical solutions to reduce risk can be overlooked…. Although the links between disaster reduction and environmental management are recognized, little research and policy work has been undertaken on the subject. The concept of using environmental tools for disaster reduction has not yet been widely applied by practitioners (p.298).

Researchers in the Swedish Embassy in Bangkok have sought to link environmental programs with disaster risk in the context of sustainable development. They ask:-

- How can investments in environmental management and sustainable development also reduce disaster risk?
- Is there a *prevention dividend* that accrues from wise land use planning and development programs? ("*…the values of foregone disaster losses that accrue from well designed and implemented disaster risk reduction measures, including environmental management and sustainable development initiatives*.")
- Can *prevention dividends* be measured; and, how might the ability to estimate these added values enhance policy and program planning? (Dolcemascolo, 2004)

Although they find evidence for positive answers to these questions, they acknowledge that more research and analysis is necessary in order to capture the rather elusive cost/benefit parameters of disaster reduction and sustainable development.

Living with Risk (2004) also outlines ways to integrate environmental and disaster reduction strategies:

- assessment of environmental causes of hazards occurrence and vulnerability
- assessment of environmental actions that can reduce vulnerability
- assessment of the environmental consequences of disaster reduction actions
- consideration of environmental services in decision-making processes
- partnerships and regional approaches to land use and nature conservation
- reasonable alternatives to conflicts concerning alternative uses of resources
- advice and information to involve actors in enhancing the quality of the environment.

Within this context, there are a number of areas where environmental management and emergency management can and should interact more positively for mutual benefit and support. Both fields would benefit from continuing and supporting the current movement in the disaster community from "reactive" disaster response to active risk management and from iterative recovery to pro-active mitigation and prevention. Parallel efforts would transition the environmental field from contaminant clean-up to risk reduction and pollution prevention, from discrete issues management to environmental management systems, and from flood control to floodplain management (see Philippi, 1996). Put another way:

Prospective disaster risk management should be integrated into sustainable development planning. Development programmes and projects need to be reviewed for their potential to reduce or aggravate vulnerability and hazard. *Compensatory disaster risk management* (such as disaster preparedness and response) stands alongside development planning and is focused on the amelioration of existing vulnerability and reduction of natural hazard that has accumulated through past development path-ways. Compensatory policy is necessary to reduce contemporary risk, but prospective policy is required for medium- to long-term disaster risk reduction. (*Reducing Disaster Risk*, 2004)

Integration of sustainability considerations into disaster mitigation and recovery can exploit the considerable overlap between environmental management and disaster management. Planners and practitioners in both fields must recognize that the overall objectives of these fields implicitly promote sustainable communities. Sustainability should be considered both prospectively (in sustainable development planning and mitigation) and retrospectively (in response and recovery). This integration would incorporate and enhance current trends toward "holistic disaster recovery" (also "sustainable recovery") that emphasize betterment of the entire community, including environmental improvement and enhancement, through the recovery process (*Holistic Disaster Recovery*, 2001). *Living with Risk* (2004) is even more direct:

Disaster reduction specialists should be encouraged to anticipate environmental requirements under applicable laws and to design projects that address these requirements, coordinating closely with environmental institutions.

The application of international disaster assistance, especially in developing countries, can have an important influence on both the implementation and the outcomes of post-disaster reconstruction. The concept embraces both the ideas of sustainability and survivability at the heart of this paper:

Mitigation…is defined as a statement of intent or a plan of action to reduce such significant hazard risks while incorporating sustainable values; this includes seeking opportunities to relocate inappropriate land uses out of hazard areas and to rebuild damaged homes and infrastructure in more resilient ways instead of replicating brittle, unsustainable development practices. Sustainable communities also recognize the interconnectedness of social, economic, and environmental goals, and strive to break down the de facto zoning of urban and rural living space, which has previously resulted in the poor occupying the more hazardous regions in frail dwelling units. (Ranganath, 2001)

Inclusion of environmental quality enhancement and disaster resiliency principles within the scope of post-disaster reconstruction planning and implementation provides a clear mechanism for addressing both environmental shortfalls and the requirements of building (or re-building) truly sustainable communities. Land-use planning, for example, offers an effective, flexible methodology for identifying environmental enhancements and disaster mitigation strategies in both community development and post-disaster reconstruction. Such planning can contribute significantly to long-term environmental quality and disaster survivability (Burby & Deyle, 2000). An encouraging development is the specific pairing of post-disaster reconstruction with disaster mitigation in the *Draft Disaster Risk Management Policy* (2005) by the Inter-American Development Bank:

> *"Disaster risk management"* is the systematic process that integrates risk identification, mitigation and transfer, as well as disaster preparedness, emergency response and rehabilitation or reconstruction to lessen the impacts of hazards.

Finally, environmental assessments should be integrated into disaster recovery and reconstruction planning processes, perhaps following the Environmental Impact Statement model mandated by the National Environmental Protection Act. Environmental Impact Statements should (but currently do not) specifically include disaster-hazard considerations. Rapid environmental assessments should be conducted as part of disaster damage assessment and should be an integral part of reconstruction and mitigation considerations (Kelly, 2001).

Environmental Justice/Equity

Both environmental managers and emergency managers must be cognizant of the importance of environmental justice/equity issues in the context of hazard and vulnerability. Hazards of any type have a disproportionate impact on the poor and disadvantaged. A number of thorny equity issues are coming to a head in the environmental management world, among them: industrial plant and landfill siting; development in industrial or depressed areas; residential settlement on slopes or in other marginal areas; higher population density; immigrants and language differences; differential access to social services and information sources. Most of these issues have not yet been adequately addressed in emergency management planning or community dialogue.

Agyeman (2005) raises the issue of "Just Sustainability" and stresses the potentially re-distributive function of developing sustainable communities. He links the principles of justice/equity, with both environmental quality and sustainable development. Indeed he foresees a more holistic approach toward sustainability embedded with progress on economic, environmental, and social fronts.

Pellow and Brulle (2005) place the environmental justice issue squarely within the context of socio-economic inequality and environmental degradation. They explore the "winners and losers" aspect of disaster effects, whereby the distribution of environmental degradation adheres to the class/race pattern of the society – wealth accumulates at the top, risks at the bottom.

Shubh Kumar-Range notes the socio-economic and gender-based differentials in vulnerability to disasters and asserts that greater attention must be paid to the contribution and place of women in responding to and recovering from disasters.

> Structural adjustment programs of the past two decades have created increased competition for natural resources, with a resultant tendency to marginalize local populations at the expense of capital inflows into rural areas. Without an adequate framework for social equity or environmental protection, the outcomes are often literally disastrous. These failures in development can clearly [be] seen as a source of increased disaster vulnerability, and better disaster mitigation and recovery can be seen as instruments of sustainable and equitable development. Incorporating women's role in economic development from this perspective becomes common ground for both effective development and effective disaster mitigation. (Kumar-Range 2001)

Vale and Campanella (2005) state this issue most clearly:-

> What we call "recovery" is also driven by value-laden questions about equity. Who sets the priorities for recovering communities? How are the needs of low-income residents valued in relation to the pressing claims of disrupted businesses? Who decides what will be rebuilt where...Who gets displaced when new facilities are constructed in the name of recovery?

An important step toward addressing these equity issues is to involve all parts of the affected community in planning for and implementing post-disaster reconstruction and long-term mitigation. Maximizing community involvement will illuminate the physical, economic, cultural, social, psychological, and infrastructure problems that must be solved in creating (or re-creating) a more survivable community (*Participatory Planning Guide for Post-Disaster Reconstruction*, 2004).

Conclusion

Both environmental management and emergency management can contribute concepts, skills, processes, and worldviews that will make significant contributions toward maximizing the effectiveness of post-disaster reconstruction. The two disciplines can cooperatively seek solutions that will enhance environmental quality as well as meet the needs of disaster preparedness and recovery by identifying and implementing strategies that combine disaster risk and vulnerability reduction, post-disaster reconstruction, environmental sustainability, and community survivability.

Areas of fruitful interaction between the two disciplines include:-

- Identifying enhancements to environmental assets/resources that support long-term recovery and reconstruction (e.g., enhancement of ecosystem elements, habitats);
- Identifying recovery options for environmentally sensitive areas that may serve to mitigate future disaster damage (e.g., creation, enhancement, or preservation of wetlands, mangrove clusters, and coral reefs for flood mitigation);
- Identifying and reconciling the tradeoffs between environmental enhancement opportunities and disaster-resistant construction and development practices (e.g., siting of dikes/levees; identification and pre-approval of waste disposal methods/sites);
- Identifying development techniques and practices that contribute to both environmental quality and long-term survivability (siting of industrial sites; stricter environmental management requirements for environmentally-risky facilities);
- Adapting and applying the process of environmental auditing and performance measurement to recovery and reconstruction (e.g., setting measurable targets for reconstruction projects; assessing whether projects are meeting sustainability and survivability goals).

Environmental professionals can assist in identifying areas of environmental regulation that may be relaxed or otherwise modified for some specified period post-disaster in order to facilitate recovery and reconstruction without compromising long-term environmental quality. Doing this in advance, or at least mandating a policy and procedure for establishing a post-disaster environmental regulatory regime, would be better than either ignoring environmental regulations or frustrating recovery and survivability goals that run afoul of regulatory restrictions. Additionally, investments in environmental quality enhancements or in survivability projects can assist in providing short-term (or perhaps even long-term) employment and income for those whose livelihood was destroyed by the disaster.

Planning for post-disaster reconstruction (including damage and hazard assessment, goal-setting, priority-ranking, organizing, and budgeting) is, of course, most important. Processes, projects, and activities that are identified and planned in advance are much more likely to be accomplished than those initiated on an *ad hoc* basis. Monitoring of progress during post-disaster reconstruction and systematic evaluation of outcomes will help to ensure that the full range of community needs is met.

It is vital that both environmental management and emergency management considerations be represented at all stages of reconstruction planning, implementation, and evaluation. If they are not, then important enhancements to the built environment and to the social infrastructure may be ignored. Significant contributions to the long-term success of the reconstruction and recovery effort may not happen, and the community may be less sustainable and less survivable.

References

Agyeman, Julian. (2005). *Sustainable communities and the Challenge of Environmental Justice.* New York and London: New York University Press.

Aptekar, Lewis. (1994). *Environmental Disasters in Global Perspective*. New York: G.K. Hall; Toronto: Maxwell Macmillan Canada; New York: Maxwell Macmillan International.

Burby, Raymond J., Deyle, Robert E., et. al, (2000). "Creating Hazard Resilient Communities through Land-Use Planning." *Natural Hazards Review.* 1 (May 2000): 99-106.

Burton, Ian, Robert W. Kates, and Gilbert F. White. (1993). *The Environment as Hazard***.** New York: The Guildford Press.

Cutter, Susan L. (ed.). (2001). *American Hazardscapes: the Regionalization of Hazards and Disasters.* Washington, DC: Joseph Henry Press.

Dolcemascolo, Glenn. (2004). *Environmental Degradation and Disaster Risk***.** Prepared for the Embassy of Sweden/Sida Bangkok**.** Asian Disaster Preparedness Center.
http://www.sida.se/content/1/c6/03/03/92/Environmental%20Degradation%20and%20Disaster%20Risk.pdf

Draft Disaster Risk Management Policy. (2005). Inter-American Development Bank. See also Preliminary Companion Paper to the Draft Disaster Risk Management Policy. (2005). Inter-American Development Bank.
http://www.iadb.org/sds/ENV/site_2970_e.htm

Holistic Disaster Recovery: Ideas for Building Local Sustainability after a Natural Disaster. (2001). Natural Hazards Research and Applications Information Center, University of Colorado, Boulder, CO.

IUCN (2005), World Conservation Union. Gland, Switzerland.
http://www.iucn.org/tsunami/

Kelly, Charles, (2001). "Rapid Environmental Impact Assessment: A Framework for Best Practice in Emergency Response." Benfield Greig Hazard Research Centre, University College, London.
http://www.benfieldhrc.org/SiteRoot/disaster_studies/working_papers/workingpap er3.pdf

Kumar-Range, Shubh (2001). *Environmental Management and Disaster Risk Reduction: A Gender Perspective.* United Nations Division for the Advancement of Women.
http://www.un.org/womenwatch/daw/csw/env_manage/programme.pdf

Living with Risk: A global review of disaster reduction initiatives. (2004). Inter-Agency Secretariat of the International Strategy for Disaster Reduction (UN/ISDR).
http://www.unisdr.org/eng/about_isdr/bd-lwr-2004-eng.htm

Marroloco, Maryann E., Director of Recovery and Mitigation, New York City Office of Emergency Management. Interview, December 2005. See also:
http://www.lowermanhattan.info/construction/project_updates/130_liberty_street_ _77170.asp

Mattei, Suzanne, Pollution and Deception at Ground Zero: How the Bush Administration's Reckless Disregard of 9/11 Toxic Hazards Poses Long-Term Threats for New York City and the Nation. Sierra Club, (no date).
http://www.sierraclub.org/groundzero/summary.asp

May, Peter J., Raymond J. Burby, Neil J. Ericksen, John W. Handmer, Jennifer
E. Dixon, Sarah Michaels, and D. Ingle Smith. (1996). *Environmental Management and Governance: Intergovernmental Approaches To Hazards and Sustainability*. London; New York: Routledge.

Meyers, Jeffrey, Emergency Response Officer, Louisiana Department of Environmental Quality. Interview, December 2005.

Mileti, Dennis S. (1999). *Disasters by Design: A Reassessment of Natural Hazards in the United States*. Washington DC: Joseph Henry Press.

Parker, Ronald, Alcira Kreimer, and Mohan Munasinghe (eds.). (1995). *Informal Settlements, Environmental Degradation, and Disaster Vulnerability: The Turkey Case Study.* Geneva, Switzerland: International Decade for Natural Disaster Reduction (IDNDR); Washington, DC: World Bank.

Participatory Planning Guide for Post-Disaster Reconstruction. (2004) EPC-Environmental Planning Collaborative, Ahmedabad, India and TCG International, LLC, Washington, DC, with the support of USAID/India and the Indo-US Financial Institutions Reform and Expansion (FIRE-D) Project. January 2004
http://www.tcgillc.com/tcgidocs/TCGI%20Disaster%20Guide.pdf

Pelling, Mark. (2003). The Vulnerability of Cities: Natural Disasters and Social Resilience. London; Sterling, VA: Earthscan Publications.

Pellow, David N. and Brulle, Robert J. (eds.). (2005). Power Justice and the Environment: A Critical Appraisal of the Environmental Justice Movement.. Cambridge, MA: The MIT Press.

Philippi, Nancy S. (1996). *Floodplain Management: Ecologic and Economic Perspectives*. San Diego, CA: Academic Press; Austin, T.: R.G. Landes.

Reducing Disaster Risk: A Challenge for Development. (2004). United Nations Development Programme, Bureau for Crisis Prevention and Recovery. New York.

www.undp.org/bcpr

Ranganath, Priya (2000). "Mitigation and the Consequences of International Aid in Postdisaster Reconstruction." *Natural Hazards Research Working Paper #103*. Natural Hazards Research and Applications Information Center Institute of Behavioral Science University of Colorado

http://www.colorado.edu/hazards/wp/wp103/wp103.html

Saurí i Pujol, David. (2004). *Mapping the impacts of recent natural disasters and technological accidents in Europe.* Luxembourg: Office for Official Publications of the European Communities. http://reports.eea.eu.int/environmental_issue_report_2004_35/en/accidents_032 004.pdf

Schwab, James, and Topping, Kenneth. (1998). *Planning for post-disaster recovery and reconstruction.* Chicago, IL: American Planning Association

Smith, Keith. (1996). *Environmental Hazards: Assessing Risk and Reducing Disaster.* London; New York: Routledge.

Vale, Lawrence J. and Campanella, Thomas J. (eds.). (2005). *The Resilient City: How Modern Cities Recover From Disaster.* New York: Oxford University Press

Varley, Anne. (1994). *Disasters, Development and Environment.* Chichester; New York: J. Wiley.

THE REGULATORY FRAMEWORK FOR EFFECTIVE POSTDISASTER RECONSTRUCTION IN NEW ZEALAND

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Abstract

New Zealand has extensive infrastructure networks and localised, dense urban populations that make it vulnerable to natural disasters. When they occur, the effects can be devastating on the natural and built environment. Organisations therefore need to be well prepared, rather than rely on a reactive recovery process after an event. As one aspect of a major programme of research in New Zealand, the authors address the recovery issue in terms of how the local legislative and regulatory frameworks either facilitate or hinder reconstruction projects and programmes. If well articulated and implemented, the regulations should not only provide an effective means of reducing and containing vulnerabilities (disaster mitigation), but also a means of facilitating reconstruction projects. This paper highlights the interrelated reconstruction challenges of allocation of responsibility for coordination, scarcity of resources and the application of legislation and regulations that were written for routine construction rather than post-disaster reconstruction. Examples of reconstruction following recent small scale disasters in New Zealand are presented to support the points raised. The paper concludes that whilst routine construction processes have proved adequate for small-scale disasters, the greater degree of coordination required for programmes of reconstruction following a larger disaster has not been adequately addressed in policy and legislation.

Keywords: Reconstruction; Legislation; Regulation.

Introduction

New Zealand invests heavily in relative terms, in research and development of disaster management plans. Government agencies such as the Ministry of Civil Defence and Emergency Management (MCDEM), Earthquake Commission (EQC), Institute of Geological and Nuclear Sciences Limited (GNS), and Resilient Organisations research programme funded by the Foundations for Research Science and Technology, have current research objectives to address pressing disaster management needs. Though disaster management and the need to develop a resilient community capable of recovering from disasters has become topical, focus until recently has been mainly on reduction, readiness and response and Angus (2005) suggests that there is poor understanding of recovery and little consideration is given to the implications of recovery in New Zealand.

In comparison to routine construction, there is little provision in several areas of legislation to cater for post-disaster reconstruction processes. Following a major disaster it is unlikely that coordinating authorities and regulatory bodies would be able to cope with the volume of work due to shortfalls in experienced personnel, thus the coordination and management of a major programme of reconstruction could become cumbersome and inefficient.

Post-Disaster Reconstruction : Meeting Stakeholder Interests : Proceedings of a conference held at the Scuola di Sanità Militare, Florence, Italy 17-19 May 2006, edited by David Alexander, Colin Henry Davidson, Andrew Fox, Cassidy Johnson, Gonzalo Lizzaralde, ISBN 978-88-8453-611-2 (online), ISBN 978-88-8453-612-9 (print), © Firenze university press, 2007

The Recovery Framework

The MCDEM in New Zealand encourages a holistic approach to the issue of recovery planning and believes this will be most effective if it is integrated with the remaining 3Rs of reduction, readiness and response. The definition of recovery encapsulates the expectations of recovery as "the coordinated efforts and processes to effect the immediate, medium and long-term holistic regeneration of a community following a disaster" (MCDEM 2005)

Recovery requires a concerted approach that will support the foundations of community sustainability and capacity building and which will eventually reduce risks and vulnerabilities to future disasters. Jigyasu, (2004) describes an increase in vulnerability of local communities after the Latur 1993 earthquake in India, where sustainable recovery interventions were poorly planned and implemented. The rational starting point is the setting up of an institutional infrastructure for emergency management, which will formulate public policies for mitigation, response and recovery (Comerio 2004). These recovery policies should then be integrated into other emergency management areas as well as policies of sustainability and community capacity building (Coghlan 2004). New Zealand's recovery planning and management arrangements are contained in the National Civil Defence Emergency Management Strategy (MCDEM 2004). Recovery is delivered through a continuum of central, regional, community and personal structures (Angus 2004).

Management of recovery may involve an element of competition between central, regional and local levels of government for control of the process (Rolfe and Britton, 1995). The MCDEM, together with cluster groups of agencies, coordinate planning at the central level. Regional and Territorial authorities are encouraged to produce group plans that will suit peculiar conditions of their local areas. Other discussion documents produced at the national level like *Focus on Recovery: A holistic framework for recovery*; and *Recovery Planning* both released in 2004, give context to recovery planning while the Civil Defence and Emergency Management Act (CDEMA) 2002 provides the legislation and the foundations for the New Zealand Civil Defence and Emergency Management (CDEM) environment.

Legislation that applies to routine construction provides for the safe development of infrastructure, capital improvements and land use, ensuring preservation and environmental protection, however there appears to be little provision in several areas of legislation to facilitate reconstruction projects. Much existing legislation was not drafted to cope with an emergency situation and was not developed to operate under the conditions that will inevitably prevail in the aftermath of a severe seismic event (Feast, 1995).

Pieces of legislation that make reference to building work include, but are not restricted to the following:-

- Building Act 1991 and 2004
- Resource Management Act 1992
- Housing Improvement Regulations 1947
- Historic Places Act 1993

This paper will consider the problems associated with the implementation of some of these pieces of legislation particularly in relation to recovery, so as to gain insight into the appropriateness of the CDEM framework.

The Recovery Process

Recovery is an integral part of the comprehensive emergency management process (Sullivan 2003). It refers to all activities that are carried out immediately after the initial response to a disaster situation. This will usually extend until the community's capacity for self-help has been restored. In other words, the end-state is when the assisted community reaches a level of functioning where it is able to sustain itself in the absence of further external intervention (Sullivan 2003).

The effectiveness of the process will depend on how much planning has been carried out and what contingencies are provided for in preparing for the disaster. It is expected that recovery and reconstruction works will restore the affected community in all aspects of its natural, built, social and economic environment.

The recovery process may present an opportunity for improvement in the functioning of the community, so that risk from future events can be reduced while the community becomes more resilient.

Recovery is an enabling and supportive process, thus the heart of recovery is community participation. Consultation and communication is encouraged especially in identifying community needs and for collective decision making amongst all stakeholders. This way all stakeholders understand the process and their commitment towards agreed objectives is ensured. Typical stakeholders will include:-

- Asset owners (may be private or public and the business community)
- Lifeline Agencies
- CDEM groups (national, territorial and local government departments, police, fire brigade, relief and welfare agencies, health and safety personnel etc)
- Insurance companies
- Non-governmental agencies (charities, funding organisations etc.)
- Construction and reinstatement organisations

The recovery process will typically follow a conceptualised model (Figure 1) comprising five key stages (Brunsdon and Smith 2004) which are discussed below.

Impact assessment. This is the information gathering stage in the recovery process aimed at gaining knowledge on the impact of the disaster event on individuals, community and the environment. It involves all stakeholders as it is at this stage that the necessary inspections and surveys (needs assessment) are carried out that will form the basis for all reinstatements activities. The needs assessments will include building inspections, insurances, and health and safety assessments.

Success of this stage will depend on the levels of communication, consultation and planning between all stakeholders. The process must lend itself to reviews and updating to take account of new information at later stages.

Restoration proposal. This is the stage where decisions are made on whether to repair, replace or abandon affected properties. These decisions are reached based on the input of the impact assessment activities. Realistic proposals for meeting the anticipated recovery task are presented for funding organisations consideration.

Funding arrangements in New Zealand affected parties may have access to two types of funds: funds from private insurance companies and from government. (Residential property owners are insured by the EQC, New Zealand's primary provider of natural disaster insurance. EQC insures against damages caused by earthquake, natural landslips, volcanic eruption, hydrothermal activity, and tsunami). Secondary funding may come from charity organisations and external donor agencies.

Regulatory process. Design and regulatory approvals are sought for the reinstatement of damaged facilities. Processing of resource consents is usually painstaking and the target of approving authorities is to ensure that considerable level of resilience is incorporated in all developments. New knowledge gained on risk from hazards after the disaster will assist approving authorities to correct former design concepts to mitigate future disaster risk.

Physical Construction. This is the regeneration stage in the recovery process where every aspect of the community and its environment (natural, built, social and economic environments) return to normalcy. Experience has shown that it is difficult to return to the pre-event status quo but effort is made to restore the functions of the affected community.

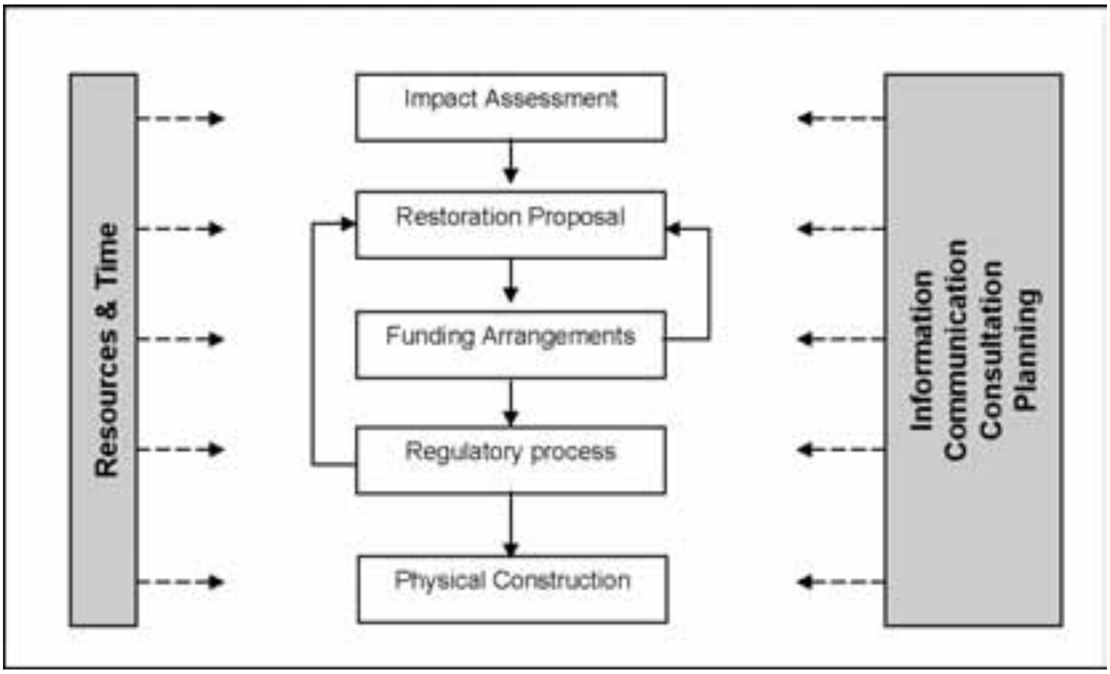

Figure 1. Key Stages in Recovery Process (Brunsdon and Smith 2004)

Recent Natural Disasters

In recent years there have been two locally significant disasters due to flooding events, at Manawatu in 2004 and Matata in 2005. The circumstances of these events are described briefly and some lessons learnt are summarised below.

The Manawatu flood. Flooding in Manawatu was caused by heavy rain and gale force winds from 14 to 23 of February 2004. A Regional State of Civil Emergency was declared on 17 February. The flooding caused over 2,000 people to be evacuated from their homes at the height of the event. Many rivers breached their banks and considerable areas of farmland were inundated by silt and floodwaters. There was significant damage to infrastructure with damage to roads, bridges, and railways. In addition, there were telecommunication, power, gas and water supply outages to tens of thousands of people. Remarkably no lives were lost as a direct result of the event.

Recovery costs are estimated at $160-180million for the rural sector and $120million for roads and council infrastructure. In addition $29.5 million and $3.5 million will be required to stop future flooding of the lower Manawatu and Rangitikei rivers respectively.

he Matata debris flow. A debris flow occurred on the 18 th of May 2005 when a band of intense rain fell in the catchments behind Matata in the Bay of Plenty region. This triggered floods and several large debris flows.

The highly erosive debris flows cleaned out the valley bottoms and destabilised the slopes along the channel, causing secondary landslides. The debris flows were structurally damaging to all buildings and bridges in their paths and at several locations the associated debris floods also were structurally damaging.

In response to the Matata disaster a Civil Defence Emergency was declared on 18th May 2005 and this remained in place until the end of May. Total government valuation including land value and capital value of properties affected along the flood path hazard was estimated to be $9,740,000 for unsafe buildings and $2,937,000 for buildings subject to restricted use (WDC Recovery Report Nr. 06).

Reconstruction Following the Floods

Reconstruction was carried out through collaboration between CDEM agencies, local authorities, utility companies and insurance companies during recovery in the two cases.

For the Manawatu-Wanganui region recovery was coordinated through the regional council's new CDEM Group arrangements under the provisions of the Civil Defence Emergency Management Act (CDEM Act) 2002. For the other territorial authorities the event was managed through their Civil Defence Act 1983 arrangements. The CDEM Act provides a structure appropriate for dealing with events such as the floods and did not introduce any structures or procedures that hindered authorities in dealing with the event. In Matata the state of emergency was extended to allow work to be completed on critical road access routes but still only lasted two weeks.

The roading authorities did not diverge from normal legislation and regulations and building consents were sought and granted as usual. Road users were consulted and kept updated on reconstruction issues.

A source of frustration for utility companies in the Manawatu flood event according to AELG (2005) was the time taken to develop an understanding with the Regional Council about emergency actions that would cover all situations under the Resource Management Act, rather than require a formal process for each activity. A particular issue arose when the Regional Council initially required that slip material should be disposed of in a designated landfill; subsequently they allowed a more pragmatic approach which meant that slip material could be moved and redeposited locally.

The road funding authority, Transfund, should ideally become involved as early as possible following a disaster since Transfund has direct access to government funds. However this was not the case following the Manawatu floods and it is likely that more could have been done to secure certainty over funding in the early stages of recovery which would have helped with the physical works prioritisation process.

Recovery at Matata relied heavily on Central Government funding since the local council had a small number of rate payers and insufficient funds to cover the recovery costs itself. Funding took some time to come through whilst government requested and were awaiting details of the costs. This frustrated the local population.

Overall there was little difference between the normal building process and the reconstruction process, due to the fact that the disasters were of a relatively small scale. The parties normally involved during routine construction projects were also involved during the reconstruction and using existing relationships eased the process. During the initial recovery stage local contractors volunteered their time, but this needed careful management. National scale contractors were a valuable source of resources, since they were able to use their networks to mobilise resources from the whole country.

Challenges for Larger Scale Disasters

Coordination of reconstruction. Whilst relying on routine processes proved adequate in many ways for these small-scale disasters, a higher level of coordination and management would be needed for programmes of reconstruction following a larger disaster. CDEM agencies are provided with certain powers under the CDEM Act to direct reconstruction, however, these powers can only be exercised in a declared emergency situation. When a declaration is lifted, the designated Recovery Manager has no statutory power to direct resources for recovery. If they were to direct activities using powers under the Act the agency would become responsible for the oversight and management of those activities; since CDEM agencies do not generally have the resources and skills for these tasks, they are reluctant to take on such responsibility (AELG, 2005). Clearly there is still a need for coordination once a state of emergency ceases, and the responsibly for this is generally taken up by local authorities and insurance companies.

EQC provides statutory funds to cover losses incurred by individual property owners as a result of natural disasters. This arrangement is clearly inefficient in a large-scale disaster and it has been suggested by Page (2005) for example, that bulk reconstruction contracts should be awarded by the EQC so as to relieve house owners from sourcing and managing the process. The EQC trialled a coordinated response to the Te Anau earthquake of 2003, using a large single contractor to coordinate and manage the recovery works on its behalf. The relatively small scale damage of this particular event did not allow definitive conclusions to be drawn on the benefits of such a coordinated approach, but coordination was clearly an improvement on the situation where individual property owners competed for the services of a limited number of building contractors.

MCDEM Director's Guidelines (2005) proposes a management structure for coordinating recovery and it recommends the setting up of various task groups to achieve recovery objectives. Under the 'Built Environment Task Group' are sub-task groups for various parts of the built environment. For example, the 'Residential Housing Subtask Group' would be responsible to:

> *'repair, reconstruct or relocate buildings – obtaining fast-track building and other consents, sufficient builders and materials, coordinating skilled trades and their work standards'*

This is a very challenging responsibility for the task force to take on and does not appear to concur with what has happened in practice following recent disasters.

Reconstruction Resources

The processing of building consents at the early stages of reconstruction and recovery after an event has been identified as a potential bottleneck. Access to normal resource levels will be unlikely and inevitably there will be shortages of qualified people to handle impact assessments and consent processing. A more flexible approach to the standard consent process would be necessary to expedite the process and help cope with the high volume of consent applications after a major disaster.

In terms of overall human resources Page (2004) suggests that the construction industry could cope effectively with a medium sized disaster if the base work load was at an average level, but a large scale disaster coinciding with a high base load could require up to 180,000 additional construction industry workers (this is based on an event causing $10billion worth of damage in the Wellington region and with a base work load 7% higher than current levels). Hopkins, (2004) in a similar study estimates a combined resource requirement for reinstatement to be about $7.73 billion. The National Civil Defence Emergency Management Plan, due to come into force in July 2006, acknowledges New Zealand may need to mobilise all nationally available resources because it has finite capacity and capability for response and recovery.

Hazard and Risk Assessment

The need for a focussed assessment of potential hazards after an event cannot be overemphasised as it will enable the determination of risk levels and put in place the mechanism for avoiding any increase in those risks by limiting future developments in those areas.

The new Building Act (2004) requires that Territorial Authorities must not grant building consents on land subjected to natural hazards unless they can be protected from the hazard and, where waivers are granted, it requires that notices be placed on the land to indicate the risk of natural hazards they are exposed to. Implementing this Act will have far reaching implications on insurance claims as the Earthquake Commission Act indicates that the EQC is not liable to settle any claim where there is an identified large risk. Current revisions to the mapping of vulnerable natural disaster zones may prevent existing properties from being compensated at all.

The CDEM Act is the only piece of legislation that requires specific identification of hazards by councils. However, the scope of this identification is limited to the hazards already identified through the Resource Management Act (RMA) process and for which building works have been undertaken in hazard zones. Hazard identification can only be inferred from other pieces of legislation such as the Building Act and RMA where in the course of discharging council duties, information concerning natural hazards is deemed collected.

The implication of council's inability to gather information on hazards is that development control outside recognised hazard zones are limited, thus the provisions of the various acts concerning land use cannot be effectively applied. For the incident at Matata, the extents of the flood and debris flow were outside known hazard zones.

Conclusion

The task of reconstruction after a major event can be an onerous challenge. It requires deliberate and coordinated efforts of all stakeholders for effective and efficient recovery of the affected community. The paper has shown that the issues surrounding the implementation of the pieces of legislation concerning reconstruction after a major disaster are complex and interrelated. Though the existing regulatory framework seems to point to the right direction, more issues have to be addressed in practice.

Legislation cannot be used for purposes other than those for which it is intended and there appears to be little provision in several areas of legislation for post-disaster situations. These polices need to be revised before hand as hasty revisions during the course of reconstruction works do not provide the best solution to major disaster problems.

Should the routine regulatory and legislative processes be followed after a major disaster it is unlikely that regulatory bodies would be able to cope with the volume of work.

The conflicts in the interpretation of the different pieces of legislation need to be harmonised, whilst the roles and responsibilities of the various CDEM agencies and other stakeholders need to be made clear. The apparent division between those who, in practice, take responsibility for reconstruction and those who set policy and legislation create barriers that need to be overcome. Failing this, implementation of reconstruction works will be cumbersome in the event of a major disaster.

References

AELG (2005). *Resources Available for Response and Recovery of Lifeline Utilities*, Technical Publication for Auckland Regional Council, New Zealand.

Angus, L. (2004). The Direction for Recovery in New Zealand. In: *NZ Recovery Symposium, Napier, New Zealand*, Ministry of Civil Defence and Emergency Management, New Zealand.

Angus, L. (2005). New Zealand's Response to the 1994 Yokohama Strategy and Plan of Action for a Safer World. In: *World Conference of Disaster Reduction*, Kobe-Hyogo, Japan

Brunsden, D. and Smith, S. (2004). Summary Notes from the Infrastructure Workshop. *NZ Recovery Symposium, Napier, New Zealand*, Ministry of Civil Defence & Emergency Management, New Zealand.

Coghlan, A. (2004). Recovery Management in Australia: A community-based approach. *NZ Recovery Symposium, Napier, New Zealand*, Ministry of Civil Defence and Emergency Management, New Zealand.

Comerio, M. C. (2004). Public Policy for Reducing Earthquake Risks: a US perspective. *Building Research and Information* 32(5): 403-413.

Feast, J. (1995). Current Planning and Construction Law: The practical consequences for rebuilding Wellington after the quake. In: *Wellington after the quake*, EQC / CAE, New Zealand.

Hopkins, D. C. (2004). Assessment of Resources Required for Reinstatement. *NZ Recovery Symposium, Napier, New Zealand*, Ministry of Civil Defence and Emergency Management, New Zealand.

Jigyasu, R. (2004). Sustainable Post-Disaster Reconstruction Through Integrated Risk Management. *Proceedings of the Second International Conference on Post-disaster reconstruction*, Coventry University, UK.

MCDEM (2004). *Recovery Planning. Information for CDEM Groups.* Ministry of Civil Defence & Emergency Management, New Zealand.

MCDEM (2005a). *Focus on Recovery: A holistic framework for recovery in New Zealand*. Ministry of Civil Defence and Emergency Management, New Zealand.

MCDEM (2005b). *Recovery Management. Director's Guidelines for CDEM Groups*. Ministry of Civil Defence & Emergency Management, New Zealand.

Page, I. (2004). Reconstruction Capability of the New Zealand Construction Industry. *NZ Recovery Symposium, Napier, New Zealand*, Ministry of Civil Defence andEmergency Management, New Zealand.

Rolfe, J and Britton, N (1995). Organisation, government and legislation: Who coordinates recovery? In: *Wellington after the quake*, EQC / CAE, New Zealand

Sullivan, M. (2003). Integrated Recovery Management: A new way of looking at a delicate process. *Australian Journal of Emergency Management* 18(2): 4-27.

Tonkin and Taylor Ltd (2005). *Matata Debris Flows Hazard and Risk Investigations (Regulatory Review)*, Prepared for Whakatane District Council, New Zealand.

Acknowledgement

We wish to acknowledge Jetske van der Zon (a student intern from University of Twente) whose report on *Post Disaster Reconstruction in New Zealand* was invaluable.

THE CONSTRUCTION INDUSTRY AND EMERGENCY MANAGEMENT: TOWARDS AN INTEGRATED STRATEGIC FRAMEWORK

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Abstract

Although most emergency events are not entirely unexpected and therefore can, to varying degrees, be mitigated for, the construction industry in the UK does not appear to play a sufficiently integrated role in emergency management. This paper reports on research that is developing a knowledge database and decision support framework to enable more effective emergency planning and response strategies from a built environment perspective. Questionnaire surveys were used to review the opinions of professionals involved with emergency management, construction, planning and insurance (amongst others) on issues related to emergency management in the UK. The early findings suggest that knowledge and awareness of integrated approaches is poor, that training needs to be more interdisciplinary, and the construction sector as a key stakeholder and potential resource is not being used sufficiently. Professions involved with the construction industry, and the expertise they can offer, need to become more integrated with emergency management if lessons are to be learnt from the past and a resilient built environment created in the future.

Keywords: Construction industry; resilience; mitigation; interdisciplinary training

Introduction

Designing, constructing and operating resilient built assets demands an in-depth integrated understanding of how to avoid and mitigate the effects of emergencies and disasters in order to secure a resilient built environment. Resilience should be systematically built-in to the planning and design processes not simply added on as an after thought, however, it is not clear to what extent this is being achieved in the United Kingdom (UK).

Some advances have been made in recent years to incorporate the roles of construction professionals into debates regarding topics such as climate change and sustainability. However, the integration of construction professions with the processes associated with emergency management has largely been neglected (Spence and Kelman 2004). Although many emergency events are not entirely unexpected and can therefore be mitigated for, at present emergency management does not play a sufficiently integrated role with the construction industry in the UK. Current and potential threats need to be considered when planning, building and maintaining built assets (Broadbent & Broadbent 2004) and critical infrastructures. Therefore, amidst growing concern for the safety and security of the UK's civil infrastructure in relation to natural and human-induced threats, this paper reports on research that explores the construction sector's knowledge of, and involvement with, emergency management in the UK.

Post-Disaster Reconstruction : Meeting Stakeholder Interests : Proceedings of a conference held at the Scuola di Sanità Militare, Florence, Italy 17-19 May 2006, edited by David Alexander, Colin Henry Davidson, Andrew Fox, Cassidy Johnson, Gonzalo Lizzaralde, ISBN 978-88-8453-611-2 (online), ISBN 978-88-8453-612-9 (print), © Firenze university press, 2007

Emergency Management

Traditionally, emergency management has been motivated by immediate challenges or by responding to single events rather than being engaged in long-term planning (Schneider 2002:143) because the profession can be constrained by indifference or outright opposition. The United Nations have adopted a concept of emergency management that combines activities over five phases, incorporating; 1) Pre-emergency preventive and mitigating actions, 2) Formulation of emergency plans and preparedness activities, 3) Emergency relief interventions, 4) Short-term recovery and rehabilitation, and 5) Longer-term reconstruction (UNOCHA 1997). However, only the relief and recovery phases of emergency events receive much public (and media) attention. Schneider (2002) stated that emergency management has largely been viewed as a reactive profession because hazard mitigation is rarely seen as urgent.

> "Policy makers and stakeholders alike tend to underestimate hazard potentials. They see a low probability of hazard occurrence, are reluctant to impose limitations on private property, often unwilling to bear the costs incurred by mitigation plans, and frequently are ambivalent toward hazard mitigation, because they see it as being in conflict with other values and goals" (Schneider 2002:144).

Emergency management needs to be placed in a holistic setting and new initiatives found in order to ensure that emergency management duties are viewed as a shared responsibility that not only mitigates potential hazards, but also embraces the sustainability agenda (Trim 2004). Sustainable development is "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED 1987). Emergency management should therefore be concerned with people's capacity to manage their natural and built environment; to take advantage of it in a manner that safeguards their future and that of their children. Part of this shared responsibility could be achieved by integrating more with the construction industry professionals that possess the knowledge and experience of how to design, build, retrofit and operate what are typically bespoke built assets.

The UK Construction Industry

By and large, the built environment is designed, built and maintained by the construction industry, which can be defined as "all those firms involved directly in the design and construction of buildings" (Morton 2002:39) and includes civil engineering and infrastructure work such as roads, bridges and railways. The UK construction industry is worth some £65 billion a year, accounts for 8 percent of gross domestic product, and employs 1.9 million people (NAO 2001). The construction industry is a critical component of not only the nation's economy,[1] but is also a fundamental factor in the quality of life and the ability of the government to achieve policy requirements. If a resilient and sustainable built environment is to be achieved and critical infrastructures are to be protected, it is feasible that emergency management in the UK should adopt a strategic framework that promotes the integration of construction related disciplines.

There is currently little commentary within the literature on the contribution of the construction industry related to the mitigation of natural and human-induced

[1] Studies show that Gross Domestic Fixed Capital Formation in construction is 45-60 percent of the total capital formation (Ofori, 1990; Hillebrandt, 2000).

hazards. In view of this, research entitled 'Towards a Safe, Secure and Sustainable Built Environment' is currently being undertaken on this topic. As part of the project, questionnaire surveys were used to obtain the opinions of a range of construction and non-construction professionals on the topic of emergency management in the UK. Perceptions of the most and least significant natural and human-induced threats were obtained, awareness of emergency management involvement by construction disciplines was investigated and opinions regarding the potential role of the construction sector were sought.

The Research

Between September and December 2005, 102 questionnaire surveys were completed by a range of professionals involved with construction, insurance, emergency management, local and national government, urban planning, and academic research. The response rate to the questionnaire survey was low at 28 percent so initially it was useful to assess which professions were most engaged with the topics covered by the questionnaire; this was measured by the questionnaire response rate for each sector (Table 1).

Sector	Sent	Returned	Response rate
Engineering Consultancy	13	7	**54%**
Insurance/Risk	13	6	**46%**
Academia/Research	31	11	**36%**
Government department/agency	40	13	**33%**
Emergency Management	45	13	**29%**
Construction (large scale operation)	99	28	**28%**
Utilities (e.g. water, transport)	8	2	**25%**
Developer	36	8	**22%**
Trade representation/bodies	27	6	**22%**
Construction (small – medium scale)	41	6	**15%**
Urban planner (local authority)	15	2	**13%**
Total	**367**	**102**	**28%**

Table 1. Response rate to questionnaire survey by sector

Above average responses to questionnaires were provided by engineering consultancies (54 percent), the insurance/risk sector (46 percent), academia/research (36 percent) and Government Agencies (33 percent). Below average responses were from local authority urban planners (13 percent), and small to medium scale construction companies (SMEs) (15 percent). Follow up telephone calls and e-mail correspondences to a broad range of the non-responders highlighted that the main reason for not returning a questionnaire was due to the individual believing that the topics covered by the questionnaire (such as awareness of and involvement with emergency management, and hazard identification, training and mitigation) were not applicable to them.

Perceptions of Tto the UK

Threats to the UK built environment are diverse and include extreme natural hazards (such as floods and storms) and human-induced hazards (such as terrorist attacks, explosions at industrial facilities and mass transportation accidents). Typically, these hazards cause minor disruption to the economy, infrastructure and residents of the UK but some commentators (such as UKCIP 2002; Keane 2005) believe that the magnitude and frequency of these extreme events are increasing. As such, current and potential future threats need to be considered when planning, building and maintaining the built environment. In view of this, the research sought the views of the respondents regarding their perceptions of which natural and human-induced threats they considered to be most or least significant (Figure 1).

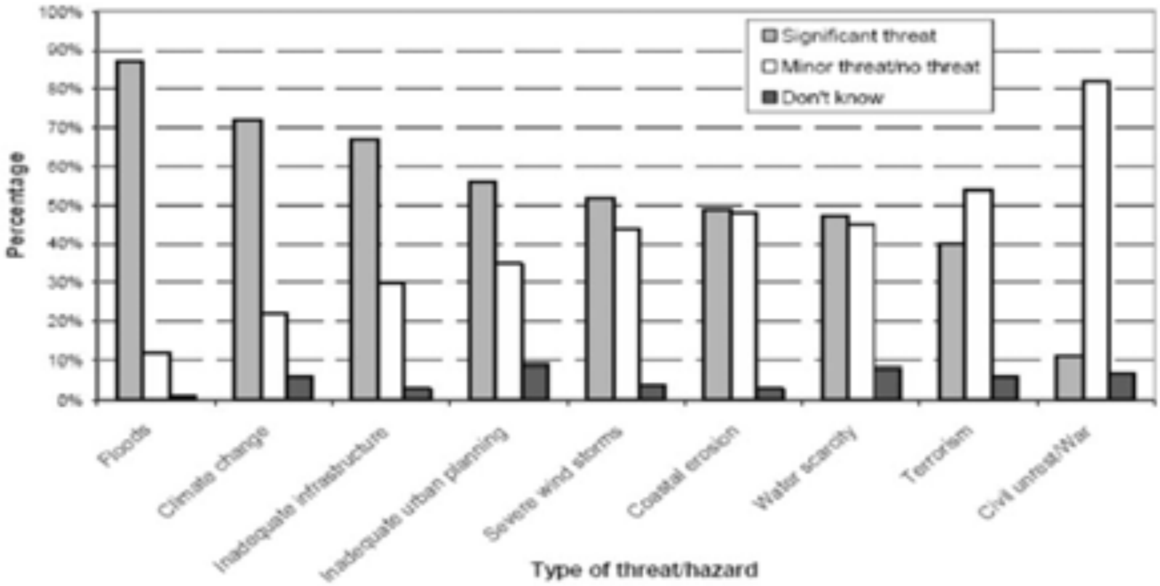

Figure 1. Perceptions of threats to the built environment in the UK.

Figure 1 shows that the most significant threats to the built environment in the UK are considered to be floods, climate change, ageing/inadequate infrastructure, and inadequate urban planning. Minor threats were perceived to be civil unrest/war and terrorism. It is interesting that in light of last year's terrorist attacks in London that terrorism was not generally viewed as a significant threat to the UK's built environment. However, it is significant that respondents with primary responsibility for public safety, such as urban planners and emergency managers, were the only disciplines that perceived terrorism to be a significant threat.

Perception of threats by sector. All sector categories perceived the threat from flooding to be the most significant threat to the built environment (see Table 2). The respondents involved with the construction sector considered 'wind storms', 'coastal erosion' and 'terrorism' to be of no threat to the built environment, which is in complete contrast to the responses from 'urban planners'. Respondents from the utilities sector and 'developers' did not view climate change as a significant threat, while trade representation, urban planners and engineering consultants considered climate change to pose a significant threat. It is difficult to assess the reasons behind these differing perceptions. Further in-depth analysis of the data did not produce any statistically significant observations or correlations, but this may be symptomatic of low sample sizes. Nonetheless, differing opinions occur and to some degree these opinions are delineated across disciplinary lines.

Threats Sector of respondent	Floods	Clim change	Ageing infrastructure	Inadequate urban planning	Severe wind storms	Coastal ero-sion	Water scarcity	Terrorism	Civil unrest/war
Academia/ Research	♦							¤	¤
Construction	♦				¤	¤		¤	¤
Developer	♦	¤	♦	♦			♦		¤
Emergency Management	♦							♦	¤
Engineering Consultancy	♦	♦	¤						¤
Government department/ agency	♦			¤					¤
Insurance/Risk	♦		♦			¤			¤
Urban planner (local authority)	♦	♦	♦		♦	♦		♦	¤
Trade representation/ bodies	♦	♦	♦	♦	♦		♦	¤	¤
Utilities (e.g. water, transportation)	♦	¤	♦		¤	¤			¤

Table 2. Perceptions of threats to the UK – by respondents' sector

Therefore, it is important to recognise that essential differences, such as perceptions of threats and risk, exist between professional people from different backgrounds (Pavlica and Thorpe 1998). Indeed, differences exist between the disparate professionals working in the area of emergency management (Trim 2004) and construction (Morton 2002) because an individual's identity is formed by history, tradition, politics and education and is further influenced by management learning and development; and shaped also by factors associated with organisational change (Pavlica and Thorpe 1998) and types and methods of employment (Morton 2002). These differences need to be considered when attempting to integrate a wide range of professions into any strategic framework, but before this can be done it is essential to understand who is (and should be) involved with emergency management.

Emergency Management – Who is involved?

The Civil Contingencies Act 2004 (Cabinet Office 2004) attempts to deliver a single framework for civil protection in the United Kingdom to meet the challenges of the 21st century. The Act is separated into two substantive parts: local arrangements for civil protection (Part One) and emergency powers (Part Two). The overall objective for both parts of the Act was to modernise outdated legislation. The Act focuses on three types of threat -

- an event or situation which threatens serious damage to human welfare;
- an event or situation which threatens serious damage to the environment; or
- war, or terrorism, which threatens serious damage to security

Part One of the Act covers local arrangements for civil protection and sets out clear expectations and responsibilities for front line responders at the local level to ensure that they are prepared to deal effectively with the full range of emergencies from localized incidents through to catastrophic emergencies. It divides local responders into two categories (see Table 3).

CATEGORY 1 ORGANISATIONS	
Local Authorities	All principal local authorities (County, District, Borough & Metropolitan)
Government agencies	Environment Agency, Scottish Environment Protection Agency (SEPA), Maritime and Coastguard Agency
Emergency Services	Police Forces, British Transport Police, Police Service of Northern Ireland, Fire Authorities, Ambulance Services
National Health Service (NHS) Bodies	Primary Care Trusts, Health Protection Agency, NHS Acute Trusts (Hospitals), Foundation Trusts, Local Health Boards (in Wales), Welsh NHS Trusts, Health Boards (in Scotland), Port Health Authorities
CATEGORY 2 ORGANISATIONS*	
Utilities	Electricity, Gas, Water and Sewerage, Public communications providers (landlines and mobile networks)
Transport	Network Rail, Train Operating Companies (Passenger and Freight), Transport for London, London Underground, Airports, Harbours and Ports, Highways Agency
Government	Health & Safety Executive (HSE)
Health	The Common Services Agency (in Scotland)

* *Cat. 2 organisations are responsible for co-operating with Cat. 1 organisations and sharing relevant information.*

Table 3. Organisations involved with emergency management in the UK.

Organisations in Category One will have duties placed upon them to:

- Assess local risks and use this to inform emergency planning;
- Put in place emergency plans;
- Put in place Business Continuity Management (BCM) arrangements;
- Put in place arrangements to make information available to the public about
- civil protection matters and maintain arrangements to warn, inform and
- advise the public in the event of an emergency;
- Share information with other local responders to enhance co-ordination; and
- Co-operate with other local responders to enhance co-ordination and
- efficiency

The Civil Contingencies Act 2004 has therefore put in place a framework that enables a wide range of sectors, such as transport operators, utilities companies and communications providers, to be integrally involved with emergency management planning. However, the extent to which the respondents were aware of who is and who isn't involved in emergency management was unclear.

Awareness of who is involved. An integral part of this study involved the identification of which sectors are currently involved with emergency management in the UK. Approximately one in six of the respondents were not aware of whether the construction sector is involved with emergency management processes. Nearly half of the respondents stated that the construction industry is involved on an ad-hoc basis (but mainly related to emergency response, search and rescue and reconstruction). Three quarters of the respondents agreed that there is a pressing need for professions associated with the construction industry to become more involved with emergency management in the UK (only 3 percent disagreed). Of those who construct the built environment (in contrast to those who plan and govern the built environment) only 30 percent are involved in most cases and one third are involved on an ad-hoc basis.

The majority of respondents (81 percent) stated that local authorities are involved with emergency management, while 43 percent of the 'developers' believed that local authorities were not involved. This may highlight a potential weakness in the awareness of some developers regarding the key role of local authorities in the planning process. The majority of the respondents (75 percent) did not feel that developers or clients were involved with emergency management. In contrast 57 percent of developers and 71 percent of engineering consultants felt that developers and clients were involved. Two thirds of the respondents believed that civil engineers are involved with emergency management but 69 percent of emergency managers and 67 percent of professionals in the insurance and risk sectors believe that civil engineers are not involved. Again, awareness of who is responsible for emergency management planning and consultation appears to be very mixed and in some cases extremely limited.

Future involvement with emergency management. Over half of the respondents stated that urban planners, designers, engineers (civil and structural), developers, clients and architects should be more involved with emergency management than they currently are (refer to Table 4). However, the two respondents from local authority urban planning departments did not agree that they should be more involved. The two respondents from utilities companies did not think they were sufficiently involved with emergency management; in stark contrast, the respondents that were not from this sector stated that utilities companies were significantly involved with emergency management. It is possible that this may reflect a delay between what has been set out in the Civil Contingencies Act, regarding involvement of utilities companies etc., and the establishment of the working groups and sub-groups that constitute the proposed framework. Whatever the reasons may be, at the moment there is little evidence that the respondents are aware of who is and who isn't involved with emergency management in the UK; this is an issue that should be resolved urgently.

	Level of involvement with emergency management?			
Discipline	Involved but need to be even more involved	Involved sufficiently	Not involved sufficiently, should be more involved	Not involved and don't need to be
Local authorities	X			
Civil engineers	X			
Structural engineers	X			
Utility companies		X		
Risk managers		X		
Academia/researchers		X		
Developers/clients			X	
Urban/town planners			X	
Architects			X	
Designers			X	
Main contractors			X	
Construction managers			X	
Insurance industry			X	
Facilities managers				X
Materials suppliers				X
Surveyors				X
Conveyancing				X

Table 4. Perceptions of which disciplines are involved with emergency management in the UK.

There is a need for policy makers, practitioners and the academic community to realise that hazard risk reduction and emergency management should be more integrated than in the past. Hazard mitigation and urban planning is more than a niche issue in the construction industry and knowledge about disruptive events needs to be incorporated into the mainstream risk-management process (Lorch 2005). In view of this it was necessary to assess the extent to which the respondents believed that hazards and risk reduction issues had been integrated into their professional training (see Table 5).

The findings suggest that awareness of natural/human-induced/climate change related hazards tends to be most prominent with respondents who govern/advise on the built environment (such as the Environment Agency, the Department for Environment, Food and Rural Affairs and the insurance sector), rather than those who actually design, build and maintain it. The respondents from the construction sector (including developers and trade representation) typically stated that the issues highlighted in Table 5 were not integrated into their professional training. The findings suggest that the levels of training provided to construction professionals on the awareness of these hazards needs to be more integrated into their professional training than it has been in the past.

Issue / Sector of respondent	Natural hazards	Human made disasters	Climate change	Hazard & risk reduction
Academia/Research	Yes	Yes	Yes	Only recently
Construction (large scale)	No	-	-	Only recently
Construction (small-medium scale)	No	-	-	Only recently
Developer	-	No	-	No
Emergency Management	Yes	Yes	Only recently	Only recently
Engineering Consultancy	Yes	No	Yes	Only recently
Government department/agency	Yes	Yes	Yes	Yes
Insurance/Risk	Yes	Yes	-	-
Urban planner (local authority)	-	-	-	Yes
Trade representation/bodies	No	No	Yes	-
Utilities (e.g. water, transport)	-	-	Only recently	Only recently
Respondents that build	-	No	-	Only recently
Respondents that govern/advise	Yes	Yes	Only recently	Yes

Note:
Yes' -majority of respondents from the sector said issues are integrated
'No' - majority of respondents from the sector said issues are not integrated
'Only recently' - majority of respondents from the sector stated that issues only recently considered
'-' denotes that there was no clear indication that issues are integrated or not.

Table 5. The extent to which hazard and risk awareness/reduction is integrated into professional training – by sector.

Input From the Construction Industry

It has been suggested that emergency management is too focused on response, while mitigation activities are overlooked (Schneider 2002). Presently, the construction sector is involved with response on an ad-hoc basis and it would make sense if construction professionals were more involved with mitigation activities, via consultation related to the design and engineering of structures. However, Lorch (2005) believes that some of the non-technological problems of emergency planning are a demonstration of the disciplinary boundaries within the scientific community and between the scientific community and the policy community. Consequently, there is a need for policy makers, practitioners and the academic community to realise that hazard risk reduction and emergency management should be more integrated than in the past. Hazard mitigation and urban planning is more than a niche issue in the construction industry and knowledge about disruptive events needs to be incorporated into the mainstream risk-management process (Lorch 2005). So how can this integration be facilitated?

Government Offices, through the work of the Regional Resilience Teams (RRTs) and Regional Resilience Forums (RRFs), have an important role to play in the promotion and implementation of the regional tier of emergency management as set out in the Civil Contingencies Act 2004. Regional Resilience Forums have been formed to bring together key players within each region, such as local authorities, central government agencies, the armed forces, and the emergency services. This study has assessed the extent to which the respondents are involved with these RRTs/RRFs. Table 6 shows that emergency managers (as one would expect) are likely to be regularly involved with RRT/RRFs. However, professions associated with the construction sector and development are not currently involved with RRT/RRFs.

	Percentage involvement?			
	Regularly involved	Involved on an ad hoc basis	Would like to be involved	No
Emergency Management (n=13)	62	23	15	0
Government Dept/Agency (n=13)	31	8	8	53
Engineering Consultancy (n=7)	14	29	0	57
Insurance/Risk (n=6)	0	50	17	33
Urban planner (local authority) (n=2)	0	50	0	50
Trade representation (n=7)	0	20	20	60
Academia/Research (n=11)	0	9	45	46
Construction (broad sector) (n=33)	0	3	18	79
Developers (n=8)	0	0	0	100
Utilities (n=2)	0	0	0	100
Total (n=102)	13	13	15	59

□2 = 79.917; significant, $p<0.01$

Table 6. Involvement with Regional Resilience Teams/Forums.

Roles Within Regional Resilience Teams/Forums

These findings suggest that despite the introduction of the Civil Contingencies Act 2004, there is still a lack of involvement from private sector stakeholders (91 percent of respondents not involved) compared to public sector stakeholders (62 percent of respondents involved).[2] Arguably, the emergency management sector needs to be more proactive and initiate involvement from private sector stakeholders by, for instance, inviting representatives from construction companies or contractors to become involved with Regional or Local Resilience Forums. For example, those involved with construction projects could be classed as temporary (whilst they are involved with a project under a certain local authority's jurisdiction) 'Category Two responders' (as a requirement of the Civil Contingencies Act 2004). This would mean that representatives for the various disciplines/contractors/stakeholders would be obliged to become intrinsically involved with Regional Resilience Forums. This could be made a prerequisite for any contractor/organisation that is involved with the design, planning, construction and operation of critical infrastructure or any large scale

[2] $X^2 = 41.517$; significant, $p<0.01$

projects (such as hospitals, transport infrastructure, or any other project that is essential to the safe and secure operation of the built environment, including the 2012 Olympic games facilities). To make this suggestion more workable it may be necessary for the relevant parties to provide a representative that holds a suitably broad perspective of the project being undertaken. This representative should ideally possess sufficient knowledge of the potential hazards that could affect the project and be aware of the impacts of the project on safety, security and sustainability.

Improved Training

Because the impacts of natural and human-induced hazards have not been sufficiently integrated into the professional training of people in the construction sector (refer to Table 5), improvements to training programmes would be required. At the same time research communities will need to be more integrated if the temporal concepts of life cycle, hazard and impact are to be better understood in the future. Lorch (2005) believes that higher education and training can play a major part in the integration of sustainable development and hazard, vulnerability and risk reduction principles into the domain of built environment students and asks, "Should we be investigating the capabilities of the built environment under extreme circumstances as well as subtle, protracted circumstances?" (Lorch 2005:210). For example, in Europe, much work has been done to re-educate architects to design eco-friendly and more resilient buildings, which not only have lower carbon emissions, but are more resistant to floods and storms (Roaf *et al.* 2005).

Increasing Competitiveness

The construction sector should embrace, and possibly pre-empt, regulatory changes regarding resilient construction requirements and use it as an opportunity for competition within the sector, nationally and globally and as a 'reputation damage' avoidance measure. In this way the construction industry could significantly contribute towards actions related to mitigation initiatives whilst viewing the required innovations as opportunities to become leaders in the field of resilient structures.

Conclusions

Recent natural and human-induced events have highlighted the fragility and vulnerability of the built environment to disasters and emergencies. These physical systems have traditionally been designed, built and maintained by the myriad professions involved with the construction industry. However, the construction industry has not been involved sufficiently in the planning and mitigation of natural and human-induced hazards (Spence and Kelman 2004). Resilience should be systematically built-in to the planning and design processes not simply added on as an after thought, however, it is not clear to what extent this is being achieved in the UK. In view of this, the key findings from this research so far are:-

- The most significant threats to the built environment in the UK are perceived to be floods, climate change, ageing/inadequate infrastructure, and inadequate urban planning. Minor threats were perceived to be civil unrest/war and terrorism. Only those with responsibility for public safety (such as emergency managers and urban planners) believed that terrorism is a significant threat to the UK.
- There is a lack of awareness demonstrated by the respondents regarding who is responsible for, and involved with, emergency management planning and consultation in the UK.

- Of those who construct the built environment, only 30 percent are involved in emergency management in most cases and one third are involved on an ad-hoc basis. The majority of the respondents (75 percent) agreed that there is a pressing need for disciplines associated with the construction industry to become more involved with emergency management in the UK.
- Awareness of natural/human-induced/climate change related hazards tends to be most prominent with respondents who govern/advise on the built environment, rather than those who actually design, build and operate it.
- Professions associated with the construction sector and development are not currently involved with RRTs/RRFs.

Emergency management needs to be more proactive than it currently is and also embrace a strategic framework that integrates a wide range of professions from the construction sector. Emergency management that does not integrate the range of experience and skills that the construction industry can offer is tantamount to mismanagement of the built environment.

Recommendations

If a resilient built environment in the UK is to be achieved, emergency management needs to become more integrated with professions from the construction industry. This could be achieved by:-

- Involving construction related stakeholders in Regional Resilience Teams and Forums thereby facilitating the integration of skills that construction disciplines can offer. Emergency management and construction professions could then become more involved with locational planning and building design codes related to future developments in hazard risk areas; this is of particular importance regarding the protection of critical infrastructures.
- The construction sector should embrace and pre-empt regulatory changes regarding resilient construction requirements and use it as an opportunity for competition within the sector, nationally and globally and as a 'reputation damage' avoidance measure. In this way the construction industry can significantly contribute towards actions related to mitigation initiatives whilst viewing the required innovations as opportunities to become leaders in the fields of resilient structures and sustainable construction etc.
- All stakeholders should increase their awareness. Risk and hazard awareness training needs to be systematically integrated into the professional training of architects, planners, engineers, developers etc. Trans-disciplinary training for construction professionals and emergency managers should be encouraged. At the same time clients and consumers should be made aware of the benefits of resilient and sustainable built assets in contrast to the 'lowest price' options.
- Research needs to be expanded to assess the resilience of materials, fixtures and fittings to a wide range of potential hazards. Studies should also be conducted to find alternative options regarding resilient and sustainable materials, designs and processes.

References

Broadbent S.G, and Broadbent D.M., (2004), *'Traditional vs. Modern Construction Practices'*, paper presented at the Second International i-Rec Conference on Post-disaster reconstruction: Planning for Reconstruction, 22-23 April 2004, Coventry University, England

Cabinet Office, (2004), *The Civil Contingencies Act 2004 (Contingency Planning) Regulations*, Civil Contingencies Secretariat, London

Hillebrandt, P.M., (2000), *Economic Theory and the Construction Industry, Third Edition*. Macmillan, Basingstoke.

Keane B., (2005), 'Major Incident and disaster management', *The Structural Engineer*, 7th June, 83 (11). pp. 22-25

Lorch, R., (2005), 'What lessons must be learned from the tsunami?', *Building Research and Information*, 33 (3). pp. 209-211

Morton, R, (2002), *Construction UK: Introduction to the Industry*, Blackwell Publishing, Oxford.

NAO, (2001), *Modernising Construction*, National Audit Office, London

Ofori, G., (1990), *The Construction Industry: Aspects of its management and economics*. Singapore University Press, Singapore.

Pavlica, K. and Thorpe, R. (1998), 'Managers' perceptions of their identity: a comparative study between the Czech Republic and Britain', *British Journal of Management*, 9 (2). pp. 133-49

Roaf, S. Crichton, D., and Nicol, F. (2005) *Adapting Buildings and Cities for Climate Change*, Architectural Press and Elsevier Press, London.

Schneider R.O., (2002), 'Hazard Mitigation and Sustainable Community Development', *Disaster Prevention and Management*, 11 (2). pp. 141-7

Spence R., and Kelman I., (2004), 'Editorial: Managing the risks from natural hazards', *Building Research & Information*, 32 (5). pp. 364-367

Trim, P., (2004), 'An Integrated Approach to Disaster Management and Planning', *Disaster Prevention and Management*, 13 (3). pp. 218-225

UKCIP, (2002), *Climate change scenarios for the United Kingdom*, UK Climate Impacts Programme, April 2002, Swindon.

UKCIP/EPSRC, (2003), *Building Knowledge for a Changing Climate: The impacts of climate change on the built environment: A research Agenda*, UK Climate Impacts Programme (UKCIP)/ Engineering and Physical Sciences Research Council (EPSRC), Swindon/Oxford.

UNOCHA, (1997), *Humanitarian Report 1997: The Reduction of Natural, Technological and Environmental Disasters*, United Nations Office for the Coordination of Humanitarian Affairs, Geneva.

WCED (World Commission on Environment & Development), (1987), *Our Common Future*, Oxford University Press, Oxford.

STATE – CIVIL SOCIETY RELATIONSHIP IN DISASTER MANAGEMENT[3]

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Abstract

This paper provides a comparative analysis of how different states have involved civil society in their attempts to prepare for, respond to and mitigate the impact of, disasters, with specific reference to medium to long-term developments within civil society during and following the reconstruction process. In order to achieve its objective the paper focuses on state-civil society relationships in the aftermath of three major earthquake disasters: Kobe earthquake in Japan, Marmara earthquake in Turkey and Gujarat earthquake in India.

Keywords: civil society; disaster management; earthquake; governance.

Introduction

Recent studies of disaster management have noted the powerful effects of the catastrophic earthquakes on civil society's relationship with the state (Tierney and Goltz, 1997; Jalali, 2002; Kubicek, 2002; Sharma and Palakudiyil, 2003; Thiruppugazh, 2003; Shaw and Goda, 2004; Özerdem and Jacoby, 2006), and the aim of this paper is to provide a review of how state-civil society relationships have been changed in the aftermath of the catastrophic earthquakes that affected Kobe in 1995, the Marmara region in 1999 and the Gujarat in 2001.[4] The paper will attempt to answer whether or not the occurrence of large-scale disasters strengthens the organisational power and autonomy of the state, and how such events mesh with the policies and structures of the international development industry.

Andrew Maskrey asserts that community based organizations 'enable people to express their real needs and priorities, allowing problems to be correctly defined and

[3] This paper is based on the author's book with Tim Jacoby entitled 'Disaster Management and Civil Society: Earthquake Relief in Japan, Turkey and India, I.B. Tauris, 2006.

[4] *Kobe Earthquake:* At 5:46 on the morning of Tuesday, 17 January 1995 a 20-second earthquake centred beneath Awajishima Island off the coast of Kobe was recorded at a severity of 7.2 on the Richter scale. Six thousand, four hundred people were killed by a combination of falling debris and the fires which engulfed Kobe for days. Its economic cost was estimated at $100 billion. *Marmara Earthquake:* The Marmara earthquake which registered 7.4 on the Richter scale and affected an area of over 40,000 square kilometres, struck at 03.02 on 17 August 1999 and was centred on Gölcük, the country's most important naval base in the province of Kocaeli 90 kilometres east of İstanbul. The official death toll was 17,127 with more than 43,000 people injured. Over 75,000 households and commercial buildings collapsed or were heavily damaged, a similar number suffered moderate damage and over 90,000 were only slightly affected. *Gujarat Earthquake:* At 8:46 am on the 26 January 2001, an earthquake of a magnitude of 6.9 on the Richter scale occurred in the Gujarat – a western state of India. Affecting 21 out of the Gujarat's 25 districts, the earthquake devastated 18 towns, 182 *talukas* and 7,904 villages. Of these, an estimated 900 villages and 10 towns were razed to the ground. The total number of people who lost their lives was in excess 20,000 with over 167,000 individuals sustaining injuries. With nearly one million houses damaged or destroyed, approximately 600,000 people were instantly rendered homeless.

responsive mitigation measures to be designed' (1989: 84). While this may be so, it remains unclear whether such an involvement in disaster management would also bring about political change and whether the role of civil society been limited to creating social capital for an effective disaster response or has it also been able to play a role as an intermediary between the state and disaster-affected people. Moreover, has it been able, as in the classic formulation of de Tocqueville, to generate organisations representative of society more broadly as well as to act as a pressure group for raising issues in the public arena and acting as a checking mechanism on the actions of the state? How do these features differ across various polities? For example, each of our three case studies represents different economic development levels, Japan being the richest and India the poorest (at least in terms of GDP per person). Correlatively, Japan is often given as a best practice example in the field of disaster management, while Turkey and India are often criticised for their lack of disaster preparedness and response strategies. Is there really a linear relationship between per capita wealth, civil power and state accountability in the context of natural disasters, though? Are there, in fact, other non-economic factors, such as participative democracy and welfare provisions, to consider? To what extent can acutely destructive earthquakes be seen as a catalyst for the development of the third sector and a civil basis for greater governmental efficiency and accountability? Does the empowerment of civil organisations imply a diminution in state responsibility and action? Have processes of civil empowerment endured or have state agents been able to appropriate their spheres of activity and influence? In summary, can earthquakes and the threat of earthquakes be regarded as an important marker in the 'modern' transition from a politically passive population to an active, rights-based citizenry?

Civil Society Organisations and Disaster Response

Civil society has, in recent years, ascended to a fundamental position within the lexicon of both the social sciences and development policy-makers. It has been 'the prime beneficiary of wider political and ideological changes that have redefined the powers and responsibilities of states, markets and voluntary associations over the last twenty years' (Edwards, 2004: 11). The rise of neo-liberalism, the New Right and the ideology of the small state strengthened, as Omar Encarnación observes, 'the sense that the government was untrustworthy, wasteful and best kept to a minimum essentially drove the rise of civil society to the top of the agenda' (2003: 708). An invigorated civil society was also seen as a force of resistance to the declining dictatorships of Eastern Europe and as a means of democratic transition within the developing world where the Soviet's influence was on the wane (Ekiert & Kubik, 1999). Civil society was frequently seen as a means of mediating the views of masses and restraining the arbitrary governance of a despotic or unaccountable state. As Encarnación states, 'in embracing civil society, liberals hope to find answers to society's vexing problems - from poverty to racism to environmental degradation - that do not invite further intrusion of the state' (2003: 708). As such, it has been lauded as a means of both reviving the West's moribund political culture and of consolidating democratisation in the developing world (Fukuyama, 1996; Diamond, 1999). In all, then, 'it is Alexis de Tocqueville's ghost that wanders through the corridors of the World Bank' not that of Gramsci or Marx (Edwards, 2004: 10).

This vision of civil society sees voluntary associations as the fundamental organisational expression of non-state power. In keeping with de Tocqueville's view that it serves the dual purpose of representing the masses and resisting or scrutinising governmental extraction and legislation, civil society is regarded as *part* of society rather than a neutral space or a utopian future. The repository of such civil, or 'good', governance is, in most Tocquevillean formulations, the 'third' sector; defined by Alison Van Rooy as 'advocacy groups, non-governmental organisations, social movement agents, human rights organisations and other actors explicitly involved in 'change work''(civil society organisations (CSOs) are thus 'third' in the sense that, overtly at least, they do not belong to the market or the state) (1998: 15).

Mary Kaldor identifies overlapping and inter-connected categories of organisations within the third sector, which are illustrated in Table 1. For the limited scope of this paper, the focus here will be on NGOs which first appeared in Article 71 of the United Nations' Charter in which the Economic and Social Committee was instructed 'to make suitable arrangements for consultation with non-governmental organisations which are concerned with matters in its competence' (Gaer, 1996). Under such patronage the numbers of such organisations grew steadily throughout the 1950s, 1960s and – with the loosening of Cold War 'tightness' – the 1970s (Smith, Chatfield and Pagnucco, 1997). Since then, large increases in NGO numbers (by a third during the 1990s alone) has, writes Helmut Anheier, contributed significantly to economic growth during the 1980s and 90s; over 7 per cent of the workforce in 22 surveyed countries were, for instance, found to be working for NGOs (2000). Currently, NGOs can, according to the Johns Hopkins Comparative Non-Profit Sector Project, be considered to be defined by five key characteristics. They are:-

- *Organised:* institutionalised in terms of the system of operation
- *Private:* institutionally separate from government
- *Non-profit distributing:* returning surpluses to the mission of the organisation
- *Self-governing:* equipped with their own apparatus of command and control
- *Voluntary:* some degree of voluntary participation in the management and/or the operation of the organisation (Morris, 2000: 6).

The NGO sector has been subject to varying degrees of co-option, or what Kaldor calls 'taming'. In particular, neo-liberal approaches to civil society have pressured NGOs to reorganise the political space in order to minimise the role of the state. Sweetened by the provision of funding, but without regard for local conditions, this has been led by an ever-closer relationship between senior managers within the big Northern NGOs and international policy makers. The result has been a growing emphasis on privatisation, decentralisation and free enterprise within many development NGOs (Glasius, Lewis and Seckinelgin, 2004).

Of these various groupings, many have been highly active in the area of disaster mitigation and response. For example, many religious institutions and groups have traditions of supporting disaster affected populations. Amateur radio operators can become an essential lifeline in the immediate aftermath of a disaster. The mass media have also been closely involved in disaster management activities from raising public awareness and acting as a pressure group to forming communications in emergency relief. Academia and research institutions have similarly contributed by attempting to develop a better understanding of vulnerability and co-operate in training and public awareness programmes (Twigg, 2004: 70-71). In the past, these, and other, groups, have, it is often claimed, been 'able to implement programmes that connected victims with unmet needs to a diversity of resources' (Bolin and Stanford, 1998: 35). Indeed, in virtually all disasters, particularly those in the South, it is, according to Ian Christoplos, 'the local communities that provide the vast majority of support to victims in crucial, acute stages' (2003: 102).

	Social Movements	NGOs	Social Organisations	Nationalist and Religious Groups
Mission	Emancipation of the poor and excluded	Development and relief	Protection and promotion of members' interests	Protection and promotion of members' interests
Activities	Mobilisation, protests and demonstrations	Service provision and advocacy	Service provision and lobbying	Mobilisation, protests and demonstrations
Social Composition	Activists and students	Professional and volunteer staff	From displaced people to employer associations	Urban groups, migrants and peasants
Forms of Organisation	Loose coalitions and networks	From networks to corporate bureaucracies	From networks to corporate bureaucracies	Charisma-led hierarchies and networks
Sources of Funds	Donations	Foundations, donations, states and business corporations	Membership	Diaspora, donations and sometimes violent crime

Table 1. Types of Civil Society Organisation (adapted from Kaldor, 2002: 12

The decentralisation of disaster management responsibilities may thus be considered a positive step forward. For writers such as John Twigg, it 'has changed the ways in which communities and local NGOs interact with state institutions' by increasing civil engagement (2004: 66). This might, he continues, be achieved by preserving a critical stance in relation to governmental policy and thus, in the case of disaster mitigation, demanding a strategy which is more preventative than reactive. Here, CSOs have, he argues, been important elements in both policy development and administrative implementation. Alternatively, others have suggested that CSO support of state-sector efforts to enhance the resilience of communities at risk from natural hazards can improve disaster preparedness (Luna, 2001: 224). In all, there exists a widespread view that strengthening local capacities can be an effective tool in disaster management. In this regard, Nuray Karancı and Bahattin Akşit have argued that understanding and incorporating 'the attitudes, expectations, and resources of the local community in order to develop plans that can be integrated into the ongoing social life of the communities in disaster-prone areas' is a prerequisite to all successful disaster response strategies (2000: 405).

On the other hand, it is clear that the pre-eminence of neo-liberal economic orthodoxy has resulted in an abdication of governmental responsibility during times of crisis, in an erosion of states' ability to mobilise the citizenry generally and in a penetration of the third sector. As John Twigg observes, this frequently leaves 'local government and NGOs to take on the task of managing disasters, even though they often lack the skills and finances to do so' (2004: 67). Furthermore, the neo-liberal logic of decentralised decision-making, often empowers local leaders who are 'even more hostage than their colleagues at higher levels to demands to deal with immediate problems rather than distant threats' (Christoplos, 2003: 95). This, coupled with the fact that, for the most part, they do not have the 'political power to address the deeper political, social and economic forces that put people at risk', tends to obstruct the development of effective long-term hazard mitigation (Twigg, 2004: 69). As Wisner notes, full disaster mitigation is 'impossible without challenging the prevailing ideals of limitless growth, of ever-decreasing governmental regulation, and of the dominance of market values' (2003: 50).

Such problems can, in turn, increase public sector reliance on CSOs despite the fact that many, as José Luis Rocha and Ian Christoplos affirm, continue to be 'dominated by an intellectual elite of middle-class citizens' – a factor which 'explains why they have not managed to create sustainable mechanisms to enable them to act in a common direction' and adequately respond to the challenge of hazard vulnerability (2001: 247). So when disasters occur, those charged with responding may, (at least in the South) 'receive a sudden influx of money, but they too often lack of resources and support to raise the issue of dealing with hazards after the media attention has subsided and both collaborating institutions and flows of funding have returned to normal' (Christoplos, 2003: 96). The result is that, of the four phases of disaster response, emergency relief and rehabilitation are often the main focus. The systemic difficulties in developing coherent mitigation strategies, combined with 'little mass-appeal in electoral terms' (especially in the developing world where 'for many populations, the main concern is with day-to-day survival'), means that governments are frequently criticised for failing to 'recognise the importance of hazards and vulnerability to national development' and suffering from 'short-sighted planning and inadequate organisation' (UNDP/DHA, 1994: 35; Twigg, 2004: 64).

So, given the incoherent nature of the civil society, social capital and disaster management discourses, a number of key issues remain unexplored. In particular, the precise impact of disasters, in terms of response, reconstruction, mitigation and preparedness on the relationship between the third sector, the state and the market is far from clear. If, as Rita Jalali claims, CSOs can create 'social capital (cooperation and trust) for effective disaster relief… by raising issue in the public arena and demanding public action', attention needs to be given to exactly how this takes place (2002: 123). If CSOs are understood to represent a part of society in general, then a critical focus must be brought to be bear on the inclusiveness, or otherwise, of their response to disasters. Crucial, here, is the extent to which the Tocquevillean notion of a sectoral separation between the tripartite elements of society can be sustained. How, for instance, are the divides affected by engaging in the various elements of disaster response and management? Indeed, can the third sector be said to be fully discrete from market forces and state encroachment at all? Does, for instance, the organisation of civil responses to disaster threaten the very legitimacy of the state, or has the rise of free markets led to a commoditisation of disaster management strategies and resources?

State – Civil Society Relationships in Japan, Turkey and India

In Turkey, the legacy of Ottoman Empire and the founding principles of the republican state have played a decisive role in structuring the predominantly hierarchic relationship between the state and civil society. The 'modernisation' and Westernisation of the country as part of the republican project has been a top-down process overseen by various combinations of economic, bureaucratic and military elites. Meanwhile, the continuing political efficacy of Islam is often regarded as an inhibitor of civil society's capacity to resist the state. This view, coupled with Ankara's nationalist and coercive ideological monism, has, for many commentators, restricted the development of collectively determined social groups outside the authority of the state. In conjunction with an etatist vision of politics, state-granted privileges are used in the creation of a patron-client relationship between state and civil society.

The result has been a tradition of passivity based on the supremacy of *devlet baba*, or the paternal state, and, consequently, an absence of civil contribution to the emergence and institutionalisation of the modern, secular Turkish republic. Such civil inaction has been a key causal element in the ongoing vulnerability of Turkish society to the region's earthquake hazard. The mismanagement of regional and urban development policies, the neglect of building regulations, corruption, nepotism and political favouritism all played a part in the vulnerability of the country's building stock.

Although based on quite different social orientations, Japanese society is also marked by an element of passivity born of state centralisation and communitarian commitments. The fact that, as a result of military conquest, notions of Western-style constitutional government replaced imperial absolutism following the Second World War, rather than through a more endogenous process of social change, meant that civil society retained much of its traditional attitudinal structures. The 'iron triangle' between the bureaucracy, the ruling Liberal Democratic Party and corporate capital (all 'glued' together by the system of *amakudari* – the widespread practice of senior state bureaucrats retiring to top management positions in the private sector) has formed the political framework of Japan's developmental state. This oligarchic structure underpinned the state's active intervention in the economy during the economic 'miracle' of the 1960s and 1970s and it continues to influence the way that decisions over industrial strategy are made today. Such a close association between the political and economic elites have, through the combined influence of industrial advance and a burgeoning bureaucracy, led to an approximate form of American-style corporate citizenship which tends to place civil organisations within the authoritative scope of the state. The result has been an over-reliance on market-led physical mitigation measures, to the detriment of disaster response planning. Consequently, Kobe was caught unprepared and its population was left to cope with the impact of the earthquake without an effective public sector mobilisation. Furthermore, not only did the disaster demonstrate the futility of a sole reliance on technocratic fixes and the imperfections of their institutionalisation, it also revealed the vulnerability of socio-economic groups unable to afford modern, earthquake-resistant accommodation.

Although India shares the imperial heritage of Turkey and Japan, civil society has been somewhat strengthened by the self-actualisation of the de-colonisation process. The Gujarat, as Ghandi's birthplace and as one of the country's wealthiest regions, has been a key element in India's economic development. Nonetheless, civil activism has been severely constrained by enduring ethnic polarisation and acute social inequality. The comparative wealth of the Muslim minority and the proHindu clientelism of the central government have created deep-seated tensions undermining notions of state accountability and weakening civil society's capacity to organise itself. This dual and inter-related failure to scrutinise the state and its agents and to impose the interests of civil society onto the public sector was a key factor in the bureaucracy's failure to ensure that the market complied with India's building regulations. The result was a lack of adequate earthquake proofing in the construction process thereby worsening local people's vulnerability. Such delinquency was exacerbated by the fact that rapid urbanisation of the region had increased housing pressures and obliged even more people, especially those already made vulnerable by their socio-economic circumstances, to live in accommodation susceptible to earthquakes.

Impact of Kobe, Marmara and Gujarat Earthquake Disasters on State-Civil Society Relationships: a Comparative Analysis

Until the earthquakes of Kobe, Marmara and Gujarat struck, the question of whether volunteers and CSOs should have a role in disaster management strategy was not a major issue in any of the three case study countries. The overall assumption was that disaster management was a far too serious business for civil society to take an active role in. For the most part, it was considered from a technical and organisational perspective in which the main actors were state institutions and local authorities. The civil population at large were regarded as the victims of disasters (and certainly not a resource of skills and experience which might be mobilised to respond to a disaster) for whom the public sector was saviours. Response was, in other words, an apolitical and socially neutral reflection of need. Indeed, before these earthquakes, CSOs had a very low level of representation in consultation processes generally and, in the cases of Turkey and Japan, were either not widely known or were seen in quite a negative light. In Turkey, for example, they were frequently regarded as fronts for nefarious financial and political activities while, in Japan, they were often stereotyped as staffed by strange do-gooders. The contrast between civil and state responses to the earthquake did, however, give rise to a new set of relationships between the public sector, civil organisations and society more broadly. As the state's position as a 'utopia' (Japan), 'father' (Turkey) or 'provider' (India) was eroded, CSOs were spoken of in terms of their specialised capacities, efficiently-allocated resources, higher levels of motivation and greater enthusiasm. In other words, civil organisations were vaunted as better able to execute disaster response programmes than the state itself. Consequently, many CSOs enjoyed a rise in self-esteem and started to believe that they could actually be a stakeholder in the management of disasters in particular and socio-political change in general.

In the immediate aftermath of these earthquakes there was a flourishing of CSOs in all three countries. In Kobe, up to 1.5 million volunteers responded to the disaster and, while there are no reliable data available for volunteer numbers, contemporary accounts suggest that very large numbers of people also came forward following the Marmara and the Gujarat earthquakes. Although civil initiatives were not free from mistakes and organisational problems – not least because it was, for many, the first time that they had ever worked in the aftermath of a disaster – there is no evidence that these were any more severe that those made by the state authorities and their employees. Indeed, since many of the more major problems were caused by poor coordination and communication structures, the direct responsibility of the public sector, it is difficult to sustain some of the criticisms levied at CSOs – often by the state itself. In fact, there is some evidence to show that CSOs frequently took the lead in trying to develop ways to tackle coordination issues. For example, in Japan volunteer centres in each ward of Kobe established mutually supportive linkages, while the Civil Coordination Centre in Turkey and the *Kutch Nav Nirman Abhiyan* in the Gujarat took on a number of region-wide consultation duties. So, although in all three case study countries (and particularly in Turkey and India) there are strong socio-political barriers to civil organisations seeking to collectivise, there have been some improvements in the way that CSOs have coordinated their efforts across the sector as a whole.

In the Gujarat, changes in the structure of the third sector are also too new to be evaluation with any confidence. In terms of its funding configuration, there would appear to have been, as yet, little input from the private sector and the state, supported by international donors, remains the main source of revenue. The aftermath of the Kobe earthquake also witnessed an expansion in the availability of funds to CSOs. As well as taxation benefits introduced in 1998, the state started to channel more of its overall welfare budget through the third sector. So, although it has attempted to establish a number of partnerships with the private sector, the public sector also remains the main source of financial assistance for a wide range of civil society initiatives. These changes have also included a significant review of the state's relationship with civil organisations leading to major legal changes. Born of recognition of the public sector's failure to respond to the disasters, new statutes have been introduced in each of the case-study countries. For example, Japan's Non-Profit Organisation Law of 1998 was, despite its considerable weaknesses, an important step towards encouraging the wider participation of the community in general and this has led to a more flexible environment for CSOs operating in the disaster response sector and improvements in the way that Tokyo relates to the prefectures. There has also been an acknowledgement of the continuous need to revise disaster preparedness plans and a gradual move towards closer ties with the private sector (Furukawa, 2000).

Similarly, in Turkey the law for associations and foundations has been amended a number of times after the Marmara earthquake and, in line with the EU membership process, a new law which provides CSOs with some degree of flexibility has recently been passed by parliament. There has also been considerable debate over the way that disaster management is legislatively framed. These have not, however, resulted in comprehensive changes. The need for preparing an appropriate national disaster management model and reforming the Civil Defence Law has been extensively discussed, but the state remains more willing to deal with the challenges of physical reconstruction process than with the more social issues of disaster management administration. Consequently, seven years after the Marmara earthquake, serious revisions of disaster management statutes are yet to be carried out.

India has, however, legislated rather more quickly. Within two years of the earthquake, the Gujarat State Disaster Management Act was passed with the intention of developing root and branch improvements in disaster management systems, structures, programmes, resources, capabilities and guiding principles. Fundamental to this statute was an attempt to reduce hazard risks and to prepare more fully for the threats of disasters in the Gujarat. It redefined the different roles envisaged for stakeholders in both the 'ante' and 'post' phases of disaster management and, on paper at least, it brought the Gujarat into line with internationally-accepted best practice. This includes the integration of disaster management into development planning, adopting a multi-hazard approach, acknowledging the importance of response impartiality and sensitivity to local sociocultural characteristics. Nonetheless, although there is a legislative commitment to making communities central to the decision-making process ensuring that their priorities are reflected in the programmes undertaken by the state, it also, paradoxically, seeks to perpetuate the public sector as the locus of control thereby reiterating its 'provider' status. It does not, in other words, recognise that CSOs are most effective when they are permitted to be flexible in their decision making by decentralised institutional and administrative frameworks.

It is thus unsurprising that, to varying degrees, the upsurge in volunteerism following each disaster did not prove to be sustainable in the medium to long term within any of the case-study countries. Between three and six months after the disaster much of this reaction had dissipated. Many response initiatives had been spontaneous and limited to meeting the immediate needs of earthquake-affected people. It was, therefore, natural for volunteers to return to their lives once the new tent cities in the Marmara region were built or the communal kitchens in the Gujarat and the temporary shelters in Kobe had been replaced by the rehabilitation process. This did not mean that there was no longer anything else for CSOs to do, though. For example, many organisations in the Marmara region wanted to continue their work by moving into longer-term activities such as education, health and housing. Three months after the earthquake, however, Ankara announced that CSOs were no longer needed and they were 'politely' asked to leave the area.

In many ways, this represents a generic fear of the politicisation of humanitarian assistance shared by the states in all the case studies. Efforts to disempower the different ideological groups and political parties that inevitably become involved in the aftermath of such a socially significant event frequently take the form of an attempt to centralise the distribution of relief assistance. Measures such as media control and the institutionalisation of more pernicious third sector supervisory structures are often said to be essential in order to improve the coordination of relief activities. While there are clearly advantages in imposing a central authority over the coordination of emergency assistance during the immediate aftermath of disasters, the value of continuing to resist power devolution (or, as in the case of Turkey, imposing a centralised power structure when already well into the relief process) remains unclear. Indeed, it would seem that, having failed to take charge of a proper crisis management programme, the state has attempted to make political capital out of the successes of CSOs once their efforts have helped to normalise the situation.

It seems that very few CSOs in our case-study countries have been able to move from relief-oriented to development-oriented programmes. The involvement of most civil organisations was restricted to the immediate aftermath of the three earthquakes and did not generally move beyond the level of emergency relief. The political nature of such a change seems to have either deterred CSOs or prompted the state sector to take prohibitive measures. While response-orientated organisations have grown rapidly (exemplified by the popularity of search-and-rescue teams in Turkey), there are hardly any CSOs willing to tackle the root causes of the vulnerabilities that gave rise to the disaster in the first place. This policy preference for disaster response over mitigation is symptomatic of, and helps to perpetuate, civil passivity in each of the three case studies.[5] In Turkey and India, it also represents a mirror image of the state's approach to disaster management in that apolitical and technocratic response strategies are preferred to the more difficult task of trying to prevent a disaster from occurring in the first place. Indeed, the inability of civil society to impose itself upon the state is particularly evident in the way that the role of CSOs is defined and regulated. The Gujarat's State Disaster Management Act, Turkey's Civil Defence Law and Japan's Non-Profit Organisation Law all contain statutes that serve to enclose third sector organisations within hierarchical structures in which their subordination is assured.[6] In other words, the acute need for a centralised approach to decision-making in the immediate aftermath of a disaster gave rise to an overall statutory template for the entire process of disaster management. Experience from the three case studies indicates that such an approach tends to create frameworks which are too narrow for CSOs to work effectively. So long as they are treated as part of the official disaster management programme, rather than a partner to it, then strategies which best utilise the comparative advantages of both top-down and more grass-roots methods.

Conclusions

The UN-designated International Decade for Natural Disaster Reduction, which ran from 1990 to 1999, identified four overriding objectives as guiding principles for its activities. Each represents a challenge to regimes dominated by fundamentally statist inter-sectoral relationships. The first recognised the need for a political com-

[5] A good example of such fatalism is Turkish society's low interest in the state's compulsory building insurance scheme. Introduced through a by-law in the immediate aftermath of the Marmara earthquake, it has led to only 2,026,667 out of 12,988,665 housing units in the Marmara (this ratio is likely to be even lower in other parts of Turkey) being insured despite costing only around 20 cents per day for a 120 m² apartment in Istanbul is around, but only around one quarter of houses. İdris Serdar, Chairman of *Doğal Afet Sigortaları Kurumu* (Natural Disaster Insurance Corporation), asserts that unless the law is changed to bring a fine for not getting the compulsory earthquake insurance it will not be possible to overcome society's traditional dependence on the myth of the omnipotent state that will rebuild a dwelling for every citizen who loses one in a disaster (NTVMSNBC, 2004).

[6] The social composition of CSOs is an important factor in their effectiveness. Relying on voluntary human resource contributions without professional input, many CSOs are bound to remain in the sphere of basic service provision without moving towards advocacy work. Experience shows that the employment of a core of professional staff by CSOs is a significant contributor in the successful achievement of their aims and objectives. In many countries, though, there is still considerable resistance to donations being used for such purposes. In Japan, for example, public sentiment is such that the majority of CSOs are prevented from moving away from a purely voluntary basis and consequently struggle to take a more active role in social change.

mitment from public authorities involved in the design and implementation of disaster management programmes. The second concerned the importance of increasing public awareness of, and public participation in, activities intended to reduce their vulnerability to natural hazards. Thirdly, the Decade sought to foster a better understanding and a deeper knowledge of the causes of disasters through the transfer and exchange of international experiences and by providing greater access to relevant data and information. Fourthly, it advocated the stimulation of interdisciplinary and inter-sectoral partnerships between agencies involved in disaster management (including governments at central and local levels, the private sector and academic institutions as well as humanitarian, development, community based and environmental civil organisations) with the intention of reducing vulnerability levels.

In order to ensure increased inter-sectoral coordination (as set out in the UN's first objective), for instance, it is important that disaster management legislation makes specific reference to the role of different actors and the way that they are expected to engage with each other. Only then will each agency be able to make a full commitment to the disaster management process. Likewise, the second and third of the UN's objectives can also only be met through a statutory commitment to improved informational clarity and better systems of data dissemination. This will help to empower local actors and further the first objective's aim to institutionalise a more integrated structure of disaster response. Meeting the fourth objective involves the implementation of effective coordination mechanisms in each of the different phases of disaster management.

Here, and in each of the other three objectives, CSOs can play an active part. As Rajib Shaw's description of the role of civil organisations during various stages of disaster response (illustrated in Figure 1) demonstrates, the main function of CSOs during the immediate aftermath of an earthquake is to provide technical skills in rescue work and to develop relief strategies in co-operation with disaster-affected people (2003).

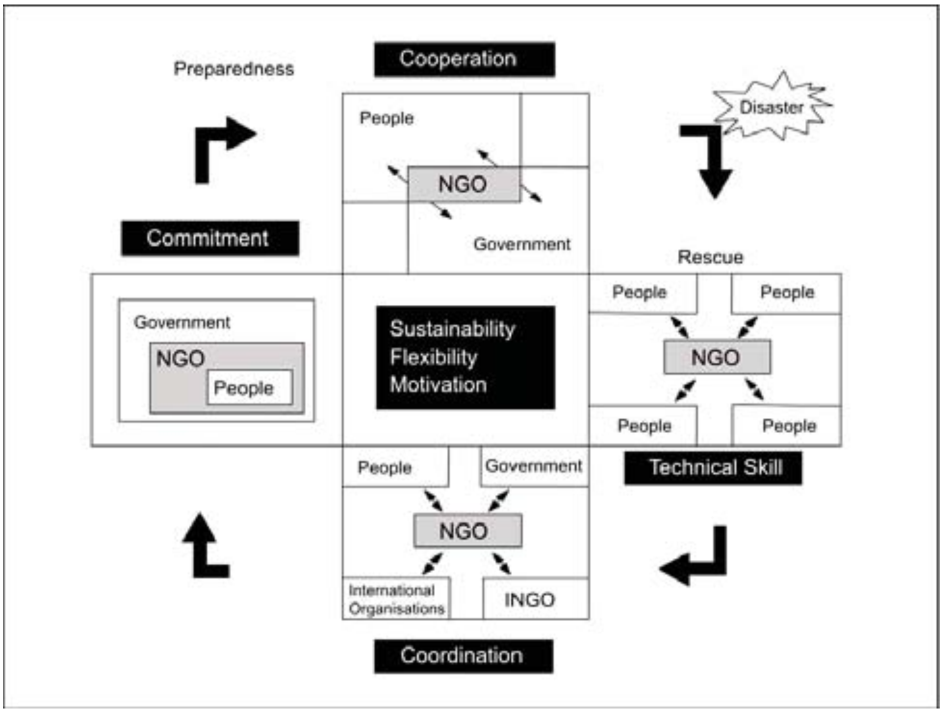

Figure 1. The Role of Civil Organisations Following a Disaster.

To this end, CSOs can help to coordinate the activities of government, local people and international organisations. During the rehabilitation and reconstruction phases, CSOs can provide an interface between the government and disaster-affected people through which the community's priorities can be communicated, a long term commitment to dealing with such needs can be institutionalised and a less statist approach to disaster management can emerge. During the mitigation or preparedness phase, CSOs can help transmit the lessons learned from post-disaster relief, rehabilitation and reconstruction to future generations so as to cope better with existent hazards. Civil organisations can assist in the creation of a co-operative environment between the state and its citizens without which it is difficult to ensure that disaster management processes remain motivated, flexible and sustainable.

The legislative changes in disaster management introduced in the three case studies so far have, indeed, gone some way to introducing a more flexible environment for CSOs to work in. The involvement of the third sector in the immediate aftermath of the Kobe, Marmara and Gujarat earthquakes show that CSOs can mobilise large human and physical resources for search-and-rescue and emergency relief. It also demonstrated that, due to the specific requirements of the relief period, it is important that CSOs be equipped with both the equipment and the technical knowledge to undertake search-and-rescue work safely and effectively. Another factor which emerged from the experiences of these disasters is that co-ordinating the various actors involved in relief period is extremely convoluted. In all of the three cases, the third sector tried to moderate the state's failure to deal with the intricacies of this challenge by setting up its own co-ordination mechanisms with varying degrees of success. It is important that these initiatives be strengthened by improved reciprocity between the public and local CSOs and by legislation at the state level.

This is also true of rehabilitation and reconstruction activities. Here, the three case studies present a mixture of experiences for CSOs. For example, reconstruction after the Kobe earthquake managed to involve the activities of CSOs in the provision of emergency shelters and in responding to the specific needs of elderly and disabled people, but, ultimately it was not able to prevent the perpetuation, or in some the cases the exacerbation, of urban socio-economic divides. Similarly, aspects of the reconstruction process in the Gujarat, included a number of CSOs in moving beyond the simple rebuilding of permanent housing and towards a concerted attempt to address livelihoods provision and other welfare issues but, again, they were not able to sustain their role and move in the direction of a functional public/third sector partnership. In many ways, reconstruction after the Marmara earthquake was even more top-down as the state shifted the locus of renewal away from the third sector by limiting the involvement of CSOs and reasserting its own patrimonial position.

Of the four phases of disaster management, though, it would appear from our case studies that developing society-based mitigation strategies presents the most intractable challenge. Its inherent engagement with socio-economic and political issues means that 'neutral' technocratic 'fixes' are unsustainable. This tends to disempower both public sector officials and, it would seem, the bulk of the third sector alike. Both this reluctance and the salient fact that most CSOs do not perceive themselves to be equipped with the necessary resources to deal with the multi-mandate complexities of planning, development and disaster preparedness has its roots in the perpetuation of statist socio-historical traditions within each of our case-study countries. The resultant weakness and material dependency of the third sector in such regimes tends to inhibit the development of both an active and critical stance towards the state executive and the representation of the needs of the *demos*. The overall consequence is that a reliance on structural, technocratic mitigation exists to the detriment of political attempts to deal with the very vulnerabilities which turn a natural hazard into a social disaster.

References:

Anheier, Helmut. (2000). *Managing Non-Profit Organisations: Towards a New Approach*, Civil Society Working Paper 1, London School of Economic and Political Science

Benson, Charlotte; Myers, Mary and Twigg, John. (2001). "NGO Initiatives in Risk Reduction: An Overview", *Disasters*, Vol. 25, No. 3, pp. 199-215

Bolin, R. and Stanford, L. (1998). "The Northridge Earthquake: Community-Based Approaches to Unmet Recovery Needs", *Disasters*, Vol. 22, No. 1, pp. 21-38

Christoplos, Ian. (2003). "Actors in Risk", in Mark Pelling (ed.) *Natural Disasters and Development in a Globalizing World*, London: Routledge

Edwards, Michael. (2004). *Civil Society*, Cambridge: Polity

Ekiert, Grzegortz and Kubik, Jan. (1999). *Rebellious Civil Society: Popular Protest and Democratic Consolidation in Poland 1989-1993*, Ann Arbor: University of Michigan Press

Encarnación, Omar. (2003). "Beyond Civil Society: Promoting Democracy after September 11", *Orbis*, Vol. 48, pp. 705-720

Furukawa, Shun'ichi. (2000). "An Institutional Framework for Japanese Crisis Management", *Journal of Contingencies and Crisis Management*, Vol. 18, No. 1, pp.

Gaer, F. (1996). "Reality Check : Human Rights NGOs Confront Governments at the UN", in T. Weiss & L. Gordenker (eds.), *Non-Governmental Organisations, the United Nations, and Global Governance*, Boulder, CO: Lynne Rienner.

Glasius, Marlies, Lewis, David and Seckinelgin, Hakan. (2004). "Exploring Civil Society Internationally", in Marlies Glasius, David Lewis, Hakan Seckinelgin (eds) *Exploring Civil Society: Political and Cultural Contexts*, London: Routledge

Jalali, Rita. (2002). "Civil Society and the State: Turkey after the Earthquake", *Disasters*, Vol. 26, No. 3, pp. 120-139

Kaldor, Mary. (2002). *Civil Society and Accountability*, Background paper for the Human Development Report Office: United Nations Development Programme.

Karanci, Nuray and Akşit, Bahattin. (2000). "Building Disaster Resistant Communities: Lessons Learned from Past Earthquakes in Turkey and Suggestions for the Future". *International Journal of Mass Emergencies and Disasters*, Vol. 18, No. 3, pp. 403-416

Kubicek, Paul. (2002). "The Earthquake, Civil Society, and Political Change in Turkey: Assessment and Comparison with Eastern Europe", *Political Studies*, Vol. 50, pp. 761-778

Luna, Emmanuel. (2001). "Disaster Mitigation and Preparedness: The Case of NGOs in the Philippines", *Disasters*, Vol. 25, No. 3, pp. 216-226

Maskrey, Andrew. (1989). Disaster Mitigation: A Community-based Approach, Oxford: Oxfam

Morris, Susannah. (2000). *Defining the Non-Profit Sector: Some Lessons from History*, Civil Society Working Paper 3, London School of Economics and Political Science

NTVMSNBC, (2004). "Türkiye Deprem Sigortasına İlgisiz" (Turkey is Indifferent to Earthquake Insurance), 28 October
http://www.ntvmsnbc.com.tr/news/293542.asp?cp1=1

Sharma, Anshu and Palakudiyil, Tom. (2003). *Facing Up to the Storm - How Local Communities Can Cope with Disaster: Lessons from Orissa and Gujarat*, London: Christian Aid

Shaw, Rajib and Goda, Katsuihciro. (2004). "From Disaster to Sustainable Civil Society: The Kobe Experience", *Disasters*, Vol. 28, No. 1, pp. 16-40

Smith, Jackie, Chatfield, Charles and Pagnucco, Ron. (eds). (1997). *Transnational Social Movements and Global Politics*, Syracuse NY: Syracuse University Press

Thiruppugazh, V. (2003). 'Training and Capacity-Building with the Policy Perspective of a Rehabilitation Programme: Experiences from Gujarat, India', *Regional Development Dialogue*, Vol. 24, No. 1, pp. 30-38

Tierney, Kathleen and Goltz, James. (1997). *Emergency Response: Lessons Learned from the Kobe Earthquake*. Preliminary Paper 260. Newark: University of Delaware

Tocqueville, de Alexis. (1966). *Democracy in America Vol. II*, New York: Harper and Row

Twigg, John. (2004). *Disaster Risk Reduction: Mitigation and Preparedness in Development and Emergency Programming*, Overseas Development Institute Good Practice Review No. 9, London

UNDP/UNDRO. (1992). *An Overview of Disaster Management*, 2nd Edition, Geneva: UNDP

UNDP/DHA. (1994). *Disasters and Development*, 2nd Edition, Geneva: UNDP

Van Rooy, Alison. (1998). "Civil Society as an Idea: An Analytical Hatstand?", in Alison Van Rooy (ed.) *Civil Society and the Aid Industry*, London: Earthscan

Wisner, Ben. (2001). "risk and the Neoliberal State: Why Post-Mitch Lessons Didn't Reduce El Salvador's Earthquake Losses', *Disasters,* Vol. 25, No. 3, pp. 251-268.

RETHINKING FUTURE UK SUPPORT TO POST-DISASTER RECONSTRUCTIONS : MEETING STAKEHOLDER INTERESTS

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Abstract

It is proposed all future post-disaster reconstruction projects attracting UK support must re-align work plans to conform to the economic, social and environmental objectives of the new 2005 UK HM Government Strategy for the delivery of Sustainability, "Securing the Future". Post-disaster reconstruction projects provide ideal opportunities for affected communities to gain sustainable improvements and thereby generate benefits for stakeholders on a global scale. To achieve this, current reconstruction practices need to be questioned and rethought to ensure that future works conform to long term needs and the priorities of all affected communities. The new approach must demonstrate a shift in conventional policies if the future security of global populations and their environment are to be guaranteed. This Paper demonstrates the need for practitioners to steer their engineering work initiatives in future post-disaster reconstruction projects on a new course. This will necessitate an acceptance of the development of a completely new supply chain of essential services and resources required in disaster management practices. There is also a need to develop a rich source of practical engineering applications that will dramatically change our current approach to dealing with emergencies and disasters.

Keywords: sustainable; economic; environmental; social; technology.

An Introductory Overview

The reporting on recent major catastrophes must make uncomfortable reading for all those involved in providing assistance in the event of a disaster. This discomfort is likely to be particularly pronounced for all those in authority, and specifically for all those holding executive responsibilities for the effective management of events that might involve emergencies and related disasters.

The impact of both the Asian Tsunami and the Pakistan Earthquake has once again clearly demonstrated that there is a need for further major changes in how the international community should respond to crises. Given that there appears to be no simple answers to these difficult issues at the present time, the UK Government has recently elected to conduct a public consultation exercise in search of new ideas (DFID 2006). The basis of this exercise recognises that current practices lead to inefficient performance as well as unnecessary burdens on developing countries. It is also identified that the way the world works can be inconsistent and unpredictable, whether this involves the prevention of conflict or state failure; or responding to a major natural disaster; or whether rebuilding after a crisis.

This observation does not only apply to major disasters in developing countries. Hurricane Katrina exposed both personal and structural weaknesses in America's government (The Economist 2005). Since Hurricane Katrina, the world's view of America has changed. The most striking revelation was the government's failure to

Post-Disaster Reconstruction : Meeting Stakeholder Interests : Proceedings of a conference held at the Scuola di Sanità Militare, Florence, Italy 17-19 May 2006, edited by David Alexander, Colin Henry Davidson, Andrew Fox, Cassidy Johnson, Gonzalo Lizzaralde, ISBN 978-88-8453-611-2 (online), ISBN 978-88-8453-612-9 (print), © Firenze university press, 2007

bring a timely response of essential relief to its people at their time of greatest need. Natural disasters on the scale of Katrina inevitably bring chaos and suffering. But if America is to avoid future catastrophes then it needs to learn the right lessons from the debacle that immediately followed this incident. Furthermore, it is equally evident that America does not have clear answers to the decisions required for the reconstruction of New Orleans. The question may appear inappropriate, but how much damage can a big American city suffer before the decision is taken that recovery initiatives should be either limited or even abandoned.

The ability for communities and even modern cities to recover from disaster is well recognised (Vale 2005). This capacity for recovery is conditioned from many dimensions of resilience, covering various intensities of social, economic, environmental and technological strands that all set out to deliver a successful reconstruction for communities confronting disasters. It is recognised that often there are also religious and political dimensions to the resilience required for a successful and timely recovery, but these strands are not so readily quantified.

Both domestic governments and the international community have responsibilities for confronting disaster at the local level. They also have responsibilities for jointly addressing global issues that are becoming a major concern for the future security of the planet (UN 2004). We currently have many organisations operating at local as well as the international level having favourable intentions for addressing issues for the common good, including disasters. So why is there a feeling that the current organisational framework is inadequate for addressing effectively the consequences of disasters? Furthermore, is it reasonable to speculate that any new overarching organisation could perform any better than the current setup for dealing with disasters? Awareness of key issues and the benefits of change are recognised in terms of new strategic management initiatives (Thompson 1994). It is equally clear the effective management of change (Burnes 2004) necessitates a good understanding of organisational behaviour (Mullins 2005).

The institutional frameworks in which all organisations involved in disasters must operate at a local level are conditioned by political and religious practices and behaviours. Local cultures which impact on practices and behaviours are significantly influenced by social, economic, environmental and technological strands. Within this context, there may be a strong argument to set up a new internationally recognised organisation with the over-arching authority to lead, manage and coordinate others involved in future major disasters with a view to improved performance. However, before this can happen, agreement must be reached on fundamental questions if such an organisation is to command the authority required for the discharge of all necessary responsibilities. Perhaps only then might it be feasible to avoid the disasters of the scale as the Asian Tsunami, the Pakistan Earthquake, Katrina or others still on the horizon?

It is outside the scope of a short paper such as this to identify an institutional arrangement or organisational solution to this problem, given that the UK Government has turned to a public consultation exercise in search of new ideas on this very matter. Accordingly, this paper only sets out to identify and define the main ingredients required of organisations if there is to be a better understanding of some of the main issues that must be addressed in the future management of disasters. These issues must be agreed if we are to have a future better performance record in dealing effectively with disasters.

The Current Situation in Meeting Stakeholder Interests

No stakeholders can feel satisfied with the current progress in addressing the needs of the Asian Tsunami, the Pakistan Earthquake or Hurricane Katrina to mention just three recent disasters. Furthermore, the eventual outcomes of these disasters remain uncertain. The count in human tragedies to-date cannot be forgotten, but neither can the needs of all survivors or the future desirable reconstruction efforts be put to one side. Whether rebuilding people's lives; their communities; their jobs; their housing; their supporting basic infrastructure or taking preparedness and mitigation measures to address shortcomings, all these individual provisions require attention from some quarter (Landes 2001).

Each stage in the disaster management cycle applied to specific incidents, whether we are dealing with preparedness, mitigation, response, recovery, reconstruction or development necessitates an input of considerable resources. These resources normally come in the form of finance or equivalent that will be required to mobilise unskilled labour, semi-skilled labour, skilled labour, management, materials, consumables, plant, equipment, vehicles and machinery. The resources required for the effective management of disasters should never be underestimated. Aircraft, helicopters, and essential operational backup do not come cheap and are sometimes scarce, but they are often essential for a timely response in some locations as well as for specific incidents. Of course, equally significant resources are required for all stages in the disaster cycle, and particularly for reconstructions.

It is therefore clear that a better understanding on the resource provision is required if we are to improve the current situation. It is argued that adequate resource provision can be equated to the economics of supply and demand, and in effective disaster management, the role of an efficient supply chain together with robust logistical systems and procedures (Broadbent 1999) are inevitably paramount.

Therefore perhaps we require a deeper comprehension of the role of economics in disaster management if we are to improve the current way things are done.

The role of economics in the shaping of history is very interesting and relevant to disaster management (Backhouse 2002). Backhouse recognises there is some difficulty in defining the precise meaning of economics, and a wide range of definitions are explored. For instance, Backhouse identifies one definition of Lionel Robbins to be: "economics is the science which studies human behaviour as a relationship between ends and scarce means which have alternative uses" whereas Alfred Marshall defined it as "the study of mankind in the ordinary business of life". Backhouse further identifies that economics "emerged only slowly as a distinct discipline out of theology, moral philosophy, administration and law" and it has been strongly "influenced by the importance of Christianity, Islam, science, and politics".

It is equally important to recognise the distinct role of economics in contrast to the role for which it is often confused, namely finance and financial markets (Coggan 2002). The discipline of economics has very wide coverage, as it is underpinned by a matrix of political, religious, social, technological and environmental strands. It is therefore understandable why economics should play such a key role in both reconstruction and development initiatives, even though it can have a very frustrating impact when efforts set out to accelerate progress or achieve quick results. Economics applied objectively can lead to the selection of the best of all alternatives given a range of options, and its application can certainly avoid significant waste.

Within the context of our search to seek improvements in the management of emergencies and disasters, we therefore come to recognise the important role of economics when it comes to the management of decision-making processes in the allocation of resources. However, it is equally important we come to accept that there can be no economics in circumstances where there is no limitation in the availability of resources (Turner 1994). We currently have a deep concern on a global basis on the depletion of our natural resource stock and the impact this has on our natural environment. Accordingly, it is very clear we must be transparent and accountable in the manner we use economics for decisions taken in allocating resources for the management of disasters, recognising the limiting constraints of the natural environment in which we all operate (Oldfield 2005). This argument therefore leads to the manner in how we adopt the principles of sustainability in disaster management practices, and whether this is applied to response, recovery and reconstruction. This issue raises questions on how serious sustainability is taken by those who practice the management of emergencies and disasters.

Recent Incidents And The Responses Generated

There is a large volume of information available on recent major incidents. This information is not always suitably consolidated and is certainly complex for comprehensive analyses. Within hours of the very recent Asian Tsunami and the Pakistan Earthquake incidents, Oxfam (Eade 1998) was able to mobilise operations at their UK Logistics HQ Warehouse and transport by air the assessed essential resources required for immediate humanitarian relief, covering water supply and treatment kits, and similar provisions. This form of service can normally be provided very rapidly by Oxfam and similar NGO Organisations to virtually anywhere in the World provided there is a political will and agreement for this. Rapid response may not always be feasible, whether for political reasons or for logistical problems.

However, the nature of response in all these circumstances may not be the most appropriate for either the short or the long term. It is argued in this Paper that all resource provisions should be questioned? For instance, Oxfam do not generally stock tents in their HQ Warehouse, as it is argued emergency shelters should be supplied from local sources. This approach may appear sensible. Local food is treated as a similar commodity. In contrast, water supply kits are generally provided because they set out to secure an essential basic need in emergencies with a view to protecting the health of the most vulnerable. Furthermore, kit alternatives are often difficult to get from the local market. However, the need for tents as the winter months approached was always assessed to be a critical requirement for the Pakistan Earthquake victims. It is certainly considered shelter, water and food are all basic needs of equal importance to people facing the consequences of disaster (Davis 2002). So why has it been so difficult to provide in Pakistan the essential temporary shelters? Could this be a lack of or failure in local preparedness?

The emergency Water Supply Kits provided by many NGOs also deserve a close examination. Storage tanks are normally formed from light corrugated sheets that are assembled and bolted together on site to form structures of circular cylindrical tanks with a capacity between circa $50m^3$ and $100m^3$. The tank water storage is normally facilitated with rubber liners. Within the treatment process, water is distributed in lightweight uPVc or PE pipes, and control is achieved with various forms of valve. Water is distributed by gravity flow where this is feasible, but it will be pumped where site topography is unsuitable or where raw water is to be abstracted from a relatively low level surface source. Pumps are generally centrifugal and are powered by the energy of diesel engines. The engines and pumps would normally be supplied with the kits, together with adequate spares. Accordingly there are many apparent attractive features associated with these kits: they are relatively light and compact to transport; they can be erected rapidly; they are easy to operate and maintain; and many view them to be technologically appropriate. But do they satisfy the best of all options, and by supplying kits, is a precedent set for the future? Furthermore, is this the basis of a sustainable solution? A major issue to assess and evaluate is whether these decisions serve the best interests for the longer term given the difficulty of meeting the demands of global populations with appropriate water supplies and sanitation (Baynard 2005)?

These are very difficult questions to answer with any authority, but they are very important. Indeed, a very comprehensive analysis and evaluation could be undertaken on many recent major disasters to assess in greater detail the economic, social, environmental and technological implications on decisions being taken. Lessons could certainly be drawn from the Pakistan Earthquake, Katrina, the Asian Tsunami, Bam, and many other major recent incidents, but this would be a massive undertaking. It is perhaps more useful to focus on recent UK issues if it comes to assessments of what future support may be appropriate for incidents abroad.

The UK has seen a rapidly changing scene over recent years in its dealing with emergencies and disasters at home (Abbott 2002). Furthermore, the recent UK Civil Contingencies Legislation (CCL) has had major impacts on those holding responsibilities for dealing with emergencies and disasters (CCS 2004). New disciplines and training continue to emerge to be significant components for those in the public and private sectors coming under the umbrella of these initiatives (Elliott 2002). However, the impact and the integration of all these changes with other developments do not appear to be fully appreciated or understood. This appears to apply particularly to the potential impact of the built on the natural environment, and it is useful for comparative purposes to focus on the water sector in the UK.

The water supply crisis in Yorkshire was a sobering UK experience (Uff 1996). As a consequence of this crisis, the Government, the Water Companies, the Environment Agency (EA) and the general public have become much more aware and concerned with key issues. Indeed, the UK has a current water stress problem in the South East which has yet to be resolved (UK National Statistics 2005), hopefully in good time for the Olympic Games. Surprisingly, and in contrast, the authorities and business are currently considering the construction of a new generation of very tall skyscrapers in the City of London. This appears to run contrary to lessons learnt from 9.11; the current water stress; and many other issues such as the recent fuel storage fires north of London. In parallel with these developments, the UK is faced with requirements to fulfil its obligations in dealing with the threats of flooding, drought and their impact on the environment (DEFRA 2004); in the implementation of the Water Framework Directive (WFD) (CIWEM 2005); and a range of other WFD commitments to bring all waters in the UK to a good ecological status. The WFD is to be applied to all surface, ground and coastal waters in the EU.

The UK Severn Trent Water (STW) Company currently holds responsibilities for water supply and sewerage services for circa 7 million customers in the catchment basins of the Rivers Severn and Trent. However, the new CCL has placed additional responsibilities on STW which concerns the planning for emergencies and disasters, and these must be integrated with the extensive obligations of the new WFD. A recent STW key note address (CIWEM 2006) identified for the first time an acknowledgement of the vulnerability of the 1 million people living in Birmingham (UK 2nd City) to the potential loss of Elan Aqueduct. This strategic aqueduct was built in the Victorian Times, and transports essential water some 100 kms overland from the catchments in Central Wales to the City of Birmingham. Over recent months, the Elan Aqueduct has indicated a local but significant natural deterioration, and the security of supplies has been seriously questioned. To address this development, STW undertook certain actions which involved:-

- closing the Elan Aqueduct for up to 2 weeks to facilitate repairs
- taking water from other sources to supplement supplies
- imposing demand management regimes as resources were inadequate
- encountering problems in mixing waters as public quality concern
- on reopening of Aqueduct, the repairs were found to be ineffective

These difficult emergency operations therefore failed to deliver the intended outcome and it will be necessary for STW to return to the work for a second attempt if a potentially serious situation involving the complete failure of water supplies is to be avoided in the future. However, other alternative options are being investigated, but the additional findings so far indicate that:-

- in the West Midlands, the maximum sized community that can be effectively

- served in an emergency using a bottled water supply distribution method is a 20,000 population. In this assessment and evaluation, logistical constraints have proved to be a key issue
- a major concern for STW in the search of all alternative options is the current energy costs which over recent months have escalated alarmingly. The security of future energy supplies and their costs for the current setup at STW are now a major concern in respect even to all normal operations.

This simple UK case study for a strategic basic need in the water sector identifies that a serious problem has yet to be resolved. In situations such as this, management must undertake a comprehensive risk assessment of the situation and evaluate the best of the alternatives (Loosemore 2006) to ensure the future is secured in conformity with the UK Government Strategy (HM Government 2005). Taking lessons learnt from this exercise on a wider scale, as well as addressing the UK commitments for Eliminating World Poverty (DfID 1997, 2000 and 2006), it is clear that there is a need to seriously question the manner in which we conduct the management of emergencies and disasters, whether this is in the UK or elsewhere.

UK Sustainable Development (SD) : "Securing the Future"

The new UK Government Sustainable Development SD Strategy, "Securing the Future", builds on other recent work (HM Government 2005). This strategy sets the scene on how the UK intends to deliver sustainability and thereby secure a future for civilisation as we know it. Since the consequences of either the success or the failure of this strategy are fundamental to the people of UK, then it is reasonable to propose that the intentions of the strategy should be applied as a blanket to all UK operations, whether locally or globally.

There is therefore a very strong argument that the Strategy should be applied to all disaster management activities. Indeed, it should be recognised that any disaster provides an ideal opportunity to introduce timely and practical solutions based on the benefits of the very latest thinking, and solutions that avoid the mistakes of the past. Furthermore, given the Strategy is to be applied within the UK, then why not to any proposed future support to worthy post-disaster reconstruction efforts wherever they might be. This approach would then be consistent to all stakeholders, whether they are in the UK or abroad. The Strategy therefore warrants a close examination if it is to be applied to post-disaster reconstruction and if we are to assess whether the adoption of the Strategy is an appropriate umbrella for disaster decision making.

It is stated that the SD Strategy "aims to enable all people throughout the world to satisfy their basic needs and enjoy a better quality of life without compromising the quality of life of future generations". The new 2005 SD Strategy builds on the 1999 four central aims of sustainability, but significantly, it is seen that equal weight should now be given to each, namely:-

- social progress which recognises the needs of everyone
- effective protection of the environment
- prudent use of natural resources, and
- maintenance of high and stable levels of economic growth and employment

An additional important provision of the UK SD Strategy is the recognition of the clear obligation on more prosperous nations both to put their own house in order, and to support other countries in the transition towards a more equitable and sustainable world. Accordingly, the strategy has a focus on long-term solutions, not short-term fixes, and it is seen as a catalyst for action to secure our future. It is worthy of mention here that a common criticism of many practices in disaster management, particular in emergency response, is they often have a focus on short-term fixes rather than the most appropriate solutions.

The UK SD guiding principles to be used to achieve the aims of sustainable development are based on living within environmental limits and a just society, and this is to be delivered by means of sound science, sustainable economy and good governance. These consolidated principles sit comfortably with the four aims, and they set out to share an approach that provide for:-

- respecting the limits of the planet's environment, resources and biodiversity.
- meeting the diverse needs of all people; promoting personal wellbeing, social cohesion and inclusion; and creating equal opportunity for all.
- ensuring policy is developed and implemented on the basis of strong scientific evidence, taking account scientific uncertainty, public attitudes and values.
- building a strong, stable and sustainable economy which provides prosperity and opportunities for all, and which environmental and social costs fall on those who impose them, with incentives awarded for efficient resource use.
- actively promoting participative systems of governance in all levels of society.

All these principles sit comfortably with good disaster management practices. Moreover, the priority areas identified under the SD Strategy for immediate action across the UK are equally relevant and have been identified to be:-

- securing a profound change in the way energy is generated and used, whilst preparing for climate change that cannot now be avoided
- identifying enhancements and recovery of degraded environments, to ensure a decent environment for everyone
- addressing how to achieve more with less, covering how goods and services are produced, and then consumed, and the impacts of products and materials across their whole lifecycle. This includes the inefficient use of resources, and breaking the link between economic growth and environmental degradation
- working to give communities more say and power in the decisions that affect them, and in partnership to get things done. It is intended the UK adopts this approach in overseas aid programmes in order to tackle poverty and environmental degradation where good governance is being sought.

For overseas aid, the UK's approach to global development over recent years has been framed to a range of international commitments, such as to the Millennium Development Goals (MDGs) and the European Union's Sustainable Development Strategy (EU SDS). It is stated in the UK SD Strategy that the goal for international sustainable development is to support multilateral and national institutions through commitments such as the MDGs and the EU SDS to ensure effective integration of social, environmental and economic objectives to deliver sustainable development, especially for the poorest members of society. Accordingly, all these goals have one focus on poverty and the vulnerable poor, which are a major concern to the practice of effective disaster management (Blaikie 2000).

But it is recognised that the goals presented here will be meaningless unless progress is made in achieving each of the specified objectives, and that progress achievements are carefully monitored and evaluated. The UK Government has therefore introduced a new set of high-level indicators that are robust and meaningful; are linked and agreed; provide UK coverage; indicate trends and highlight challenges, to give an overview of sustainable development. An undertaking has been made to assess and report annually on the progress in SD against the indicators (UK National Statistics 2005). These indicator assessments will be used to determine the success in attaining the goals or whether different policies and actions are required. It is also intended to explore the feasibility of using the indicators to measure UK impacts overseas.

Future Disasters : New Opportunities For Sustainability?

The implementation of the UK SD Strategy provides key management opportunities in arguing for support in dealing with the needs of future disasters provided that, where initiatives are taken, they are seen to be clearly based on the social, economic, environmental and technological strands that all underpin sustainability.

Firstly, major behavioural changes will be needed to deliver sustainable development. These are social issues in which the role of education aids could be used to raise awareness, thereby developing new skills and knowledge to forge good habits in preparation for when individuals take up their role as members of active communities. It is generally accepted that people are prepared to act and change behaviour when working in groups at a community level provided there is a catalyst to enable and encourage people to engage with the key issues. This could involve developing community energy and transport projects; assisting in tackling climate change; economising water use; helping to minimise waste; promoting fair trade; mobilising sustainable consumption and production; and improving the quality of the local environment. It could involve building up resilience to deal with disasters.

Secondly, the environmental impacts from consumption and production patterns remains very severe, and inefficient use of resources is now becoming a drag on the global economy and business. Increasing prosperities across the world have allowed many people to enjoy the benefits of goods and services which were once available to just a few. However, current developed country patterns of consumption and production could certainly not be replicated world-wide, and some assessments indicate we would in fact require three planet's worth of resources to achieve this goal. In the past, there has been a focus mainly on pollution from production activities. However, there is now a need to refocus on greater efficiency and value with less resource use, pollution and waste. Business also needs to be encouraged to develop sustainable products, and to promote new design solutions which benefit the environment and the economy. Recycling, re-use or remanufacturing measures should also be promoted to complete the loop in the way resources are used. The current largest and fastest growing pressures on the global environment come from areas such as household energy, water consumption, food consumption, travel and tourism. The world as a whole cannot sustain consumption patterns like those enjoyed by Western Europe, whether this is related to air and vehicle travel; water use; diet; and in the support of the general standard of living. Future production and consumption provisions for the management of disasters should reflect this change.

Thirdly, the greatest threat faced concerns climate change and energy. Projections of future climate change indicate a trend in increases of global average temperatures and consequential changes in the risks of storms, floods, droughts, and heat related deaths. This all leads to greater risks of major disasters. There is a need to make a profound change in energy usage as well as the traditional methods of energy generation which produce greenhouse gas emissions. These emissions need to be significantly controlled and reduced, whether at home; at work; when travelling over land, across water, through the air; or at leisure activities. This action could then beneficially modify the current course of climate change, thereby reducing its impacts on the environment, the economy and society. There is thus a need to promote energy efficiency in homes and businesses; increase the share of electricity generated by renewable resources; encourage the take up of less polluting vehicles; and encourage individuals and communities to reduce detrimental emissions.

Fourthly, natural resources are vital to our existence and to the development of communities throughout the world. However, the demands on natural resources continue to increase at an alarming rate as a consequence of the current consumption patterns of global economic growth. A better understanding of environmental limits is therefore required where natural resources are being or have been severely depleted or degraded. The relationships between a healthy economy and an effective functioning ecosystem must be recognised, given that air, water and soil sustain life and support the biological resources on which all populations depend. A better knowledge is therefore required on the value, resilience and vulnerability of the ecosystem, so that the full benefits and the current pressures on it are more fully understood. The health of global populations and its wellbeing are inextricably linked to the quality of the air, water, soils and biological resources. Furthermore, the variability of the global biological resources provides the umbrella for the biodiversity in plants, animals and other organisms to maintain the life-sustaining systems of the planet. To accommodate all these demands, sufficient allocated space is required both for the natural environment processes to function in a healthy state, whether in the oceans, across continents or within the forests, as well as for civilisation to harness opportunities for agriculture, industry, cities and supporting infrastructure. A balanced approach in the use of non-renewable resources for the optimum development of renewable energy resources must therefore be aggressively promoted to harness the benefits of wind, tidal, geothermal and solar energy. Disaster management should be fully aware of these key issues.

Finally, it is important all future initiatives are effectively promoted, moving from a local scale and expanding this to global dimensions. Past efforts on a global scale have generally focussed on dealing with the consequences of instability and responding to crises. It is felt more attention in future should focus on building up global capacities and resilience to manage risks and deal with shocks that lead to disasters. Food and water scarcity, changes in land use, natural disasters and environmental migration can all play a part in the escalation of tensions leading to disasters. In these cases, the most vulnerable are the poor, and tacking global poverty remains a priority under the umbrella of the MDGs. Partnerships should be developed to tackle social, economic and environmental issues and inequalities.

Ultimately, it is recognised that all these strategic initiatives have little value unless they can be delivered and turned into action. Domestic Government and the International Institutions are accountable only in part, as each individual in global populations has a responsibility for a successful outcome. This will be achieved when all communities emerge in sustainable forms, and these will be:-

- active, inclusive and safe, being fair, tolerant and cohesive with a strong local culture and other shared community activities
- well run, with inclusive participation, representation and leadership
- environmentally sensitive and considerate, providing places for people to live
- well designed and built, featuring a quality built and natural environment
- well connected, with good transport services and communications linking people to jobs, schools, health and other services
- thriving, with a flourishing and diverse local economy
- well served, with public, private, community and voluntary services that are appropriate to people's needs and accessible to all, and
- fair for everyone, including those in other communities, now and in the future.

These provisions provide a sustainable framework upon which management can focus in the future, and thereby set about meeting the best interests of all stakeholders when responding to emergencies and disasters. All disaster managers must recognise the time as arrived when there is need for change in the approach to all post-disaster reconstruction initiatives, and all decisions must take account of the full social, economic, environmental and technological implications. This can then have a major impact on the resources required for any production and consumption processes in many reconstruction activities; in securing construction materials; in transporting people and goods; in providing food and dealing with all wastes.

Planning Practical Opportunities For Future Events

So what are the practical implications of these new proposals? The changes would certainly bring sustainable benefits over the longer term provided all stakeholders were made aware and agreed to all key issues that were being addressed. Disasters are like a major consumer at the end of a supply chain, and therefore manufacturers and traders associated with key production lines would need to be persuaded on the benefits of these new directions. It is envisaged the largest difficulties could be associated with the launch of the new initiatives, and therefore some simple issues will be examined to demonstrate how key hurdles might be overcome.

Each future emergency or disaster would still be treated as an individual project, and therefore sound management principles should be applied (Alexander 2002). This will entail applying planning and controlling techniques for effective management (Burke 2005) but with a very clear focus on the economic allocation of resources in line with sustainability decision-making. A major first concern of people caught up in catastrophe (Alexander 2000) is often to attend to their basic needs of food, shelter and water prior to attending to more longer term requirements. To deliver all these needs requires an allocation of various resources in a supply chain composed of various inputs of labour, materials, consumables and machinery to provide outputs of transport, consumables, equipment and goods. The best of all alternatives would need to be identified adopting the principles of economics, with a focus on limiting energy provisions, environmental impacts and wastes in line with sustainability.

Accordingly, for shelters, short term measures might identify local tent fabrics to be the best option (Davis 2002) whereas for the longer term, traditional forms of structure (Broadbent 2004) with a mix of appropriate variations (Yahya 2001) using local construction materials (Keefe 2005) and modern principles (Chudley 2004) may be the most appropriate. The use of non-renewable energy resources for transport (Royal Academy 2005) and power generation would be avoided where practical and feasible for both short term and long term requirements. The best of the options for particular circumstances might include rapid introductions of a mix of new renewable energy resources (Twidell 2006) for power generation based on solar, wind, biofuels, biomass, hydro-power, wave, tidal, geothermal or other alternatives, together with a rapid phasing out of any fossil energy-based power generation. Power provisions would come from the same sources for supporting domestic needs, water supply, sanitation, drainage, irrigation, agriculture, infrastructure, and for any other economic development. Post-disaster reconstructions would set out to generate local employment from these works (Broadbent 2003), whilst every effort would be taken to minimise waste as well as avoiding to pollute the environment (Appelo 2005).

Conclusions

This paper has demonstrated with some simple supporting illustrations how the UK could jointly support both its strategy for sustainable development as well as serve the interests of disaster victims in post-disaster reconstruction works. Whilst the emphasis here has been only on some feasible changes in resource allocations and related technological issues, the UK support would also set out to underpin the full spectrum of beneficial social, economic and environmental matters relating to all stakeholders interests, whether these be for disaster victims or the wider global community. This approach meets the interests of all present and future stakeholders.

References

Abbott, I. (2002). "Emergency Planning in Local Authorities", *ICE, Municipal Engineer, 151(4), 245-247.*

Alexander, D.(2000). "Confronting Catastrophe", *Terra Publishing*, Hertfordshire, UK.
Alexander, D. (2002). "Principles of Emergency Planning and Management", *Terra Publishing,* Herts, England.
Appelo, C. and Postma, D (2005). "Geochemistry, Groundwater and Pollution", *Balkema*, Amsterdam, The Netherlands.
Backhouse, Roger (2002). "The Penguin History of Economics", *Penguin* , UK.
Banyard, John (2005). "Water for the World – Why is it so Difficult". *5th Brunel International Lecture, Institution of Civil Engineers*, London, UK.
Blaikie, P. Cannon, T. Davis, I. Wisner, B. (2000) " At Risk – Natural Hazards, People's Vulnerability, and Disasters", *Routledge*, London, UK.
Broadbent, D.M. (1999). " Lessons Learnt from 25 Years Overseas Experience", *Proceedings of the 15th International Logistics Congress on Life-Cycle Effectiveness through Logistics,* Exeter, UK, May 24-27, 1999.
Broadbent, D.M. (2003). "The Role of the Labour Force in Disaster Management". *Proceedings of the International Civil Engineering Conference on Sustainable Development in the 21st Century*, Nairobi, Kenya.
Broadbent, D.M. (2003). " Effective Disaster Management Practices for Flood and Drought Prone Areas". *Proceedings of the World Conference on Water and Climate Related Disasters,* Hyderabad, India.
Broadbent, S.G. and D.M. (2004). "Traditional Vs Modern Construction Practices". *Proceedings of the Second International Conference, Post-disaster reconstruction : Planning for Reconstruction*. Coventry, UK
Burke, Rory (2005). "Project Management – Planning and Control Techniques", *Wiley*, Chichester, England.
Burnes, B (2004). "Managing Change", *Prentice Hall* (Fourth Edition).
Chudley, R and Greeno, R (2004). "Building Construction Handbook", *Elsevier*, Oxford.
CIWEM West Midlands' Conference (2005). "The EU Water Framework Directive – Fundamentals and Key Challenges", *CIWEM,* Birmingham, UK.
CIWEM West Midlands' Key Note Address (2006). "Water for the Midlands – The Successes and Challenges", *CIWEM*, Birmingham, UK.
Civil Contingencies Secretariat (CCS)(2004). "The Civil Contingencies Bill",HMSO, London, UK.
Coggan, Philip (2002). "The Money Machine – How The City Works", *Penguin*, UK.
Davis, J. and Lambert, R. (2002). "Engineering in Emergencies – A Practical Guide for Relief Workers", *ITDG Publishing*, London, UK.
Department for Environment, Food and Rural Affairs (2004). "Making Space for Water – A Consultation Exercise", *Defra Publications*, London, UK.
Department for International Development (2006). "Eliminating World Poverty : A Consultation Document", *DFID*, London and East Kilbride, UK.
Department for International Development (2000). "Eliminating World Poverty : A Challenge for the 21st Century", *DFID*, London and East Kilbride.
Department for International Development (1997). "Eliminating World Poverty : Making Globalisation Work for the Poor", *DFID*, London, UK.
Eade, D. Williams, S. (1998). "The Oxfam Handbook of Development and Relief", *Oxfam Publishing,* Oxford.
Elliott, D. Swartz, E. Herbane, B. (2002)."Business Continuity Management– A Crisis Management Approach", *Routledge*, London, UK
HM Government (2005). " The UK Government Sustainable Strategy Securing the Future – Delivering UK Sustainable Development Strategy", *HMSO*, Norwich, UK.
Keefe, Laurence (2005). "Earth Building – Methods and Materials Repair and Conservation", *Taylor & Francis*, London and New York.
Landes, D. (2001). "The Wealth and Poverty of Nations," *Abacus*, Lancaster Place, London.
Loosemore, M. Raftery, J. Reilly, C. Higgon, D (2006). "Risk Management in Projects", *Taylor & Francis*, London and York.
Mullins, Laurie J (2005). "Management and Organisational Behaviour", *Prentice Hall* (Seventh Edition).
Oldfield, Frank (2005). "Environmental Change – Key Issues and Alternative Approaches", *Cambridge University Press*, Cambridge.
Royal Academy of Engineering (2005)."Transport 2050 : The Route to Sustainable Wealth Creation", *The Royal Academy of Engineering*, London.

Royal Academy of Engineering (2005). “Engineering for Sustainable Development: Guiding Principles”, *The Royal Academy of Engineering*, UK.

The Economist (2005). “The Shaming of America” and “When Government Fails”, *The Economist*, September 10-16 2005, 11 and 24-26.

Thompson, J.L (1994). “ Strategic Management – Awareness and Change”,*Chapman & Hall,* London, UK.

Turner, R.K. Pearce, D. Bateman, I. (1994). “Environmental Economics”, *Harvester Wheatsheaf*, Hemel Hempstead, Herfordshire, UK.

Twidell, John and Weir, Tony (2006). “Renewable Energy Resources”, *Taylor & Francis*, London and New York.

Uff, J. ((1996). “Water Supply In Yorkshire - Report on Independent Commission of Inquiry”, *HMSO*, UK

UK National Statistics (2005). “Sustainable Development Indicators in Your Pocket – A Baseline for the UK Government Strategy Indicators”, *Department for Environment Food and Rural Affairs Publications*, UK.

United Nations (2004). “A More Secure World : Our Shared Responsibility” *Report of the High-Level Panel on Threats, Challenges and Change*, UN.

Vale, Lawrence J. andCampanella, Thomas J. (2005). “The Resilient City : How Modern Cities Recover from Disaster”, *Oxford University Press*, New York, USA.

Yahya, S. Agevi, E. Lowe, L. Mugova, A. Musandu-Nyamayaro, O. Schilderman,

T. (2001). “Double Standards, Single Purpose – Reforming Housing Regulations to Reduce Poverty”, *ITDG Publications*, London.

Part 2

Sustainable Post-Disaster Reconstruction Projects

Ensuring the sustainability of post-disaster reconstruction projects requires the optimization of economic, environmental and social constraints in alignment with the needs and priorities of the affected community.

ANALYSIS OF THE POST-DISASTER RECONSTRUCTION PROCESS FOLLOWING TURKISH EARTHQUAKES, 1999

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Abstract

Post-disaster housing reconstruction is a process that is the interaction of complex social, technological and economic factors and actions. The process of post-disaster housing reconstruction is comprised of four different periods: The pre-disaster, immediate relief, rehabilitation, and reconstruction periods. The objective of this paper is to briefly define the phases and actions in the process and then to analyze the housing reconstruction implementations following the 1999 Earthquakes in Turkey. With the help of this analysis, the establishment of a multi-disciplinary planning framework for post-disaster housing reconstruction will be simpler to achieve. The analysis would be a first step for realizing a more precise organization plan which omits the frequent mistakes for the implementations in Turkey. In implementations, it was observed that the main problem was the lack of satisfactory actions and policy framework in the pre-disaster phase. Therefore, although the actions in the post-disaster phases seem to be more satisfactory; the implementations following the earthquakes can hardly be called a success.

Keywords: post-disaster housing; Turkey; earthquake; housing reconstruction.

Introduction

Post-disaster housing is defined by United Nations Disaster Relief Coordinator (UNDRO) as "housing policies and applications following a disaster for meeting the urgent, temporary and permanent sheltering needs of the survivors of the disaster" (1982, p.11). The construction of post-disaster housing is a process diverse from the construction of housing in normal times, since the process consists of actions to be realized in times of major crisis in the aftermath of disasters (Quarantelli, 1997; Quarantelli, 2000; Barakat, 2003).

Various architects, designers and other technical actors have mistakenly considered housing only as a product, but it is definitely a process. Therefore post-disaster housing is also a process and the post-disaster dwelling is the product of a "long chain of social, economic, technological, environmental, political and other interactions" (UNDRO, 1982, p. iii). This interaction combines social consciousness, highly developed technology, and economic systems with the participation of the affected community (Norton, 1980; UNDRO, 1982; Aysan and Davis, 1993; Barakat, 2003).

Analysis of the Post- Disaster Housing Process

The post-disaster housing reconstruction process consists of four different periods: pre-disaster period, immediate relief period, rehabilitation period and reconstruction period as termed by the UNDRO in 1982. The pre-disaster period is the phase when major policies are decided and database is formed. The immediate relief period is significant for the damage and needs assessments which should be realized directly after the disaster. The rehabilitation period is where all the critical decisions about the detailed implementation plan are made. The construction, implementation and evaluation period of the permanent post-disaster houses is termed the reconstruction period (UNDRO, 1982).

Post-Disaster Reconstruction : Meeting Stakeholder Interests : Proceedings of a conference held at the Scuola di Sanità Militare, Florence, Italy 17-19 May 2006, edited by David Alexander, Colin Henry Davidson, Andrew Fox, Cassidy Johnson, Gonzalo Lizzaralde, ISBN 978-88-8453-611-2 (online), ISBN 978-88-8453-612-9 (print), © Firenze university press, 2007

The actions and measures defined in the process also fall into four categories; policy-making, organization, implementation, and evaluation and follow-up (UNDRO, 1982). Actions related to policy-making and various actions about organization are realized in the pre-disaster period and the remaining actions are realized in the post-disaster phases. On the other hand, the process of post-disaster housing is a cycle. Consequently actions, especially the ones in the pre-disaster period and reconstruction period, may overlap. The major accomplishments of the phases in the disaster cycle can be seen in Figure 1.

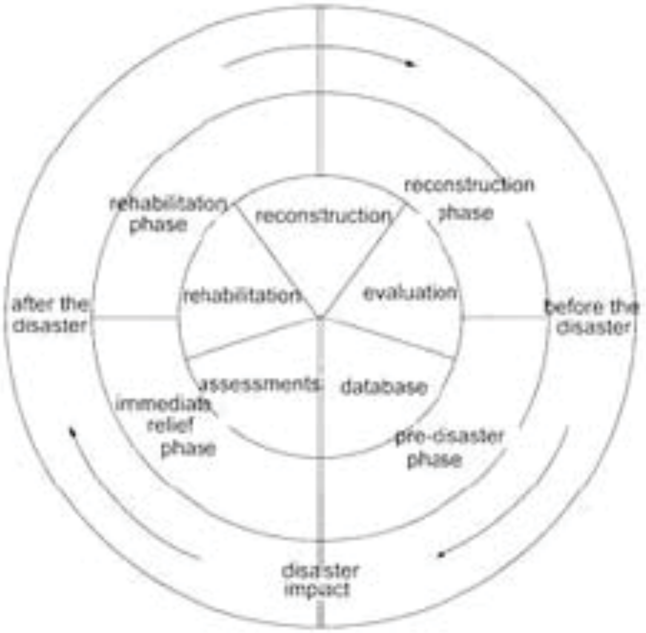

Figure 1. Post-Disaster Reconstruction Cycle.

Pre-Disaster Phase

The pre-disaster phase is undeniably the most important period for the housing reconstruction process. In the pre-disaster phase, vital principles, policies and strategies are determined and organization of the post-disaster housing process is planned. The aim in this period is to determine a policy combining technical, social and economic factors (Davis, 1978; Alexander, 2000; Barakat, 2003; Lewis, 2003). Pre-disaster reconstruction planning has not proved popular because most countries have insufficient resources. Additionally, the psychological need not to talk about death and homelessness before it happens and the avoidance of remembering the previous suffering are significant factors for deficient pre-disaster planning for post-disaster reconstruction (Haas *et al.*, 1977; Alexander, 2004).

Policy-Making Actions at the National Level. An ideal reconstruction policy should unite social, legal, bureaucratic, technical, and economic dynamics after the natural disaster. Consequently, the most important actions related to policy-making are the analyses of the previous experiences and reconstruction models in the national level. The analysis of current post-disaster housing strategies, current economic models in reconstruction, past disaster implementations in the country, and the analysis of economic, bureaucratic, social and technical factors affecting the process are the main steps for the analysis of the reconstruction models (UNDRO, 1982; HABITAT, 2001; Kruetner *et al.*, 2003; Freeman, 2004; Trim, 2004).

After these analyses, policies and strategies of a reconstruction model at the national level are decided and roles of all the actors involved in the process are planned and defined. Consequently, a national policy and action guideline is defined for post-disaster housing reconstruction in the pre-disaster phase (UNDRO, 1982; HABITAT, 2001).

Organizational Actions at the National Level. In the pre-disaster period, there are also organizational actions in the national level. Such actions can be listed as; preparation of novel construction systems and bylaws (if needed), the modification of emergency legislation (specifically regarding land-use), providing the technology for the establishment of a nationally consistent system of data collection, preparation of the damage and needs assessment and survey methodology, and training of the local key actors. Organizational actions are the first but fundamental steps to prepare an organizational model for post-disaster housing reconstruction at the regional and local level (Haas *et al.*, 1977; UNDRO, 1982; Aysan and Davis, 1993; Comerio, 1997; HABITAT, 2001; Prestipino, 2004).

Organizational Actions at the Regional and Local Level. Although policy-making measures are only established at the national level, organizational actions can be realized at the regional and local level as well.

Preparation of a topographical, climatic, economic, social and cultural database related to the region, hazard mapping, evaluation of building and site conditions in regions at risk, revision of the existing plans, preparation of the new and extended city layouts that are for re-modeling as well as for growth, preparation of sample guidelines and training aids for immediate action, training of the staff in the post-disaster teams are the organizational actions to be realized in the pre-disaster period (Haas *et al.*, 1977; UNDRO, 1982; HABITAT, 2001; ITDG, 2004; Akinci, 2004).

Immediate Relief Phase. Many of the actions and measures taken in the immediate relief period are intended to minimize the physical and social destruction, and survivor's psychological trauma. Furthermore, actions and decisions to be realized in this period can greatly influence implementations in the later stage. As for post-disaster reconstruction, the prior tasks of assessment of damage, existing resources and needs should be precise because housing reconstruction decisions are based on these early data (Davis, 1978; Aysan and Davis, 1993; Alexander, 2000). This period usually lasts for approximately two weeks after the disaster event (Haas *et al.*, 1977; UNDRO, 1982). Actions related to post-disaster housing reconstruction in this period are all organizational.

Organizational Actions at the National Level. In the immediate relief period, the organizational actions to be held at the national level are the re-establishment of communication and setting up a local database in the crisis center, and coordinating emergency shelter assistance (Aysan and Davis, 1993; HABITAT, 2001).

Organizational Actions at the Local Level. Actions related to organization at the local level in the immediate relief period are the distribution of emergency shelters, the assessment the needs of the homeless-, and the damage, and the re-establishment of damaged infrastructure, if essential. Fieldwork is mostly used for the assessment of damage and needs. It is still the most common data-collection approach; and field workers are more successful in gaining access to people, activities, and information sources than the use of high-technology communication devices, especially in the developing countries (UNDRO, 1982; Aysan and Davis, 1993; Comerio, 1998; HABITAT, 2001; Barakat, 2003).

Rehabilitation Period. Rehabilitation is the time period where all the vital decisions about the detailed implementation plan are made. In this period, the data obtained from damage and needs assessments are analyzed and evaluated, and then the types, structure and quantities of the dwellings, and regions to be implemented are decided (UNDRO, 1982; Alexander 2000; Lewis, 2003). Rehabilitation period lasts for about 45-60 days following the disaster (Haas *et al.*, 1977). Actions in this period are related to organization and implementation.

Organizational Actions at the National Level. The analysis and evaluation of data obtained from damage and needs assessments is the only action related to organization in the rehabilitation period. On the other hand, this action is extremely significant because the extent of damage and needs are translated into appropriate action.

Actions Related to the Implementation at the National Level. In the rehabilitation period, the types, systems and numbers of the permanent post-disaster dwellings and regions to be implemented are decided in the national level. Preparation of a detailed plan about the production of housing, developing and maintaining a list of manufacturers and suppliers, training and communication with the actors involved in the production and construction of dwellings are realized at this period. In the later stages of the process, modifications in the plan and systems are made using the feedback from the local community (UNDRO, 1982; Lewis, 2003; Barakat, 2003; ITDG, 2004).

Actions Related to the Implementation at the Local Level. In this period, provision of the information about the post-disaster housing process to the community, presenting a model house or plan for evaluation of the community, training of the actors and local labor in the community involved, and the construction of the infrastructure of the site are the actions to be implemented at the local level. Additionally, there may be the distribution of temporary shelters or core shelters according to the type of the post-disaster housing project chosen in the rehabilitation phase. Besides the governmental actions, donated temporary shelters are distributed by NGO's and some spontaneous temporary shelters are built by the local people at this level (UNDRO, 1982; HABITAT, 1989; Aysan and Davis, 1993).

Reconstruction Period

The construction and implementation period of the permanent post-disaster houses is called the reconstruction period. In contrary to popular belief, this period does not end with the handover of the houses to the survivors of the disaster. The activities for the evaluation of the dwellings fall into this period, as well as the first period of the post-disaster reconstruction cycle, namely preparing for the next pre-disaster period, as mentioned before. The reconstruction period can last between two and four years depending on the resources of the affected community (Haas *et al.*, 1977; UNDRO, 1982; HABITAT, 2001; Barakat, 2002).

Actions Related to the Implementation at the National Level. Even though the construction of the houses is realized at the local level, the control of the implementation process and the preparation of an evaluation document for the project are the actions related to implementation at the national level in the reconstruction period.

Actions Related to the Implementation at the Local Level. In the reconstruction period, all the actions in the construction of houses, from the transportation of the building materials to the settlement of the survivors to the buildings, are related to implementation in the local level (Barakat, 2003; ITDG, 2004). The permanent dwellings may be self- constructed by the community (or the NGO's in the country) with support from the local government, disaster insurance systems or the low-interest loan programs (Comerio, 1998; Kreutner *et al.*, 2003).

Actions Related to Evaluation and Follow-up. Evaluative actions help the creation of basic data which outlines program objectives, the philosophies behind them, a brief history of the personal involved and the details of the implementation phase, and the immediate and long-term impacts. Creation of such basic data is a necessity for the establishment of flexible feedback model of post-disaster action for future disasters. Evaluation and follow-up actions are carried out by the project personal no less than every 6 months while the project is being implemented so that necessary additions and modifications can be possible. In 3-5 years after the end of the project, a final evaluation of long-term impacts should be prepared by professionals who are independent from the project. (Norton, 1980; UNDRO, 1982; Guha-Sapir & Lechat, 1986; Lizzarelde, 2002; Akinci, 2004).

The summary of all the actions, their levels and all the actors involved in the post-disaster housing reconstruction process can be seen in Table 1.

Time Period	Level	Actions	Actors
Pre-Disaster Period	National	**Policy Making** Analyses Decision of the policies Role planning Action guideline	National Government, Disaster Managers, Local Architects/ Engineers, Multi-Disciplinary Experts
		Organizational New construction systems Hazard-mapping Emergency legislation Assessment methodology Training of local figures	N. Government, Disaster Managers, Local Architects/ Engineers, Multi-Disciplinary Experts, Private Sector
	Local	**Organizational** Regional database Sample guidelines	Local Multi-Disciplinary Experts, Disaster Managers, Community
Immediate Relief Period	National	**Organizational** Assistance of coordination Communication centre	Disaster Managers, National Government
	Local	**Organizational** Emergency shelter assistance Needs assessment Damage assessment	Disaster Managers, Architects/ Engineers, Multi-Disciplinary Experts, Volunteers, NGO's, Donor Countries, Local Military, Community
Rehabilitation Period	National	**Organizational** Analysis of damage and needs assessment	N. Government, Disaster Managers, Local Architects/ Engineers, Multi-Disciplinary Experts,
		Implementation Decision of dwelling Contacting manufacturers Modifications of dwellings	N. Government, Disaster Managers, Architects/ Engineers, Private Sector, Community
	Local	**Implementation** Shelter assistance Model house/plans Training of actors Infrastructure construction	N. Government, Architects/ Engineers, Private Sector, NGO'S, Donor Countries, Community
Reconstruction Period	National	**Implementation** Controlling construction Evaluation document	N. Government, Architects/ Engineers, Private Sector
	Local	**Implementation** Construction of site The handover of buildings **Evaluation & Follow-Up**	Architects/ Engineers, Private Sector, Local Government, Multi-Disciplinary Experts

Table 1. Analysis of Post-Disaster Housing Process

Post-Disaster Housing Reconstruction Following The Turkish Earthquakes, 1999

On August 17th 1999, an earthquake with a magnitude of 7.4 and epicenter under Izmit Bay, destroyed the whole Eastern Marmara Region, Turkey. The earthquake caused the death of 18,373 people and the injury of 48,901 more, according to the official data. Furthermore, a great number of people were reported to be missing. Besides the loss of lives, the earthquake caused damage to or demolished 96,808 houses, the homes of estimated 800,000 inhabitants. This earthquake caused the biggest and widest damage in the history of Turkish disasters (Gulhan & Guney, 2001; Karaesmen, 2002).

After the Marmara Earthquake, supplying the post-disaster housing for earthquake victims was planned in three phases; tent cities for urgent settlement, prefabricated houses for temporary use and permanent houses for permanent settlement. Three months after this disaster, another earthquake in Bolu with a magnitude of 7.2 occurred in Turkey. Following these two earthquakes, 162 tent cities, 44,107 prefabricated houses and 40,665 permanent dwellings were constructed in total (Bozkurt, 2001; Karaesmen, 2002).

The Analysis of the Post-Disaster Housing Reconstruction Following the Turkish Earthquakes, 1999

Following the Turkish Earthquakes of 1999, a total of approximately 44,000 permanent dwellings were built, as mentioned before. For such large-scale reconstruction, the process of post-disaster housing became significant for success of the reconstruction. Consequently, the analysis of the process is important for the evaluation of the reconstruction following the Turkish Earthquakes in 1999.

Pre-Disaster Period. The pre-disaster phase, as has been mentioned, is the most significant phase since all of the decisive actions related to policy making at the national level should be realized before the disaster event. In spite of this ideal situation, the policy making actions at the national level was narrowly realized before the earthquakes in 1999.

Following the previous disasters, the analyses and evaluations of post-disaster related material were written in various universities, associations and private or government related institutions, accessible only in their own records or libraries and accessible only to the specialists or researchers. As an example, the evaluations of the economic models for funding the housing reconstruction were present only in the economic departments of the concerned universities and institutions, unfortunately not accessible to the community. Furthermore, the analysis of the previous disasters in Turkey focused on the technical and economic factors ignoring the social factors (Sey, 1999; Akinci, 2004; TR Ministry, 2004).

The establishment of a guideline that explains the major steps in post-disaster housing reconstruction is important for determining a post-disaster housing policy at the national level. Since there were no detailed guidelines before the earthquakes of 1999, the national policy-making decisions which should mostly have been realized in pre-disaster period was comprehended in the immediate relief phase in a situation of chaos and with the pressure of time (Sey, 1999; Balamir, 2001).

The success of the organizational actions in the pre-disaster period is mostly dependent to the success of the analyses in the same period. Consequently, the organizational actions at the national level were scarcely realized except the training of the key figures. Sample assessments and surveys were already present but they were not seriously modified according to the feedback from the recent disaster experiences. On the other hand, organizational actions at the national level were realized to an advanced degree. The regional database formed was only accessible in the local universities and institutions. Consequently, time-consuming re-gathering of this database became a vital issue in the immediate relief period (Sey, 1999; TR Ministry, 2004).

Immediate Relief Period. All the actions in the immediate relief period should ideally be organizational. Conversely, some policy-making actions such as deciding the national strategy for the post-disaster housing and re-gathering of the local database were also realized in this period, as mentioned before. In this period, it was decided that post-disaster housing reconstruction was to be three-phased, and temporary and permanent dwellings were to be constructed via contractors. The financial method chosen for reconstruction was a combination of international aid and limited support of the government by the help of the long-term loans (World Bank, 1999; Eroglu, 2000; Balamir, 2001; Kruetner *et al.*, 2003).

Organizational actions in the national level such as the establishment of a crisis center have been successfully realized immediately especially after the Bolu Earthquake. Relatively rapid distribution of tents, mobile kitchens, and mobile sanitary facilities proved to be a success for the crisis center. On the other hand, shortage of tent stocks, low-quality fabric and the absence of a tent city settlement plan before the earthquake were major problems (Eroglu, 2000; Bozkurt, 2001).

The organizational local actions were mostly field assessments. The assessments of the damage were performed by teams of experts from disciplines of civil engineering, architecture and geology (Eroglu, 2000). The assessments of various needs were also done by teams of doctors, psychologists, sociologists, architects and volunteers. The assessment of realized by State Institute of Statistics was significant for the determining the preferences of the temporary settlements by the survivors and the approximate number of the temporary units to be built (State Institute of Statistics, 1999; World Bank, 1999). Damage and needs assessments could be evaluated as successful applications of the housing reconstruction process.

Rehabilitation Period. Critical national level decisions such as the decision of types, systems, and numbers of the dwellings and the design of the dwellings and site plans are completed in the rehabilitation period. In order to translate needs into appropriate action, the analysis and evaluation of data obtained from local field assessments. In Turkey, this evaluation was indeed realized. Alas, many of the actions that help to analyze these needs, to be done in the pre-disaster period, were also to be realized in this period. Thus, lack of time caused misinterpretation of the needs for various decisions. As an example, the local data such as land, soil, climate and scenic conditions, and sociocultural characteristics of the community were neglected in the designs because of the time pressure. It was decided that all buildings have three floors and all units are composed of two rooms and a living room; and net usage areas are 63-87-107 m^2 (Bozkurt, 2001; Oztekin, 2003; Akinci, 2004).

Besides decisions of design, other national level actions related to implementation such as preparation of a detailed plan about the production of housing, bidding of the dwelling construction, training of the key figures, communication with the actors were realized successfully in the appropriate time frame. In contrast, model plans were not prepared and feedback from the community and experts was not provided for possible modifications (Bozkurt, 2001; Balamir, 2001; Oztekin, 2003; Akinci, 2004).

The local actions in this period are all related to implementation. Information about the post-disaster housing process accessible to the community, especially related to the legal and economic factors, were provided in time. Education of the key figures was successful compared to the previous disasters. There were minor mistakes regarding the quality of the construction of the infrastructure but the major mistakes in this period were observed to be the low construction quality of the temporary units (Figure 2) and the lack of community participation in the local decisions (Gumus, 2000; Bozkurt, 2001; Baradan, 2002; Oztekin, 2003; Akinci, 2004).

Reconstruction Period. The reconstruction period is significant because the products (housing units) of the process that are open to evaluation and criticism are constructed during this period. In Turkey, the control of the implementation has been realized rather successfully in the national level but the preparation of a sample evaluation plan has not been successful. Evaluation plans undeniably have been prepared but not by the actors in the implementation such as national government and/or contractors.

The actions related to construction of the housing sites realized in the local level following the Turkish earthquakes of 1999, are the transportation of the building materials to the construction area, and the actual construction of the units, site facilities and social environment. The construction quality and earthquake safety of the permanent buildings were observed to be satisfactory compared to the temporary units (Figure 3). On the other hand, the regional priorities and needs were not taken into consideration, as mentioned before (Öztekin 2003; Akinci, 2004; Gulkan, 2005)

Figure 2 Temporary shelters in Izmit (Baradan, 2002, p. 93)

Figure 3 Permanent Shelters in Kocaeli (Eroglu, 2000, p.123)

The evaluative actions in the reconstruction period offer constructive feedback for future projects. Project personal evaluated the units during and at the end of the project, however, the results have not been gathered as a published report. A report which outlines the program objectives and the brief history of the implementation phase and the personnel have indeed been published by the Ministry of the Public Works and Settlement but the evaluations of the project were not included in the report. Then again, there were numerous reports, articles and books evaluating the various phases of the post-disaster reconstruction process. Although, they mostly focused on the technical evaluations, there were social evaluations that centered on the survivor's needs as well. Those evaluations became a feedback for disaster managers and they were definitely used for the preparations of the future disasters (Crisis Management Center; 2000; TR Ministry of Public Works and Settlement, 2004).

General Evaluation of the Post-Disaster Housing Reconstruction Process Following the Turkish Earthquakes, 1999

Post-disaster housing reconstruction following the Marmara and Bolu Earthquakes of 1999 was the largest-scale reconstruction in Turkey. Consequently, the success of the project was significantly connected with the successful organization the process of reconstruction. When we analyzed the process, it was observed that almost all of the mistakes in the permanent housing reconstruction were caused by the lack of preparation in the pre-disaster period.

The scattered distribution of the disaster-related material in the country, and the absence of a post-disaster plan that defines the reconstruction process were two major problems in the pre-disaster period. As a result, most of the policy-making and organizational actions to be accomplished in the pre-disaster period were established in the immediate relief phase and even in the rehabilitation phase. There was an urgent need for sheltering the homeless; the main aim of the project became to shelter as many people as possible in the shortest possible time with no consideration of the land use qualifications, different compositions of the families or the regional needs and interests of the community. If there had been an organizational plan for the post-disaster reconstruction before the earthquakes, then the mistakes mostly caused by the pressure of time especially in the immediate relief and rehabilitation periods could have been omitted. Consequently, this analysis shows that the pre-disaster actions in the process of post-disaster housing are the most vital.

The most productive phase of the reconstruction process following the Turkish earthquakes of 1999 was the evaluation stage in the reconstruction period. With the attention of the media and the community, the policy of "learning to live with the earthquake" was accepted in the national level. Implementations towards strengthening all kinds of disaster-related organizations started following these earthquakes. The accomplishment of the natural hazards information database, including GIS database and hazard mapping; the establishment of a wide-ranging disaster communication and management center, disaster insurance system, the revision of disaster legislation, the search for new construction systems for earthquake safety are among organizational actions to be realized after the Turkish Earthquakes in 1999.

Conclusions

Post-disaster housing reconstruction is definitely a process. This process is affected by legal, bureaucratic, and social factors as well as by economic and technical factors. Consequently, post-disaster dwelling is the product of this process of relations and it cannot be evaluated independently from this process. In order to comprehend the achievements or failures in a post-disaster housing reconstruction program, the actions in the pre-disaster, immediate relief and rehabilitation periods should be appraised as well as the post-disaster dwelling itself.

With this aim, the analysis of the housing reconstruction process following the Turkish Earthquakes in 1999 was realized and reported in this paper. After the analysis, we can conclude that the most important period in the post-disaster housing reconstruction is the pre-disaster period. The main problems in this period could be stated as the deficiency of actions and measures and the lack of an organizational framework. Although the actions in the post-disaster periods were analyzed to be more satisfactory; the implementations following the earthquakes can hardly be called "successful". Consequently, we can assume that the analyses and the preparation of an organizational framework are the fundamental actions for a continuous success in the establishment of a national post-disaster housing reconstruction policy in the country.

Before the Marmara and Bolu earthquakes in 1999, the evaluations and analyses were mostly focused on the product with a technology-biased view in Turkey. Following the earthquakes, however, the focus of the research shifted to the various phases of the process. Among all those valuable analyses, the analysis of the process itself is more significant for defining an organizational framework. Being one of the few examples of such research in the country, this paper significantly centered on the whole process. The analysis defined in this paper is actually a summary of findings. In a more thorough analysis, the process should be evaluated with all of its actions in various time periods and implicating the actors involved in the process. Consequently, this analysis is actually a first step for realizing a more precise framework and organization plan which omits the frequent mistakes for the future implementations.

References

Akinci, Ferah (2004). "Viewpoint: The aftermath of Disaster in Urban Areas: An Evaluation of the 1999 Earthquake in Turkey" *Cities*, Vol.21, No 6, pp. 527-536.

Alexander, David (2000). *Confronting Catastrophe*, New York, Oxford University Press.

Alexander, David (2004). "Planning for Post-Disaster Reconstruction" Presentation at *Second International Conference on Post-Disaster Reconstruction in Developing Countries*, Coventry (22-23 April 2004).

Aysan, Yasemin and Ian Davis (1993). *Rehabilitation and Reconstruction, UN Disaster Management Training Programme Module*, Washington D.C., UnitedNations Development Programme & United Nations Department of Humanitarian Affairs Publication.

Balamir, Murat (2001). “Depremzedelerin Konutlandırılmasında Sorunlar” [Problems in Settling the Survivors of the Disaster] *Planlama,* No.4, pp. 4-10.

Baradan, Berna (2002). *Gecici Afet Konutunun Yapim Sistemleri Acisindan İncelenmesi [Analysis of Temporary Housing Unit according to its Construction System*], Unpublished Master’s Thesis, Dokuz Eylul University, Izmir.

Barakat, Sultan (2003). *Housing Reconstruction after Conflict and Disaster*, London, Overseas Development Institute.

Bozkurt, Gurdal (2001). “Deprem Sonrasi Planlama Deneyimi” [Post-DisasterPlanning Experience] *Planlama,* No 3, pp. 50-53.

Comerio, Mary C. (1998). *Disaster Hits Home: New Policy for Housing Recovery*, Berkeley, University of California Press.

Davis, Ian (1978). *Shelter after Disaster*, Oxford, Oxford Polytechnic Press.

Eroglu, Turker (ed). (2000) *Sakarya ve Deprem [Sakarya and Earthquake],*İstanbul, Sakarya Valiliği Deprem Serisi.

Freeman, Paul K. (2004). "Allocation of Post-Disaster Reconstruction Financing toHousing" *Building Research and Information*, Vol. 32, No 5, pp. 427-437.

Guha-Sapir, Debarati and Michael F. Lechat (1986). "Information Systems and Natural Needs Assessment in Natural Disasters: An Approach for Better DisasterRelief Management" *Disasters*, Vol. 10, No 3, pp. 232-237.

Gulhan, Demet and Guney, Inci O. (2001). “Marmara Depremi Hasar TespitÇalismalarindan Izlenimler” [The Impressions from Damage Assessment after the Marmara Earthquake] *Mimarlık*, No 299, pp. 43-45.

Gulkan, Polat (2005). “An Analysis of Risk Mitigation Considerations in RegionalReconstruction in Turkey: The Missing Link” *Mitigation and Adaptation Strategies for Global Change,* No10, pp. 525-540.

Gumus, Korhan (2000). “Afet Konutlari ve Urun Gelistirme Sorunu” [Post-Earthquake Projects], *Domus M* , No 4, p. 36.

Haas, J. Eugene, Robert W. Kates and Martyn J. Bowden (eds.) (1977).*Reconstruction Following Disaster*, Cambridge, The MIT Press.

Intermediate Technology Development Group- South Asia (ITDG) (2004).*Guidelines for Planning in the Re-building Process: Resource Pack* (electronic book on the internet).

Karaesmen, Erhan (2002). *Oncesiyle Sonrasiyla Deprem [Beforehand and Aftermath Earthquakes]*, Ankara, Atılım Universitesi.

Kruetner, Horst V., Birgit Kunderrman & Kiran Mukerji (2003). *Guidelines for Building Measures after Disasters and Conflicts*, Eschborn, GTZ Publication.

Lewis, James (2003). "Housing Construction in Earthquake-Prone Places: Perspectives, Priorities and Projections for Development" *Australian Journal ofEmergency Management*, Vol. 18, No 2, pp. 35-44.

Lizzarralde, Gonzalo (2002). "Organizational Design, Performance and Evaluation of Post-Disaster Reconstruction Projects" Paper Presentation at *Improving Post-Disaster Reconstruction in Developing Countries*, Montreal, Canada (23-25 May2002). Norton, Reggie (1980). "Disasters and Settlements" *Disasters*, Vol. 4 No 3, pp. 339347.

Office of the United Nations Disaster Relief Co-ordinator (UNDRO) (1982). *Shelter after Disaster: Guidelines for Assistance*, New York, United Nations.

Oztekin, Kamuran (2003). “Turkiye'de Kalici Deprem Konutlarinda Kullanilan Yapim Teknolojilerinin Kullanici Gereksinmelerine Uygunlugunun İrdelenmesi” [The Analysis of Construction Technologies According to User Needs in Permanent Dwellings, Turkey], Paper Presented at *Deprem Sempozyumu, 2003* (12-14 March 2003).

Prestipino, David (2004). "Meeting the Natural Disasters Challenge" *Australian Journal of Emergency Management*, Vol. 19, No 2, pp. 8-10.

Quarantelli, Enrico L. (1997). "Ten Criteria for Evaluating the Management of Community Disasters" *Disasters*, Vol. 21, No 1, pp. 39-56.

Quarantelli, Enrico L. (2000). *Emergencies, Disasters and Catastrophes Are Different Phenomena*, Disaster Research Center Preliminary Paper # 304, Disaster Research Center, University of Delaware.

Sey, Yildiz (1999). “Deprem Bolgelerinde Yerlesme ve Konut” [Settlement and Housing in Disaster Areas]. In *Deprem Güvenli Konut Sempozyumu*, Ankara: Mesa Yayınlari, pp. 57-63.

Trim, Peter R. J. (2004). "An Integrative Approach to Disaster Management and Planning" *Disaster Prevention and Management*, Vol. 13, No 3, pp. 218-225.

Turkish Republic Ministry of Public Works and Settlement (2004). *Deprem Surasi 2004 [Earthquake Discussion 2004]*, Ankara: TR Ministry of Public Works and Settlement.

Turkish Republic Prime Ministry Crisis Management Center (2000). *Depremler 1999: 17 gğustos ve12 Kasim Depremlerinden Sonra Bakanlık ve Kamu Kuruluslarinca Yapilan Çalismalar [Earthquakes 1999: The Works Established by Ministries and Other Civil Institutions Following the 17th of August and 12th of November Earthquakes],* Ankara, Basbakanlık Basımevi.
Turkish Republic Prime Ministry State Institute of Statistics (1999). *Deprem Bölgesinde Geçici İskan Tercih Eğilimlerini Belirleme Çalısması [A Study Aiming to Determine the Temporary Settlement Preferences of Victims in the Earthquake Region]* [CD- ROM].
United Nations Centre for Human Settlements (HABITAT) (2001). *Guidelines for Operational Programme Formulation in Post Disaster Situations: A Resource Guide*, Nairobi, HABITAT Risk and Disaster Management Unit.
World Bank (1999). *Project Appraisal Document on a Proposed Loan in the Amount of US$ 550 Million to the Republic of Turkey for a Marmara Earthquake Reconstruction Project* (electronic report on the Internet).

RELOCATION OR REBUILDING IN THE SAME AREA: AN IMPORTANT FACTOR FOR DECISION MAKING FOR POST-DISASTER HOUSING PROJECTS

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Abstract

Whether to relocate or rebuild in the same area is an important up-front decision to take in post-disaster housing projects since some projects result in failure when new settlements are refused by their intended beneficiaries. After the earthquake of 2000, permanent post-disaster houses were constructed in both new and existing settlements in the villages of Çankırı Province, Turkey. It was revealed that most of the beneficiaries refused to move to the new settlements in the region. Research was conducted in the area in order to reveal the reasons for relocation and refusal of the new settlements and opinions of the beneficiaries about the sites selected for post-disaster houses. Questionnaires were administered to the permanent users of the post-disaster houses and also to the beneficiaries who refused to move to the new settlements. Some of the data gained through the questionnaires was evaluated, while some was analyzed with the help of statistical tools. As a result, it can be said that refusal of new settlements is due to: quick decision-making; lack of user participation in the decision-making process; inadequate site-selection criteria; lack of interdisciplinary work during site-selection; not considering the life style of the users and inadequate guidance to the beneficiaries during the construction phase of the houses. It was revealed that most of the beneficiaries to whom the questionnaires were administered did not want move to the new settlements, conversely they preferred to construct houses in their existing settlements. Recommendations which may eliminate the causes of refusal are also made in the paper.

Keywords: post-disaster housing; post-disaster reconstruction projects; relocation; Turkey.

Introduction

Whenever a disaster strikes and leaves people homeless, reconstruction projects are undertaken for re-establishment purposes. Reconstruction projects include some decisions to take such as the kind of post-disaster houses to provide (temporary or permanent or both), the financing method, the procurement method and the type of construction. Whether to relocate or rebuild in the same area is an important up-front decision to take during this process. Tercan (2001) defines relocation as removal to another location due to provision of land or housing voluntarily or involuntarily. According to Bayulke (1983) relocation takes place during the following situations:-

- When the old location is subject to a natural hazard,
- When the old location is completely destroyed and to move the debris and to make new plotting in the old settlement is inconvenient for rapid recovery and housing purposes,
- When there is a chance to relocate the settlement to land which belongs to the Government since it is generally preferred not to have to pay for the land.

Barakat (2003) declares that construction of new settlements involves a great deal of effort and requires the highest level of investment. The choice of location, site selection and settlement planning; the choice of construction method and materials; and the choice of design are the considerations that must be addressed when planning new settlements. The same author states that the choice of location and site selection are the most important factors in determining the success or failure of new settlement programmes. According to Oliver-Smith (1991) refusal and abandonment of the site can be safely interpreted as failure of the resettlement projects.

Tercan (2001) declares that any attempt to remove people from their existing physical, social and economic environment will have important effects on their lives. However, negative effects can be limited if some conditions are fulfilled. Thus, the site chosen for reconstruction is one of the most important steps of the relocation process. Site selection can be done in two different ways: at the existing place of the damaged buildings or in a new residential area. If a good survey is not done, both of these ways may have many disadvantages. Sometimes relocation is done involuntarily. This often happens when the society has evolved old patterns of adaptation to its environment over many years. This relationship of a society to its land and environment may be based on economic, political or sociocultural factors or a combination of them. Economic factors may be soil fertility, resource availability, overall productivity or access to employment or labor resources; political factors can be considered as territoriality, leadership structures and inter-group relations; and cultural factors can be considered as privacy connections between environment and religion, cosmology, world view and individual and cultural identity. Removal of a society from its environment can result in a cultural and/or physical crisis which may lead to a new disaster. Thus, many researchers state that relocation must be avoided or minimized in reconstruction projects.

In Turkey, if there is a need to construct post-disaster houses, generally, disaster stricken settlements are relocated to a different location. This is true especially for the villages in the country. A literature survey related to the topic and the case study conducted by the author revealed that relocating a settlement creates many problems. The main problem is that people refuse to move to the new settlements and this leads to most of the post-disaster houses standing empty.

Relocation in Post-Disaster Housing Projects

Reconstruction projects were conducted in the villages of Çankırı, Turkey after the earthquake of June 6, 2000. The Ministry of Public Works and Settlement initiated the reconstruction projects in the area; it was decided to provide permanent post-disaster housing loans with a payback period of 20 years without interest for people whose houses were demolished or heavily damaged. According to this provision method beneficiaries had to hire contractors for their houses. A construction supervision unit, which does not exist anymore, was established by the Government for the reconstruction projects in the region to check the works going on in the area and pay the loan to the victims according to the completed stages of construction.

According to this system 1,221 permanent post-disaster houses (PDH) were constructed in 5 districts of Çankırı. Three different *Typical Designs* of permanent post-disaster housing were prepared by a private firm for the area (Figure 1). However, the beneficiaries who did not like any of these three types had the option to get their houses designed professionally. Those houses designed professionally are referred to as "*Custom Designs*" in this study. Besides seven new settlements, five of which are in Orta and two in Şabanözü districts, some of the PDH were constructed in the existing villages. Some of the new settlements are far from the existing ones, while some are close to the existing villages. Table 1 shows the numbers of villages/quarters, new settlements and PDH in Çankırı.

District	No of villages/ neigh-bourhoods	No of new settle-ments	No of PDH
Çerkeş	16	0	98
Atkaracalar	3	0	4
Şabanözü	19	2	210
Orta	30	5	908
Bayramören	1	0	1

Table 1. Number of villages/quarters, new settlements and PDH in Çankırı
Source of statistics: General Directorate of Disaster Affairs

Most of the houses were completed in 2003 and the region was visited twice by the author in the winter months of 2005. Most of the PDH constructed in the new settlements were standing empty at the time of the research. The reconstruction projects in the area were investigated in order to reveal the reasons for relocation and refusal of the new settlements and opinions of the beneficiaries about the sites selected for the PDH. The research consists of interviews with the officials of the Ministry of Public Works and Settlement and field surveys in the area. Villages in Orta and Şabanözü Districts were visited and questionnaires were administered to the permanent users of the PDH and also to the beneficiaries who refused to move to the new settlements. Although the total number of PDH constructed in the study area was 1,221, the exact number of the projects which are permanently occupied is not known, therefore, a random sample of 90 beneficiaries was selected for the study. Eighty permanent residents of the PDH were met during the field trip to the villages and everybody who happened to occupy the PDH at that time was included in the sample. During summer months however, seasonal occupants can also be contacted but it was not considered to be important for this study. In addition, 10 beneficiaries who refused to move to new settlements were met in the old settlements and they were also included in the sample.

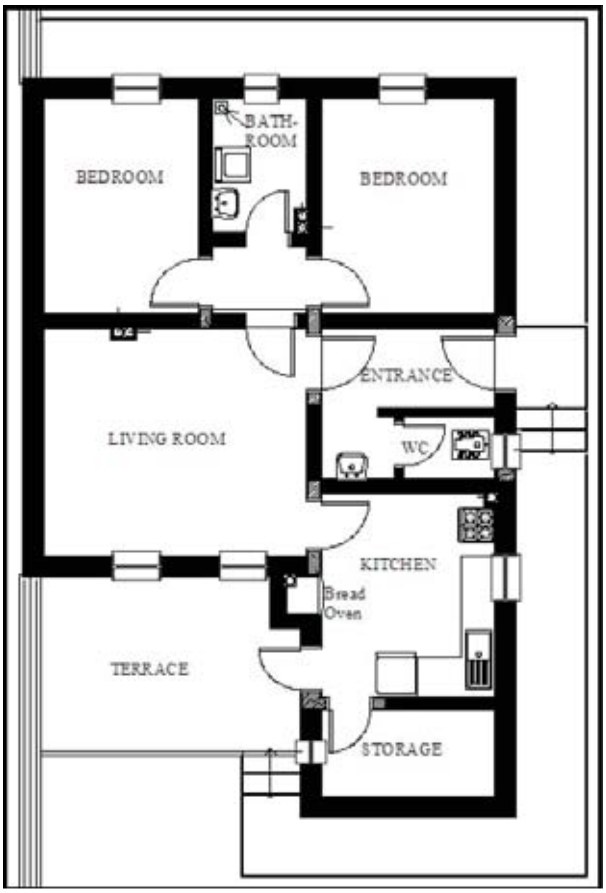

Figure 1. Plan of a PDH with typical design.

Data gained through the questionnaires filled out by those 80 families who are permanent PDH users was analyzed with the help of statistical tools. Furthermore, data collected from the questionnaires administered to the 10 beneficiaries who refused to move to their PDH was evaluated. Visited villages are described as follows:

Old Yuva Village. Most of the inhabitants in the village were beneficiaries some of whom refused to move to the new settlement. A house in old Yuva Village can be seen in Figure 2.

Old Ortabayındır Village. The new settlement with 52 houses, access to which is almost impossible, was constructed 5 km. away from the old one on top of a hill. Most of the houses in the village were not finished in the settlement and all of the houses in the new village were empty at the time the author visited the region. Therefore, the old village was visited and the owners of the houses were interviewed there.

Figure 2. A house in old Yuva Village.

Aşağı Kayı Village. 4 PDH were constructed on the lots of the demolished houses in the village. There are three PDH with *Typical* and one with *Custom Design* in the village. Two of the PDH with *Typical Designs* and the PDH with *Custom Design* were being used permanently.

Buguoren Village. 142 PDH, most of which are with *Custom Designs*, were constructed on the lots of the demolished houses in the village. Nearly all of the PDH were being used permanently (Figure 3).

Kısaç Village. 19 PDH, some of which are with *Typical* and others are with *Custom Designs* were constructed on the lots of the houses demolished in the village. Most of the houses were being used permanently.

Figure 3. Buguoren Village (PDH were constructed in the existing settlement).

New Elden Village. A new settlement with 87 PDH with *Typical Designs* was constructed 5 km. from the old one on top of a hill and only 7 of the PDH were being used permanently, while others were unoccupied at the time of the research. Some of the houses were being used seasonally, while some were vacant because the beneficiaries had refused to move in (Figure 4).

New Gümerdigin Village. A new settlement with 18 PDH was constructed approximately half a kilometre away from the old one. There are PDH both with *Typical* and *Custom Designs* in this settlement. Some of the PDH were being used permanently and some were being used seasonally at the time of the research.

Figure 4. Elden Village (A new settlement 5 km. far from the existing one).

New Yuva Village. A new settlement consisting of 58 PDH with *Typical Designs* was constructed next to the old one and only 6 of the PDH were being used permanently, while others were unoccupied at the time of the research. Some of the houses were being used seasonally, while some were vacant because the beneficiaries had refused to move in (Figure 5).

Derebayındır Village. A new settlement with 42 PDH with *Typical Designs* was constructed next to the old one. Only 7 of the PDH were being used permanently, while others were unoccupied at the time of the research. Some of the houses were being used seasonally, while some were vacant because the beneficiaries had refused to move in at the time of the research.

Figure 5. Yuva Village (A new settlement next to the existing one).

Data Evaluation

The beneficiaries were asked about the reasons why they refused to move to the new settlements. Data gained from the answers to this question were evaluated and the reasons of the refusal can be listed as follows:-

- Distance between the new settlements and the old ones,
- New settlements are difficult to reach due to the distance from the villages and/or lack of proper roads,
- New settlements are not suitable for the animals,
- Beneficiaries can not afford to construct cattle sheds and straw sheds,
- There is not enough space for a cattle shed and a straw shed on the lot,
- *Typical Designs* are not suitable for an extended family,
- Construction of the PDH is not finished because of the contractor's default.

It can be said that the first three reasons are due to the failures in the site selection criteria. Current site selection criteria for new locations are: low disaster risk, closeness to infrastructure facilities and government ownership. It is claimed by the officials of the Ministry of Public Works and Settlement that Government owned lands are preferred because it is difficult to provide large enough lots to the beneficiaries as there are more than one owners of the damaged property and it is not easy to allot one PDH to multiple claimants. There are multiple owners because mostly, the houses in the villages are inherited by the siblings in a family or there are extended families in a house, each of whom is the beneficiary of a PDH.

A group of geologists work for site selection and Government authorities consisting of the officials from General Directorate of State Hydraulic Works, General Directorate of Public Works and Settlement, Ministry of Agriculture and Rural Affairs, Ministry of Environment and Forestry, Ministry of Internal Affairs and the District of the related town approve the selection. Possible sites for relocation are not discussed with the beneficiaries. Lack of architects and planners in the site selection teams and lack of beneficiary participation in the selection process also lead to refusal of the new sites. Furthermore, decisions on post-disaster reconstruction projects are taken after the disaster occurs in Turkey. So decisions on the house provision method, design of the houses and new locations have to be taken quickly.

The main stay of the economy depends on agriculture in the region. Since the beneficiaries got loans for only house construction, some of them can not afford to construct cattle sheds which are as important as their homes. As a result, they do not leave their places in order to able to go on rearing their animals.

The fifth and sixth reasons are related to design concerns. Only houses were considered during lot sizing; however cattle and straw sheds were not taken into consideration in some of the new settlements. Furthermore, PDH were designed as if only nuclear families would live in them, however extended families including parents, children and families of the married sons live together in some houses in the villages of Turkey. Since PDH are not in accordance with the life style of some of the beneficiaries, they refuse to move to the new settlements.

The last reason is related to reconstruction method. Beneficiaries faced difficulties during the management of the construction phase. Since most of the beneficiaries are illiterate and they do not have experiences about construction management, most of them settled the terms of the contracts verbally. Thus, some builders got the money from the beneficiaries and made off without finishing the construction of the PDH. At the time of research, beneficiaries were inhabiting their damaged houses or they were staying in the cattle sheds in some villages, especially in old Ortabayındır Village as they can not afford to continue with the construction. Additionally, according to the regulations they had to demolish their traditional houses once they got the loan for house building from the Government.

Data Analysis

The permanent users of the PDH in the existing villages; in new settlements far from the old villages; and in new settlements close to the old villages were asked to evaluate the locations of the sites selected for construction of the PDH. They were asked to make the evaluations on a Likert scale of 3 (1: unsatisfactory, 2: neutral and 3: satisfactory). The evaluations were grouped and the categories were compared. T-tests were used to find out whether there are significant differences among the opinions of the users of the PDH located in different settlements. Analyses were conducted according to the null hypothesis:

Ho: $\bar{X}$ 1= $\bar{X}$ 2 (α= 0.05) that there was no significant difference between the groups.

As seen in Table 1, the calculated t value of 3.2005441 is greater than the critical t value of 1.761310115. Thus, the null hypothesis was rejected with 95% confidence. In other words, satisfaction level of the beneficiaries with respect to the existing villages and new settlements far from the old villages differs.

	Existing villages	*New settlements far from the old village*
Mean	2.75	1.777777778
Variance	0.5	0.535947712
Observations	8	18
Hypothesized Mean Difference	0	
Df	14	
t Stat	3.2005441	
P(T<=t) one-tail	0.003206799	
t Critical one-tail	1.761310115	
P(T<=t) two-tail	0.006413597	
t Critical two-tail	2.144786681	

Ho is rejected with 95% confidence

Table 1. T-test with regards to the location of the PDH in the existing villages and in the new settlements far from the old villages.

As seen in Table 2, the calculated t value of 0.446297748 is less than the critical t value of 1.710882067. Thus, the null hypothesis was accepted with 95% confidence. In other words, satisfaction level of the beneficiaries with respect to the new settlements far from the old villages and the new settlements close to the ones does not differ.

As seen in Table 3, the calculated t value of 3.142592772 is greater than the critical t value of 1.734063592. Thus, the null hypothesis was rejected with 95% confidence. In other words, satisfaction level of the beneficiaries with respect to the existing villages and the new settlement close the old village differs.

According to the results of the t-tests, satisfaction level of the beneficiaries with respect to the new settlements, whether they are close to the old villages or far from them, does not differ. However, satisfaction level of the beneficiaries with respect to the existing villages and new settlements differs. In addition, referring to the highest mean score (2.75) it can be said that existing villages were more popular than the new settlements. As a result, most of the beneficiaries to whom the questionnaires were administered did not want move to new settlements, on the contrary they preferred to construct PDH in their existing settlements.

	New settlements far from the old villages	*New settlement close to the old village*
Mean	1.777777778	1.642857143
Variance	0.535947712	0.862637363
Observations	18	14
Hypothesized Mean Difference	0	
Df	24	
t Stat	0.446297748	
P(T<=t) one-tail	0.329691493	
t Critical one-tail	1.710882067	
P(T<=t) two-tail	0.659382986	
t Critical two-tail	2.063898547	

Ho is accepted with 95% confidence

Table 2. T-test with regards to the location of the PDH in the new settlements.

	Existing villages	*New settlement close to the old village*
Mean	2.75	1.642857143
Variance	0.5	0.862637363
Observations	8	14
Hypothesized Mean Difference	0	
Df	18	
t Stat	3.142592772	
P(T<=t) one-tail	0.002814511	
t Critical one-tail	1.734063592	
P(T<=t) two-tail	0.005629022	
t Critical two-tail	2.100922037	

Ho is rejected with 95% confidence

Table 3. T-test with regards to location of the PDH in the existing villages
and in the new settlements close to the old villages.

Discussion and Recommendations

Post-disaster resettlement projects generally result in refusal of new settlements in Turkey. According to the investigation conducted in the Çankırı Province of the country, it can be said that new settlements are refused due to the following failures in post-disaster reconstruction projects.

- Quick decisions,
- Lack of user participation in early decision-making process,
- Inadequate site-selection criteria,
- Lack of interdisciplinary works during site-selection,
- Not considering the life style of the users,
- Lack of guidance to the beneficiaries during the construction phase of the houses.

The failures mentioned above may be eliminated when required work is done in a different way. Post-disaster houses have to be constructed as soon as possible after a disaster strikes, therefore decisions have to be taken quickly. However, pre-disaster strategic planning including development of provision strategy; collection of information on possible locations and initial work on the design of post-disaster houses can be done for disaster prone areas. It is not necessary to design post-disaster houses before a disaster occurs, but some of the stages required for design can be completed before the disaster. For instance background information including house typology, user profile in the region and climatic and topographical conditions of the area where PDH are planned to be built can be gathered. Completing some of the works before the disaster will create more time for post-disaster works.

Beneficiaries should be involved in early decision-making process of post-disaster reconstruction works. Discussions with the beneficiaries will help understand their needs and preferences and also users will understand the reasons for the decisions taken.

PDH should be constructed in the existing villages whenever possible, but in case relocating the settlement is unavoidable some more selection criteria should be added to the existing ones. Current selection criteria for new locations, as has been mentioned above, are: low disaster risk, closeness to infrastructure facilities and government ownership. However, the preferences of the beneficiaries include, closeness to the old village, easy access, having acceptable weather conditions and suitability for animals, and can be added to the current selection criteria. Furthermore, team for site selection should be interdisciplinary. Architects and planners should be involved in the site selection teams in addition to the geologists.

Moreover, the life style of the users should be investigated carefully in order to be able to create new settlements and design houses which are close to their indigenous patterns. Loans should be provided not only for the houses but also for cattle sheds for people whose economy depends on animal rearing. This was done in some reconstruction projects in other regions of Turkey, but it was decided to provide loans only for housing in the villages of Çankırı. Furthermore, guidance must be given to the beneficiaries during the construction phase of the houses especially on how to hire a contractor.

Conclusions

Post-disaster reconstruction projects generally include partial or complete relocation of settlements especially in rural areas of Turkey. This attempt can be considered as a kind of rehabilitation in vulnerable areas, but most of the resettlement projects resulted in rejection of the new settlements in the country. Most people do not want to leave their places since they stick to their indigenous patterns especially in rural areas. When new settlements are refused by some of the beneficiaries, then the villages become separated. As people living in a village have common activities such as preparing food for winter, relationships with the relatives and neighbours in a village are very important in rural areas of Turkey. Separation of villages makes this relationship become weak or disappear.

It is a fact that creating new settlements needs money, time and effort. It is also vital to mention that providing only houses is not enough to create a settlement; there should be public spaces at least a mosque and a village room "*Koy Odası*" which is another common building that is used by the villagers, and is an essential part of the daily life of the male population in a village. There is also the need for a school and a health centre in a settlement. However, it is well known that providing these spaces needs money, which of course explains why post-disaster reconstruction projects involve only housing especially in rural areas.

Decisions on post-disaster reconstruction projects have to taken very carefully. Decisions on whether to relocate or rebuild in the same area; whether to provide loans for only housing or both housing and cattle sheds; type of designs of the houses *etc.* may lead to failure of the projects and this will cause waste of the money, time and effort spent on the projects.

References

Barakat, Sultan (2003). “Housing Reconstruction After Conflict and Disaster” *Humanitarian Practice Network Paper*, Publish-on-Demand Ltd London, No. 43.

Bayulke, Nejat (1983). “Lessons to be Learned from Relocation of Villages and Use of Prefabricated Houses in Post-disaster Housing in Turkey” *Proceedings of the Seminar on Socio-Architectural Aspects of Housing in Earthquake-Prone Areas of Turkey*, Ankara, the Scientific and Technical Research Council of Turkey Building Research Institute: pp 17-25.

Oliver-Smith, Anthony (1991). “Successes and Failures in Post-Disaster Resettlement” *Disasters*, Volume 15, Number 1, pp 12-19.

Tercan, Binali (2001). *Post Earthquake Relocation Process in Yalova,* Unpublished master’s thesis, METU, Ankara.

Acknowledgement

This study was supported by the State Planning Organization (DPT) Grant No: BAP-08-11-DPT-2002-K120510 for OYP Research Project.

A MODEL FOR POST-DISASTER RECONSTRUCTION: THE CASE STUDY IN DINAR, TURKEY

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Abstract

Post-disaster occupants may have different expectations from their post-disaster houses in relation with their living conditions, social and cultural structures formed in their previous urban or rural settlements. Therefore, the objective of this study is to introduce a reconstruction model on the "design" of the post-disaster houses in rural or urban areas that is appropriate for the user background, requirements and preferences. With the help of the case study in Dinar district, additionally Aktoprak and Gencali villages in Afyon, this research shows that appropriate design of post-disaster houses must be in accordance with occupants' changing needs and preferences appropriate to regional living conditions.

Keywords: Post-disaster houses, housing preference, residential satisfaction, design citeria and evaluation, reconstruction/design model.

Introduction

The residences, all living areas, buildings and human relations; in brief, the social and physical environment established by mankind are badly affected from natural disasters such as earthquakes, floods, tornados and others. For the sake of survival, human beings become helpless in overcoming the big loss when they go through in post-disaster period.

In order to re-organize the socio- economical life of survivors, the post-disaster period recovery actions should be identified in detail. The construction of post-disaster houses and settlement areas play important roles in these actions. However, post-disaster occupants may have different expectations from their post-disaster houses in relation to their living conditions, social and cultural structures that are required by their previous urban or rural settlements. Therefore, the objective of this study is to introduce a reconstruction model on the "design" of the post-disaster houses in rural or urban areas that is appropriate for the user background, requirements and preferences.

Old Settlement and the Permanent Post-Disaster Houses in Dinar

Dinar (population 35,000 in 1990) is in a sparsely populated rural agricultural city center in the "Lake District" of southwestern Anatolia, Turkey. Mostly farming, breeding animal and family poultry or governmental works are the profit sources of Dinar.

It was struck by an earthquake, its magnitude, 6.1 Richter Scale, in 1st October 1995. The damage that it created on habitat is; 1,228 houses were totally destroyed or heavily damaged, 990 houses were moderately damaged, and 1,558 received minor

Post-Disaster Reconstruction : Meeting Stakeholder Interests : Proceedings of a conference held at the Scuola di Sanità Militare, Florence, Italy 17-19 May 2006, edited by David Alexander, Colin Henry Davidson, Andrew Fox, Cassidy Johnson, Gonzalo Lizzaralde, ISBN 978-88-8453-611-2 (online), ISBN 978-88-8453-612-9 (print), © Firenze university press, 2007

damages and minimum of 90 men, women, and children died in their homes or in public buildings. Over 250 people injured. The (lodging / accommodation/ sheltering) problems can be accounted as striking results of the impact of this natural disaster more than its resembling ones in history.

Buildings in Dinar are one to five storeys (mostly are one or two storeys buildings). The first levels of multistorey buildings in the center of Dinar are usually occupied by commercial retail stores. Almost all the five-storeyed apartment buildings were destroyed or heavily damaged. These buildings, as with the buildings on the main streets, were built with reinforced concrete. But mostly, one or two storeyed buildings' were built by either solid or hollow brick walls as also seen in village settlements of Dinar.

Permanent post-disaster housing construction was finished one year after (in 29th October 1996) the earthquake disaster. In the center of the Dinar there are two types of post-disaster houses. First type has 4 storeys and 16 flats in total. 4 flats were planned in each storey of the building. Second type also has 4 storeys but has 4 shops in ground floor and 6 flats in upper floors totally. Every storey has only two flats.

Figure 1. Two types of post-disaster houses in center of Dinar .

Crowded families in the center of Dinar who get used to live in one or two storey buildings and have no experience of apartment life, start a new life in small apartment flats with new neighbors. The post-disaster houses don't have eligibility for daily usage. These apartment flats with two bedrooms have insufficient space for their social and cultural life style, not enough for large families, not flexible for constructing additional parts, cause serious problems and stress on survivors. Before the disaster, when they need, could easily add parts to their old houses, but the strict structural features of the post-disaster houses don't let them. Because of that most of the survivors built their new houses without controlled by local authority.

With the new urban master plans of Dinar, instead of narrow, disordered, spontaneously developed streets within one or two storeyed, solid or hollow brick walled buildings with large gardens; new gridal formed wide streets and four storeys buildings constructed by tunnel mould system with small gardens, were organized.

Post-disaster houses with shops were built on the main streets and new intercity motorway to make additional new city trade and shopping centres.

Figure 2. Old and new streets in Dinar City.

In villages of Dinar there is only one type of post-disaster house. It is one storey building with a detached storeroom in a small garden. Survivors, according to their needs, built additions and changed some part of their post-disaster houses which can make the structures of the houses weaker against to new earthquakes

Therefore, with the help of the case study held in Dinar district, additionally Aktoprak and Gencali villages in the countryside of Afyon, we might easily understand the user background, requirements and preferences for suitable design of the post-disaster houses in rural or urban areas.

Figure 3. Post-disaster houses in villages of Dinar.

Figure 4. Additional parts of post-disaster houses in villages of Dinar.

Method

The case study was done with the people living in villages of Dinar (Aktoprak Village and Gencali Village) and center of Dinar City with the method of individual face-to-face interviews and conducted among the selected sample of a total of 70 earthquake survivors. The sample group consists of 35 people living in center of Dinar City, and 35 people living in rural area of Dinar City.

The case study was applied in two steps. In first step with a "fill in questionnaire", in order to learn about socio-demographic structure (age, education, income, job, social development and standards, family structure, neighborhood relations, etc.) and about features of their old houses and the settlement before earthquake happened and thirdly getting responses and opinions about their permanent post-disaster houses.

Figure 5. Showing the house images.

In second step with the help of house images (one storey, two-three storeys and multi storey houses) asking questions to the survivors which are related with housing preference (strength, safe, eligibility and aesthetic view) and find out the answers of design criteria in new physical environment by using survivors perception and experiences.

According to answers of the survivors, data were inserted to variable tables. By using these variables; expectations, reactions and preferences of occupants about the post-disaster houses were compared to their socio-demographic background, disaster experience, perceptual changes, individual values, living habits and spatial occupancy durations. And by using chi-square test, correlations in variables ($p \leq 0.05$) were explored and meaning of the dispersals was evaluated.

Figure 6. Showing the house images.

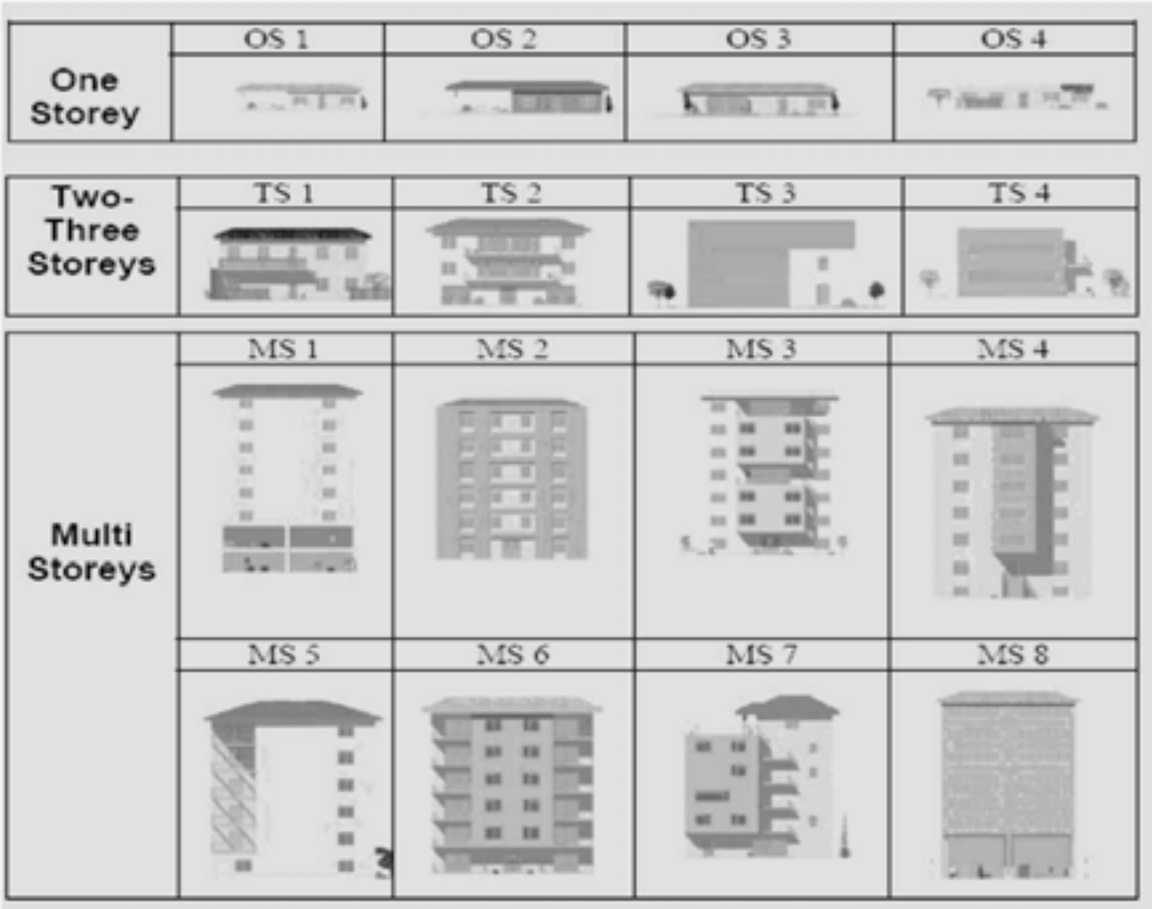

Figure 7. House images that were shown to survivors.

Results

In the context of case study, held in Dinar district, additionally Aktoprak and Gencali villages, these results were found in analysis of architectural design of post-disaster houses in rural or urban areas:-

- Need of garden, according to family structure: Differences were found in preferences of garden use according to occupant's economic responsibilities in family, need of semi-opened areas, number of person living together in one flat, age and living experience in other settlements. Because of that, according to the need of open areas and gardens in a disaster area, we have to decide the size and form of the garden(s) and also design different types of house plans with or without garden.

Living in an apartment, being citizen: In rural areas like Dinar, people use to live in one or two storeys buildings instead of multi-storey apartments. They were forced to live in an apartment building (four storeys post-disaster house) with many families who never know each other before. A new experience of living in an apartment life, make deep social problems. Because of that before starting to design we have to make a research about the height of the existing

- old buildings, social and cultural life style of the disaster area.
- Use of semi-opened space: The size, form and number of balconies or terraces that are needed in houses show differences, related to social and cultural life in

disaster areas. Because of that before starting to design we have to know about customs in use of semi-opened spaces in disaster area.

Figure 8. Need of semi-opened space.

- Feature of building elevation and aesthetical appearance: In design of the elevation, order of windows and balconies, proportions and structure give an aesthetical appearance to the building but also make survivors feel the strength and safe in their new houses.
- Building, garden and street relations: In rural and urban settlements, according to occupant's needs, we have to make different levels of relations (privacy, semi-privacy and public spaces) between building, garden and street.
- Flexible design: The post-disaster houses in Dinar have insufficient space for survivors' social and cultural life style, not enough room for large families. Because of that, to find out the number of space, which is needed by the occupants, we have to know about the family structure and search the average number of people living in a family. And also we have to design flexible spaces for new additions, which may not be harmful for structure against to new earthquakes.
- Density of occupants in houses: Different types of post-disaster house must be designed according to number of flats and density of people, which can be accepted by occupants.

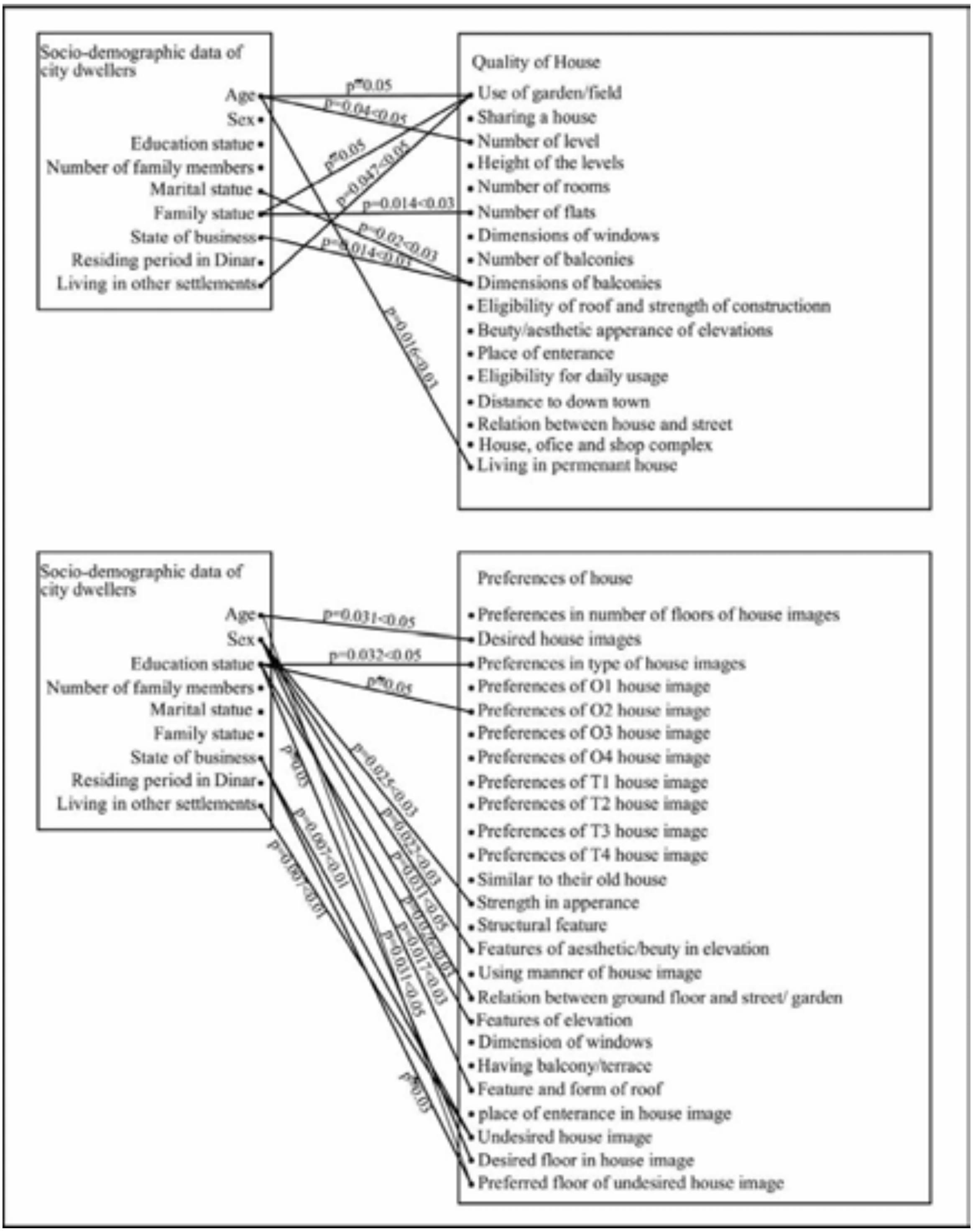

Figure 9. Correlations of city dwellers.

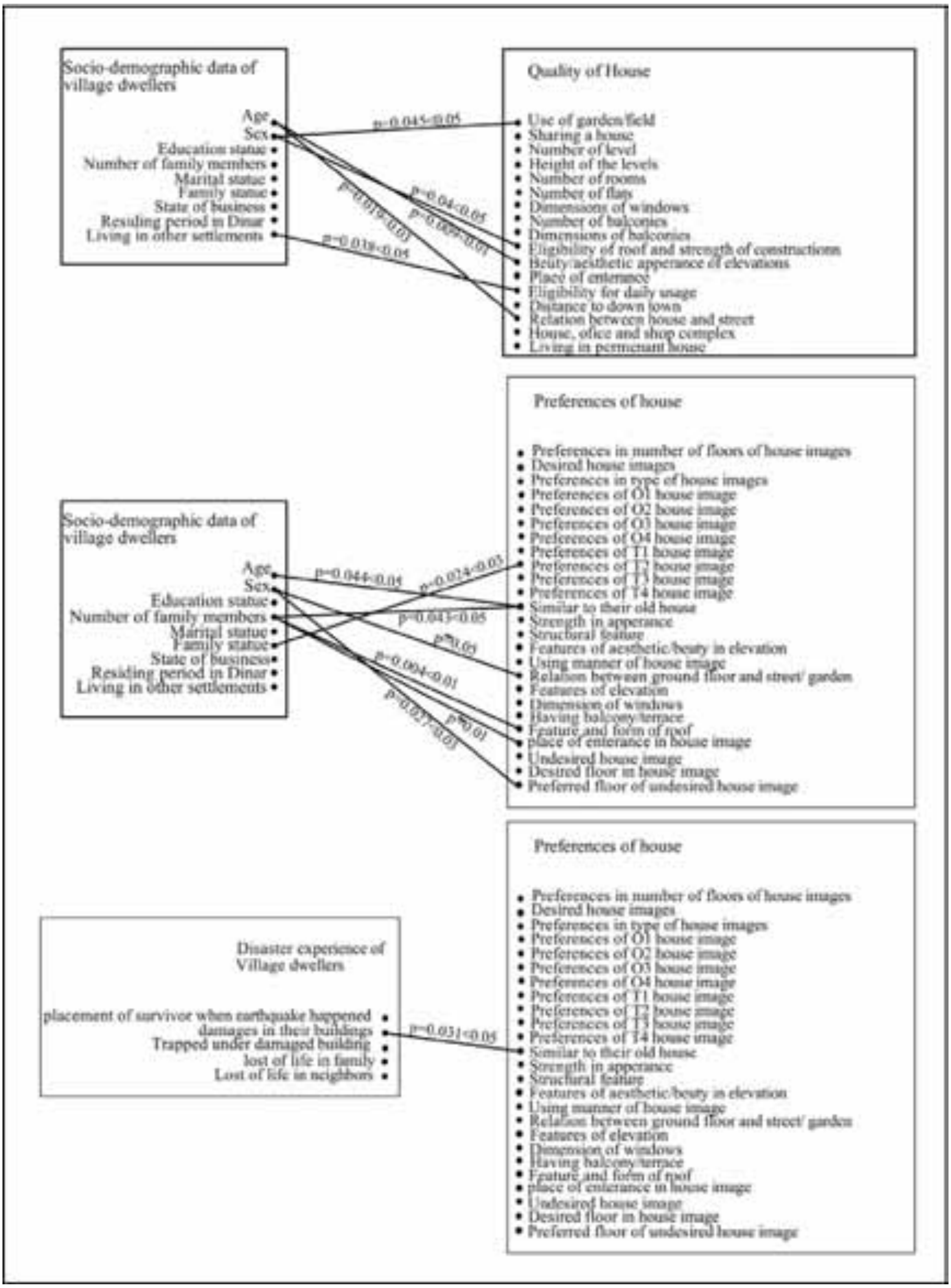

Figure 10. Correlation of village dwellers.

- Fear of earthquake: People in Dinar are afraid of four or more storeys post-disaster buildings, because they think that, when an earthquake starts, getting outside from these houses is impossible compared to one or two storeys buildings which seem better in rescuing and make them feel in safe.
- Depending on farming: In rural settlements, people make farming. They need additional parts for different functions such as bread house for making bread,

a stable, a poultry-house, a sheep-fold, larger storeroom, a garage for their tractor Because of that we have to make one or two storeys post-disaster house designs that can be developed horizontally.

The results of the case study showed us that, the design of post-disaster houses in accordance with occupants' changing needs and preferences that is appropriate to the regional living conditions, the issue of having no adaptation problem is mainly depended on serious design decisions.

Therefore, before starting to reconstruct the post-disaster settlements, we need a model in which data on demographical structure, cultural characteristics, disaster experience, spatial occupancy habits included and post-disaster house usage in general should be evaluated with a high rate of user participation.

A Model for Post-Disaster Reconstruction

Within the help of the case study, a model for post-disaster reconstruction is proposed, in which design input as knowledge and experience of each post-disaster house construction will be transferred to the next design and construction processes. This model consists of four stages: preparation, design, construction and post-occupancy evaluation.

- Preparation: In this preparation stage, governmental and non-governmental organizations make researches about socio-demographic variables, cultural attributes and manners, climatic variables, disaster experiences and the psychological problems that are seen in disaster area and also decide about new construction sites and distribution of the post-disaster houses to the survivors.
- Design: This design decisions stage consists of three parts: post-disaster house alternatives, user participation and design of post-disaster houses.

Post-disaster house alternatives. In this pre-design part, different plan and elevation alternatives are prepared according to the construction materials and working sources that are found in the disaster area.

User participation. Suitable design for post-disaster houses in accordance with occupants' changing needs and preferences that is appropriate to the regional living conditions is mainly depended on user participations. Because of that in this level designer use the images of post-disaster house alternatives to evaluate them with the survivors by face-to-face interviews. With the help of post-disaster house images and questionnaires, designer(s) learn about occupant's needs, residential satisfaction, housing preference, order of the spaces and stressors in the disaster area.

Design of post-disaster houses. With the help of the inputs from interviews and preperation level, post-disaster house designs are done.

- Construction. Within the scope of this construction stage, two different construction methods are proposed, which have both advantages and disadvantages compared to each other. The methods are chosen according to material and working sources in disaster areas and the participations of survivors. First proposed method is user own construction and the second one is conventional construction method.

User own construction. In this method, according to master plan (decisions about sites, roads, general settlement plans and types of post-disaster houses) users participate to the construction. Each survivor selects one of the suitable post-disaster house projects, then obtains the construction materials and starts to construct their house due to master plan with the help of controllers.

Advantages; constructions are under controlled so structure of the houses are strong against earthquakes. Because of survivors' own construction, no need for new additions, houses reflect their identity, having no adaptation problems, psycho-

logical and environmental stressors are decreased. Disadvantages; because of their first construction, teaching the construction details and knowledge takes time.
Conventional construction. In this method, a constructor does construction of the post-disaster houses. Survivors participate to the design stage, but not construction. Advantages; construction is done faster than other method. No risk, problems will be solved by constructor. Disadvantages; this method increases the costs, all buildings similar to each other (stereotypical) because of that adaptation problems and uncontrolled additions can be seen.

- Post-occupancy evaluation. In this stage, design guides that can be used in new design and construction stages, are introduced according to occupants' experiences of living in post-disaster houses. All variables such as order of opened; semi-opened and closed spaces, additions, residential satisfaction and housing preferences are composed into the design guides with the help of written and visual questionnaires. In each experience, design guides will be investigated and revised and after that it can be used as a reference for new design processes.

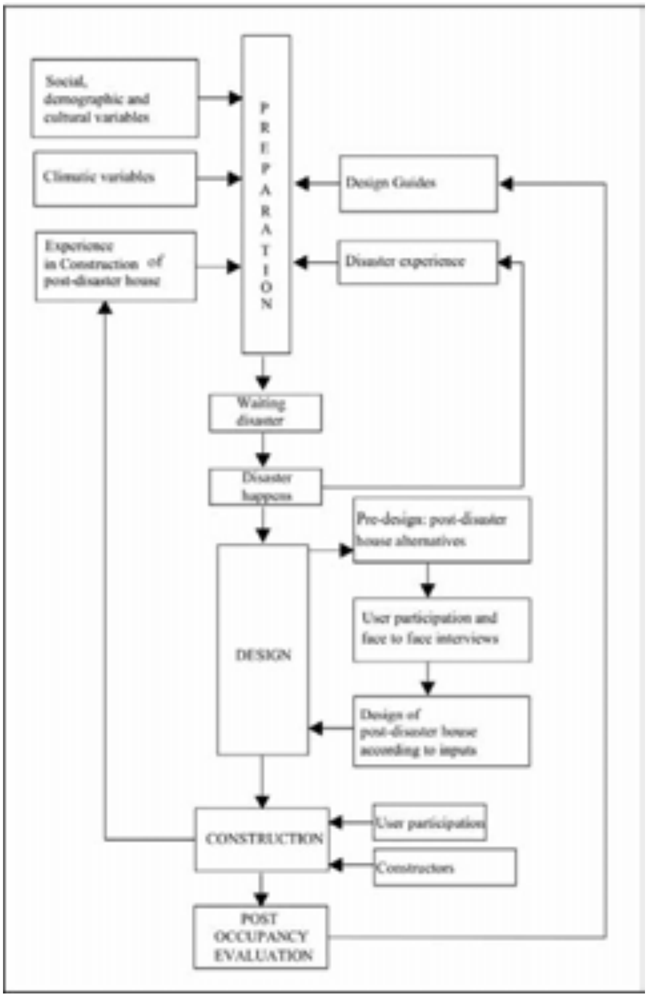

Figure 11. A model for post-disaster reconstruction.

Conclusion

The results, which are obtained from case study, show that almost complete damage of the physical environment, moreover disrupted social environment of the people who lived in this area, unpredicted amount of the property loss and the sudden change in their living conditions increase the pessimism in their lives, thus the increasing level of environmental stress has been tied to these conditions. And we can say that the effects of disasters can be decreased by a model on the “design” of the post-disaster houses in rural or urban areas that is appropriate for the user background, requirements and preferences.

So that in this paper, a post-disaster reconstruction model is proposed which helps us as a reference for arranging pre-design data, introducing design measurements, choosing construction methods and making design guides in design and construction processes. And also which is revised according to new inputs as knowledge and experience of each post-disaster house construction and transferred to the next design models.

References

Baum, A. (1992). “Symptoms of Chronic Stress following a Natural Disaster and Discovery of a Human-made Hazard”, *Environment and Behaviour*, Vol. 24, No 3 (May), pp. 347-365.

Enginoz, E.B. (2005). “Analysis of Architectural Design Process of Post-Disaster Houses in the Context of Occupants’ Needs”, *Ph D Thesis*, Technical University of Istanbul, Istanbul.

Lang, J. (1987). Creating Architectural Theory: The Role of the Behavioral Sciences in Environmental Design, New York, Van Nostrand Reinhold Co.

Moore, G.T. (1985). Environmental Design Research Directions, Praeger Special Studies, Praeger Publisher.

Rapoport, A. (1978). “Culture and the Subjective Effects of Stress”, *Urban Ecology*, No 3, pp.241-261.

Quarantelli, E.L. (1995). Patterns of Shelter and Housing in US Disaster: Disaster Prevention and Management, No 4-3, pp. 43-53.

POST-DISASTER SUSTAINABLE HOUSING SYSTEM IN TURKEY

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Abstract

Turkey experiences serious disasters due to its geological and topographical characteristics. The many damaged and collapsed buildings resulting from the disasters create a major housing problem needing urgent solutions. There are three stages in the current approach to post-disaster: the emergency relief stage, the rehabilitation stage and the reconstruction stage. However, there are no specific and decisive strategies for all these stages. This lack of strategies prevents Turkey from being prepared for the disasters. The present post-disaster housing approach cannot provide the needs of victims progressively, urgently, economically and ecologically. In the present approach, each of these is viewed as an isolated issue. Rather than a piecemeal approach, a view of the whole is needed. Therefore, this paper aims the following objectives:-

- *To take the problem with the method of systems approach before the disasters* in order to keep all serving disciplines, related components under control and to be ready against the post-disaster housing.
- *To get a solution equipped with sustainability principles* in order to solve the housing problems healthfully, ecologically, progressively, urgently, and economically.

We are proposing a new approach to solving the post-disaster housing problems that exist in Turkey, which we refer to as "post-disaster sustainable housing system."

Keywords: disaster, post-disaster housing, emergency relief stage, rehabilitation stage, reconstruction stage, sustainability, system, systems approach, post-disaster sustainable housing system.

Introduction

Turkey faces frequent disasters due to its geological and topographical characteristics. The most effective disasters in Turkey according to their severity rates are; earthquakes, landslides, floods, rocks fall, fires, avalanche, storm and rising of ground water, etc. The damaged building statistics in Turkey for the sixty years show that, 62% of the damaged buildings are caused by the earthquakes, 15 % by landslides, 12% by floods, 5% by rock falls, 4% by fires, 2% by storm, avalanches etc (Songür, 2000).

Natural disasters have extensive and violent effects, cause loss of life and property, substantial affect on the communal life. The huge number of damaged and collapsed buildings after the earthquakes creates a housing problem needing urgent attention. In Turkey, current approaches to post-disaster housing are taken in three stages:-

- Emergency Relief Stage (Tents, … …)
- Rehabilitation Stage (Temporary housing, ….)
- Reconstruction Stage (Permanent housing, .. …)

The emergency relief stage is the stage that provides emergency shelters to the homeless victims. The rehabilitation stage starts a few weeks after the disaster and continues until the permanent houses are completed. In this stage, the housing is solved by the temporary houses. The length of the rehabilitation stage is a consequence of providing the permanent housing and is never determined in advance.

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Due to the delay of the reconstruction stage, in some cases the rehabilitation stage may continue up to 30 years (Acerer, 1999). In such cases, the temporary houses undertake extemporary functions related with the usage style and period. The reconstruction stage develops after the rehabilitation stage and aims to provide proper permanent housing for the victims in a short period of time. The problems related to each of the three levels are displayed inTable1.

The problems given in Table 1 shows that the present post disaster housing approach can not provide the needs of the victims progressively, urgently, economically and it is also inadequate in using country's resources efficiently. Furthermore, it is understood that there are not any set strategies regarding the subject, it is always decided after the disaster which prevents the society from being ready against the disasters.

In this sense, this paper aims:-

- To develop a sustainable housing approach in order to solve the victims' housing problems in a more urgent, healthy and economical way which is ecologically correct and at the same time progressive.
- To take the post-disaster housing as a system with all related components in order to establish the decision steps before the disaster that the regions would follow at the time of disaster by putting its local data on the system and be prepared and ready against the disasters.

This type of research and disaster preparedness is very important for Turkey, who faces disasters periodically and frequently and experiences housing problems after every disaster.

In short, post-disaster housing problem in Turkey can only be solved by taking the problem as a system, applying this system to every region according to its local data before disaster, determining the activity steps needed to be done before disaster, at the time of disaster and post-disaster and developing a sustainable housing approach. Only then will Turkey be able to house the victims in healthy and comfortable environments in a progressive way with the productive usage of the country resources and finally to be ready against the disasters.

	Problems of the present post–disaster housing approach
Administrative legal problems	-The government is not ready against the disasters beforehand and has unsustainable policies in place. -Lack of organization / Not having sustainable organization structure
Land qualification and location problems	-Unscientific approaches are followed for the selection of the land and location decisions and the agricultural sustainability is not considered. -The local data is not taken into consideration during the settlement plans. -The present settlements are not analyzed. -Settlements are not designed to be added on the urban life and the social sustainability is not considered. -The ecological conditions are not taken into consideration during the location of the units.
Units' designapplication-usement problems	-The units are not suitable for the life style of the victims. -The units are not suitable for the regional and climatic conditions. -The emergency shelters and temporary houses are not sustainable, recyclable; therefore it is not sustainable in terms of users' health and comfort.
Substructure problems	Lighting, water, canalization, flood problems are caused by lack of basic substructure and the sustainability of the substructure is not considered.

Socio-psychological problems	-The victims are left alone at unhealthy conditions. -The social-cultural-economic life is not considered. -A model making the victims effective is not developed therefore it is seen that social sustainability is not considered.
Economic problems	-Applying international solutions -The cost of the transportation is high therefore it is seen that economical sustainability is not considered.
Being unsustainable/ not appropriate to be recycled	-Not having sustainable politics -Not having sustainable organization structure -Not being sustainable in terms of users' health and comfort -Not having sustainable substructure plans. -Not having thought social sustainability. -Not having thought economical sustainability. -Effecting the agricultural sustainability negatively

Table 1. Problems of the present post–disaster housing approach .

Post-Disaster Sustainable Housing System

Why system approach is needed to solve the post-disaster housing? The present post-disaster housing approach is not responding properly to the interrelated problems of speed, time, economy and no response or under-response. Whenever one type of the problem is taken in hand singularly, it's seen the other problems' severity increase (Ehrenkrantz, 1989). The many related components of post-disaster housing need to be analyzed as a whole. The development of systems approach has made it possible to take all the components of a system into consideration, understand their relationships, perceive alternative solution and foresee their impact and make adjustments when needed through constantly checking results.

Thus, each system is a coherent and indivisible whole that can be distinguished from its surroundings. Moreover this whole is organized since it reflects the dynamic and reciprocal interactions of its various components, and any change in one element will necessarily change others and consequently the entire system. A system cannot be reduced to the sum of its parts, since the latter do not have the same significance when studied in isolation as when seen as contributing to the whole. If we look at each component separately, therefore, we might miss the factors that constitute the system as such. As a result system approach is determined appropriate to be used as a tool to solve this problem.

Why should post-disaster housing have sustainability criteria? The need of energy and housing always increases in the world according to the speed of the population increase. Throughout the industrializing and technologically developing world, response to these needs exhausts limited resources. The contribution of the houses in this exhaustion is undeniably high. All the activities of the buildings like service, communication etc. exhaust the %75 of the energy resources of the world (Ayaz, 2002). As the limited natural resources exhaust rapidly, the possibility of facing an environmental harm increases. Thus building construction acts an effective role on these facts; therefore the sustainability criterions should be taken into consideration during planning new post-disaster settlements.

The preservation and developing of the resources are at the base of the sustainability and sustainable development. The assessment of the resources bytheir continuous preservation, especially the defense of the renewable resourceswithout going beyond their renewal limits to the development form the base of the development philosophy preserving the environment (Oktay, 2002).

Sustainability principles are as follows (Ayaz, 2002, Ministry of the Environment,2002);

- Developing strategy and overall plan.
- Preservation of the basic ecological processes.

- Developing growth models that let the productivity spread to long terms and reach to the future generations.
- Establishing balance between economical growth and natural resources.
- Providing balance between international fair and possibility.

Besides, a set of properties are expected from the new post-disaster housing approach with the present properties. These are:-

- To be ready against the disasters beforetime and to develop strategies.
- To be ecological and not give harm to the environment.
- To be sustainable and reusable.
- To be productive at time and speed.
- To provide the economical sustainability and preserve the natural resources.
- To provide the social sustainability.
- To provide the agricultural sustainability.
- To provide sustainability at the substructure.
- To respond to the needs and life style of the victims progressively, to be appropriate to the health and comfort conditions.

If the properties expected from the new approach are compared with the sustainability principles, the need of reflecting the sustainability principles to the new post-disaster housing approach emerges. In this sense; it is suitable to name the new approach which is taken in hand with the method of systems approach through sustainability principles as a "post-disaster sustainable housing system".

Principles of the Post-Disaster Sustainable Housing System

Principles of the "post-disaster sustainable housing system" can be listed as below.

- To encourage the sustainable post-disaster human settlements.
- To take the sustainable organization of the substructure into consideration.
- To be suitable to the ecological conditions.
  - Respect to the nature, preservation of the environment, well-matched design with the nature.
  - Preservation of the energy and insufficient resources.
  - To give place to the use of the renewable resources like solar and wind. While planning the settlements, positioning and forming the buildings; well-matched designs with the nature and regional data, also designs that are preserving the ecological processes should be preferred. Slope, direction of the dominant wind and solar energy should be productively used.
  - To design according to the productive usage of water, to select the building materials through this aim to evaluate rain water and other wasted waters.
  - To select building products with less environmental harm or harmless.
  - Preservation and augmentation of the green area for the rehabilitation of the micro-climax.
- To be suitable to the user's health and comfort / to respond the needs and life style of the victims progressively.
- To be suitable to the feasibility conditions / to provide economical sustainability.

Selection of the suitable building product is an important criterion in sustainable buildings. In order to be economic, the building materials should have long effectiveness life and their maintenance and repair costs should be low. Besides, usage of local and regional building materials is also important in economic point of view.

- To provide productivity at time and speed.
- To provide administrative sustainability.

- To provide agricultural sustainability. (To avoid causing harm to the prime agricultural lands. To prepare settlement master plans preserving the ecological processes, starting from the regional scale, depending on scientific criteria of land selection and thinking about regional population).
- To provide social sustainability and develop social services.

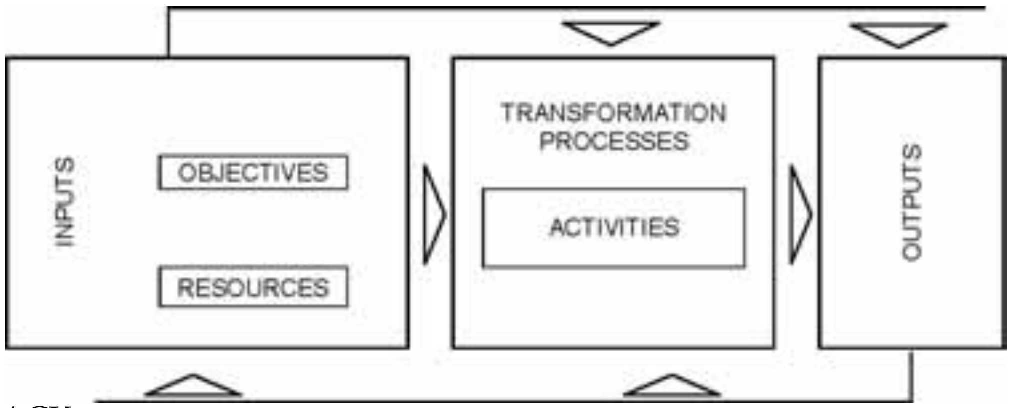
Conceptual Model of the Post- Disaster Sustainable Housing System

Accepting sustainable post-disaster housing as a system and trying to solve the case with the systems approach; oblige the case to be handled through the system components given below.

- Facts directing the process in the system, "Objectives of the System"
- Facts feeding the system, "Resources of the System"
- The possible courses to reach the objectives, "Activities of the System"
- The results given by processes of the system, "Outputs of the System"

After determining the components of the system, the system should be described by a conceptual approach. Conceptual approach requires a presentation that perceives the system visually. This presentation materializes by "forming a model". Figure1 shows the "System's Conceptual Model" formed by the arrangement of the system's components (Balanlı and Öztürk, 1997).

DEPENDENCE



FEEDBACK

Figure 1. Conceptual model of the system (Balanlı and Öztürk, 1997).

The components of the "post-disaster sustainable housing system" can be defined as below.

- Objectives of the "post-disaster sustainable housing system" determine the goals that are aimed to be achieved in return for the solution of the housing problem by providing the victims necessities economically, urgently, progressively with productive usage of the country's resources,
- Resources of the "post-disaster sustainable housing system" include all the facts needed in order to develop the solutions regarding post-disaster housing,
- Activities of the "post-disaster sustainable housing system" include the activities and all the activity stages that took place while developing the aimed progressive post-disaster housing,
- Outputs of the "post-disaster sustainable housing system" show the reached situation according to the determined objectives with the help of the resources and activities.

Various facts, relations and processes take place in the components of the "post-disaster sustainable housing system". Also these components form a new system by coming together and this give each component a property of being a system namely subsystem of the "post-disaster sustainable housing system". According to the hierarchic structure of the system, whole post-disaster sustainable housing system have sub-systems, processes, sub-processes, programs and operation stages (Figure 2).

SYSTEM
SUBSYSTEMS
PROCESSES
SUBPROCESSES
PROGRAM & OPERATION

Figure 2. Hierarchic structure of the system (Hice, 1978).

Objectives Sub-Systems of the Post-Disaster Sustainable Housing System

To solve the victims' housing needs in a systematic, practice, urgently, economic way with the progressive usage of the country's resources form the whole objectives sub-systems.

So as to reach the objectives, determination of the mid-objectives according to the period is needed and to be successful in the mid-objectives the organization of the processes is needed. As an example, specific outputs at specific stages of post-disaster sustainable housing system should be examined rather responding the user's needs or not and then the standards should be fixed according to the expectations and outputs should be manufactured through these standards.

Mid-objectives can be described as follows: -To respond the necessary number of houses according to the stage -To be suitable to the victims' early needs and progressively to the activities according to their socio-cultural conditions -To provide the allowable cost.

As the main objective, is to provide the victims' progressive houses by using the country's resources productively, it will be useful to determine the human groups acting a role in the formation of the house.

- Users (victims)
- Designers
- Constructors
- Manufacturers
- Supervisors

The objectives of the determined human groups regarding progressive housing units form the objectives sub-systems of the "post-disaster sustainable housing system".

Objectives sub-systems of the "post-disaster sustainable housing system"

- Design Objectives
    - Architectural Design Objectives
    - Engineering Design Objectives
    - Design Objectives in Manufacturing Products
- Construction Objectives
- Objectives of Manufacturing Products
- Supervising Objectives
- Usage Objectives

Resources of Sub-Systems of the Post-Disaster Sustainable Housing System

The objects, facts, knowledge that are transformed according to the production laws and used in order to provide housing units and settlements progressively according to the system form the resources sub-systems of the system.

- Natural Resources
  Land
  Natural building products
  Water
  Solar energy

- Manufactured Resources
  Materials
  Tools
  Energy

- Work power
  Designer
  Constructors
  Manufacturers
  Supervisors
  Users

- Financial Resources
  Disaster Funds

- Information Resources
  Science
  Consents
  Experience
  Evaluation

- Housing

Activities of Sub-Systems of the Post-Disaster Sustainable Housing System

The activity steps that are needed to solve the housing problem progressively, to provide the health and comfort conditions of the victims that the stage assures and besides use of the country's resources productively to provide sustainability are determined below.

- Stage of Sustainable Emergency Relief
- Stage of Sustainable Rehabilitation
- Stage of Transforming of the Units into Permanent Houses

Outputs of Sub-Systems of the Post-Disaster Sustainable Housing System

The output of the "post-disaster sustainable housing system" is the situation reached at the end of the activities determined through the objectives and formed with the help of the resources. The conceptual model of the "post-disaster sustainable housing system" is given in Table 2.

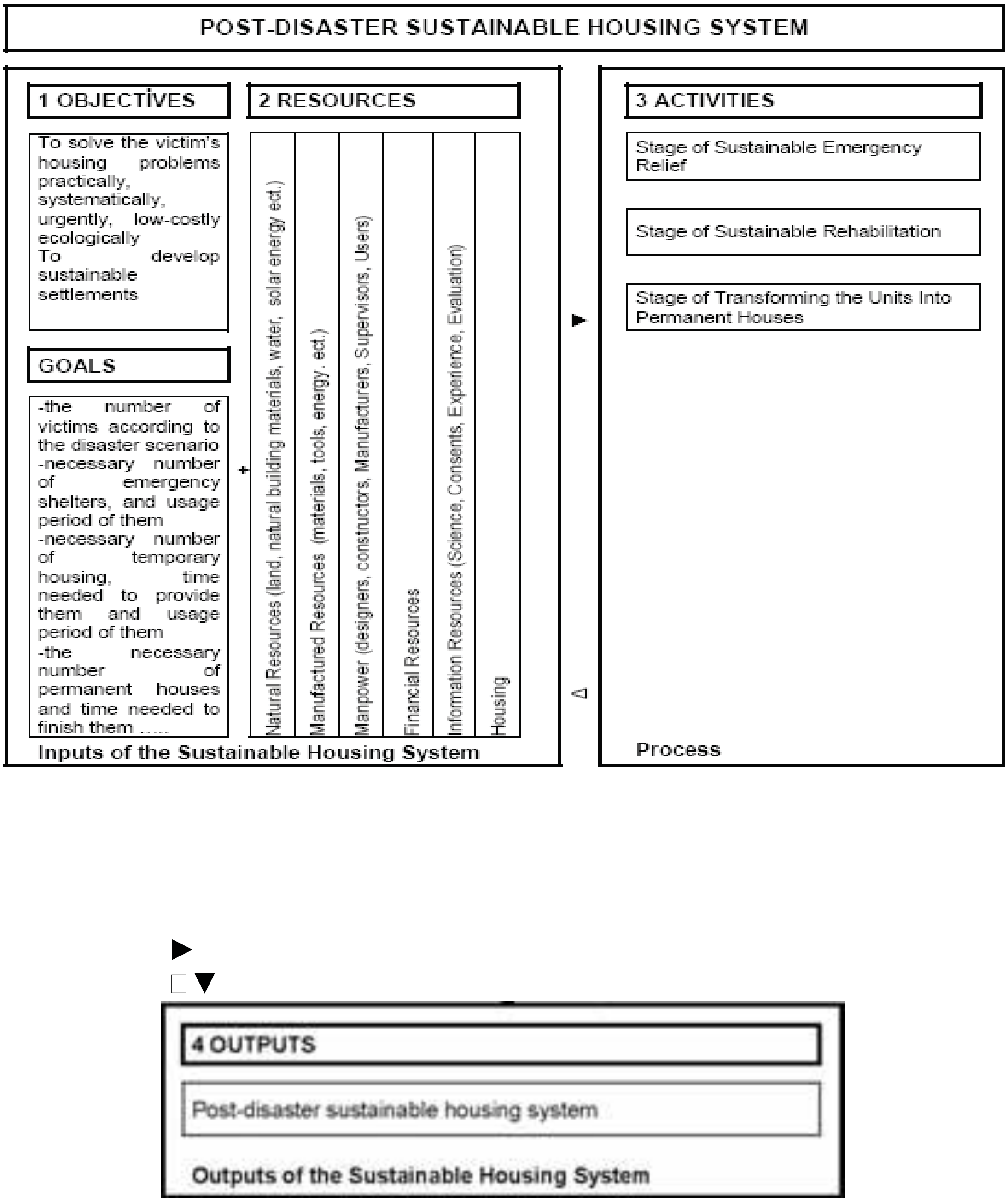


Table 2. The conceptual model of "post-disaster sustainable housing system".

Conclusions

As a result of having the advantage of being aware of the successful and unsuccessful sides of the present approach, the new approach established and named as "post-disaster sustainable housing system" should be seen as a guide that can be followed by all the regions of Turkey. The system should be applied on all the regions by the government according to their local data and the decision steps regarding before-disaster, at the time of disaster and post-disaster should be determined.

The decision steps needed; to solve the post-disaster housing, to be prepared against the disaster beforehand, to develop an urgent, economic, sustainable approach can be summarized orderly as given below.

- To take the problem/subject as a system.

- As a result of the comparison between problems / needed qualifications of the present approach and sustainability principles determined by the commission of World Environment and Development; to comprehend that the system should include or to be established on the sustainability principles.
- Afterwards, to name the new system as "post-disaster sustainable housing system", to develop comprehensively, to form the components of the system; objectives, resources, activities, outputs.

As the objectives of the system, is to give the victims progressively developed houses, to determine the activity stages of the system as follows:

- Stage of Sustainable Emergency Relief
- Stage of Sustainable Rehabilitation
- Stage of Transforming of the Units into Permanent Houses

The three stages under the activities sub-systems of the "post-disaster sustainable housing system" should be also taken as a system and solved by the method of system approach comprehensively. The objectives, resources, activities and outputs subsystems of each stage should be developed and formed.

As the post-disaster sustainable housing system is an inter-discipliner subject, the organization structure that will work on this system should include the professionals of all related disciplines like architecture, city planning, geophysics, sociology, environmental psychology, civil engineering, ecology, economy-management and law.

In short; by taking this type of approach in hand at the base of all the regions, it seems; the post-disaster housing will be solved through the environmental and climatic conditions of the region, urgently, economically, progressively within the productive use of the country's resources.

References

Acerer, S. (1999). Afet Konutları Sorunu ve Deprem Örneğinde İncelenmesi,Unpublished Master's Thesis, Istanbul Technical University, Institute of Science.

Ayaz, E. (2002). Yapılarda Sürdürülebilirlik Kriterlerinin Uygulanabilirliği,Unpublished Master's Thesis, Istanbul Technical University, Institute of Science.

Balanlı, A. and Öztürk, A. (1997). "A Systematic Approach to Solve Building Biology Related Problems', Healthy Buildings/IAQ Congress, September 27-October 2, 1997, Washington.

Comerio, M. (1998). Disaster Hits Home New Policy for Urban Housing Recovery, University of California Press, London.

Ministry of the Environment (2002). "Sürdürülebilir Kalkınma İçin 2002 Dünya Zirvesi'ne Doğru", News Bulletin of National Environment and DevelopmentProgram, 1: 34-38.

Ehrenkrantz, E. D. (1989). Architectural Systems: Aneeds, Resources and DesignApproach, McGraw-Hill Publishing Company, USA.

Hice,G.F., Turner, W.S., Cashwell,L.F. (1978). System Development Methodology,Revised Edition, North-Holland Publishing Company, Netherlands.

Levitt, M. A. (1997). Disaster Planning and Recovery, John Wiley & Sons Inc,Canada.

Limoncu, S. (2004). Türkiye'de Afet Sonrası Sürdürülebilir Barınma Sistemi Yaklaşımı, Unpublished Ph.D Thesis, Yildiz Technical University, Institute of Science.

Oktay, D. (2002). "Sürdürülebilirlik Bağlamında Planlama ve Tasarım", Mimar-ist, 6:67-71.

Songür, D. (2000). Afet Sonrası Barınakların ve Geçici Konutların Analizi veDeğerlendirilmesi, Unpublished Master's Thesis, Istanbul Technical University,Institute of Science.

UNDRO (1982). "Shelter after Disaster", Guidelines for Assistance, Office of the United Nations Disaster Relief Co-ordinator, Geneva.

THE DILEMMA OF WELL-MEANING HELP THAT COSTS TOO MUCH

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Abstract

In the immediate aftermath of a natural disaster in developing countries, when the media furnish images of horror and suffering, purse strings are loosened and donations accumulate from within the richer countries. Governments also donate, often matching the private gifts and facilitating access to resources available in their home countries. However, evidence is now emerging that this approach is an irrational use of resources. Instead of exporting items of high added value (incorporating work paid for with donor countries' high salaries), support should be given to distributed and coordinated initiatives spread among unaffected and/or neighbouring regions in developing countries with their lower built-in costs. But this is easier said than done; even if the question of the higher costs can be solved in this way, other problems arise such as finding out how to organize the provision of goods and services, how to overcome regional rivalries, what methods can ensure that funding provided to the potentially cooperating countries is really used for its intended purpose, and, finally, how the donors can obtain due recognition for their gifts. This issue may be seen to partially overlap with the socio-technical issue of whether reconstruction should be "grass roots"(i.e. locally nurtured), or "top down" (i.e. imported). This paper attempts to look at the specific problem of relative costs and the possible consequences of developing novel routes from donors to beneficiaries. Strategic procurement options coupled to "politically correct" organizational design are implicated, viewed in terms of optimizing the use of global resources.

Keywords: developing countries; donations; natural disasters; optimization; use of resources,

Introduction

Our paper comments on some unexpected consequences of the offer of help proposed by a developed country, after a disaster (natural or man-made) hits a developing country, where vulnerabilities are usually highest. We sketch out the problem that we have identified and then we suggest some measures that may enable it – not so much be solved but rather: avoided. We admit that much of what we present is 'common knowledge' – of the sort that can be described by the "of course; everybody knows that" statements; however, we believe that it merits being placed on the table for discussion.

We situate this problem in the particular characteristics of the so-called "global village" of today, dominated as it is by instantaneous broadcasting of audio and audiovisual information. The media in the developed countries (the putative donor countries) rapidly seize on a catastrophe, particularly if it hits a developing country, and broadcast the inevitably horrendous images worldwide. Whether the disaster is instantaneous (e.g. an earthquake or mud slide) or gradual (e.g. drought), the images of distress are similar and the visceral response, naturally, is for the 'haves' to provide assistance to the 'have-nots'. As was witnessed in the Tsunami response, there appears to be international pressure for governments to donate money for the immediate assistance and reconstruction cause. There are consequences of international embarrassment if a country does not give adequately compared to its economic capacity. This outpouring of response is, unfortunately, short-lived and stops as soon as the 'next' disaster is presented with its calls for compassion and more help. What concerns us here is not so

Post-Disaster Reconstruction : Meeting Stakeholder Interests : Proceedings of a conference held at the Scuola di Sanità Militare, Florence, Italy 17-19 May 2006, edited by David Alexander, Colin Henry Davidson, Andrew Fox, Cassidy Johnson, Gonzalo Lizzaralde, ISBN 978-88-8453-611-2 (online), ISBN 978-88-8453-612-9 (print), © Firenze university press, 2007

much the international social pressure for giving not the short-lived nature of the donors' response, but rather the follow-up to each response is not always well planned for.

The Sequence of Events

It is well known that when a disaster occurs, the survivors need help in sequence – wherever it comes from – and that they need this help in a sequence of very tight time frames. Water, basic food and medical supplies are needed first, within hours or a couple of days; shelter must follow, almost at once, and must be able to last as long as it takes to set in motion the production of housing – temporary or permanent – that is to say for several months or even years (for more, see, for example, Quarantelli, 1995).

The problem that we are concerned with is not at that level. The army, the local Red Cross/Red Crescent societies are well equipped to cope; they usually know the affected region well and can access stocks of essential supplies (water, food and shelter). Also, they are used to coping with situations of virtual chaos and are able to plan for organized action in the most difficult circumstances.

However, their action has to be supported by resources, typically materials and money; the question then shifts to knowing where these resources come from and seeing what restrictions are placed on their use.

The Problem

There is a familiar scenario in which the donor countries respond by offering both tax dollars from the government and using the funds raised through the generosity of their citizens to acquire, at home, the esteemed-to-be-necessary supplies, such as shelter, water treatment facilities, field hospitals and the like. These items all have built into them (i) the production costs found in those donor countries (high wages, write-off of capital investments in production equipment etc.) plus (ii) the costs of intercontinental transport.

The question we ask, then, is: why do the supplies in question have to come from the donor countries? Or: do they in fact originate in the donor countries or do they come from somewhere else, simply transiting through them, undergoing a silent mark-up?

Davis (1978) and UNDRO (1982) identified the problem of high costs in the context of post-disaster temporary housing, calling for the use of local materials and solutions that would be more cost efficient, culturally appropriate and quick-on-delivery, rather than costly imported technology such as prefabricated units.

We are well aware that many countries located near the disaster-affected region (most likely other developing countries) have resources that, in theory, can be tapped into in the search for the necessary supplies, and there is every reason to believe that these resources are not overloaded with front end costs.

We know, for example, that tents made in a developed country probably cost (FOB - Free on board, to which transport costs have to be added) ten times as much as similar tents made in a developing country, which possesses a good textile infrastructure and the capacity to make lightweight tubes (M. Ball, Weatherhaven Resources Canada, personal communication).

After the 2005 earthquake in Pakistan, NGOs were looking to purchase Canadian winterized tents for distribution to surviving families; however the costs of a tent in Canada were a quantum higher than those locally available in India and Pakistan, making it economically infeasible. We also know, for example, that high-tech purified water distributed by Canada's Disaster Assistance Response Team (DART) in Pakistan cost a few dollars per litre whereas locally-bottled drinking water costs only a few cents.

Purchasing/Procurement (see Figure 1, next page)

Certainly in the immediate disaster relief phase when tents, medical services and drinking water are crucial to save lives, the quick supply of these items is of paramount importance. However, this does not mean that the only speedy solution is to bring in costly supplies coming from developed countries (i.e. water purification from Canada's DART) just because they are prepared for deployment, when actually it could be possible to supply the same goods for a fraction of the price using local networks. The key to timely local supply, however, is up-front planning.

The need for up-front planning is also vital in the not-so-absolutely-urgent reconstruction stage (i.e. after the relief stage). In this situation there is still a need for speed; there is also an even higher degree of complexity at many levels, due to cultural differences, different scales of economic value, different plausible techniques and, above all, a large number of organizations, all anxious to intervene – altruistically or not.

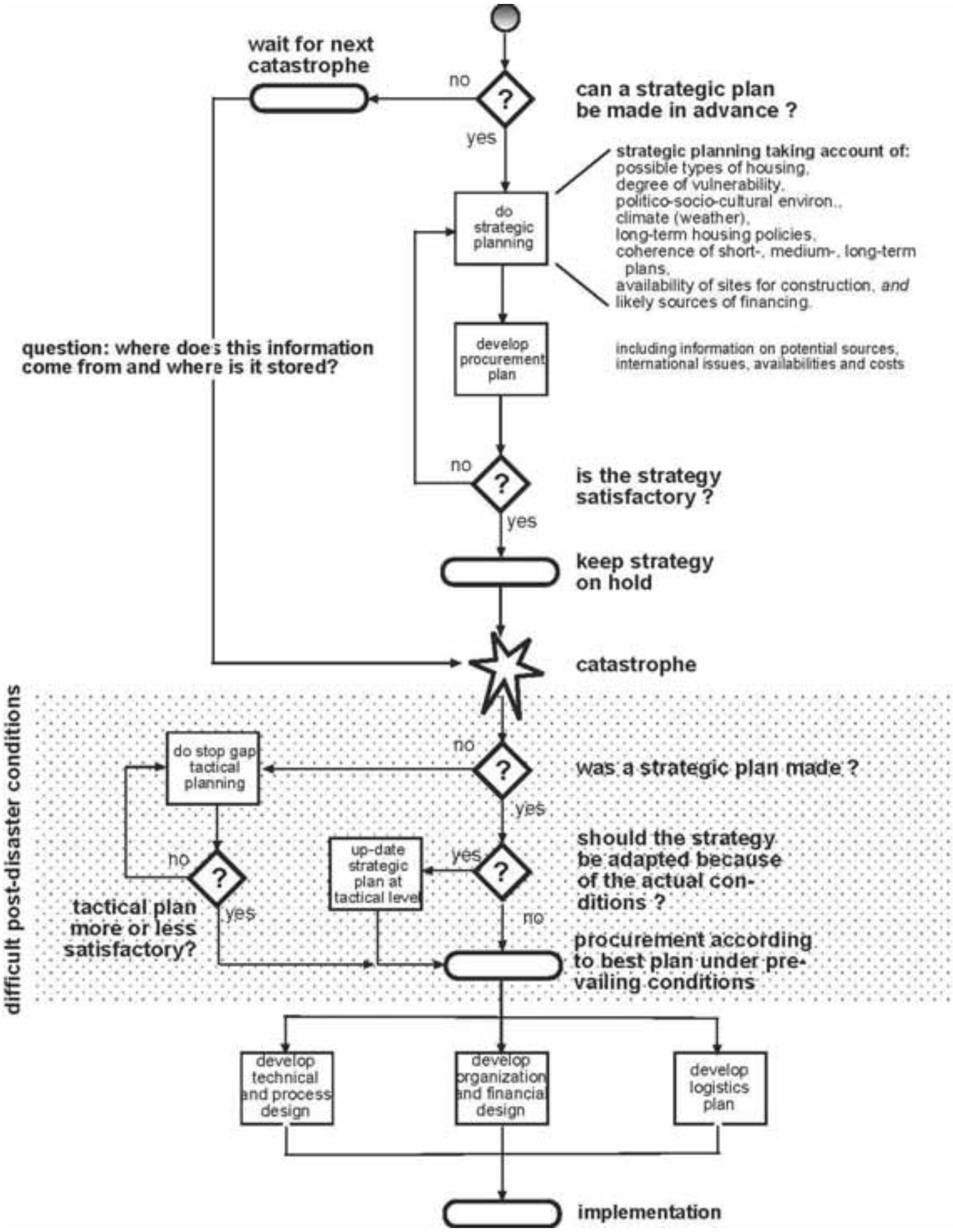

Figure 1. Strategic planning and post-disaster reconstruction – the place for international resources information related to economical procurement. (Source: adapted from Johnson *et al*, 2005).

Both relief efforts and reconstruction efforts require careful up-front planning, as we have stated; we refer to this as 'organizational design', by which we mean that the participating organizations (government agencies from the donor and the receiving countries, local and international NGOs, the beneficiaries and their own social structures, plus the many professional and technical enterprises that will carry out much of the as-yet-unplanned-for work) have to be designed into an efficient 'machine'. Tasks have to be identified in advance, responsibilities allocated, sequences of interventions worked out and all this coordinated with cash flow, that is to say, short and medium term financing. This organizational design does not occur in some abstract environment, but rather somewhere real, where despite the immediate disaster, traditions and customs strictly constrain the realities of 'how-things-are done' there.

Organizational Design

Organizational design (which should be seen in parallel with, but also in close liaison with technical design and logistics planning) involves proposing and representing (through appropriate schemata or models) how the various categories of organizations that are required for the reconstruction project will be interrelated, regardless of who will place the actual contracts engaging them. Organizational design differs, therefore, from procurement, which by its nature involves arrangements (contracts, understandings and the like) emanating from the main purchasing body (for more on procurement, see Davidson and Abdel Meguid, 1997; Davidson, 1998).

This up-front organizational design is, as we have just explained, an *extension* of procurement or the set of strategic purchasing decisions that are usually made by a single building owner – public *or* private.

We have to look at how (and when) this complex network of organizations, which become involved in each post-disaster recovery *process* is established. We emphasize the need for a systems approach to what we prefer to call "organizational design", rather than procurement - with its more limited connotations. Indeed, no conventional procurement process is possible; there is no clear contracting client, the beneficiaries (those who have survived the disaster) have few resources and probably no "voice" in decision-making, and resources (mainly from donor organizations) have to be shared among several options – within strict auditing controls. (Johnson *et al.*, 2005).

Sources of Information About Sources of Materials and Equipment

As we suggested at the beginning of this paper, there are plausible economic reasons for acquiring materials and equipment in countries located reasonably near the disaster site. However, this implies that information about where such and such a material or equipment is available or whether may be adequate and reliable production capacity. The question (as shown in Figure 1) is: how can this information be collected? How can its very existence be made familiar to post-emergency decision-makers? And how can it be retrieved?

An important clue, which, indirectly, suggests answers to these questions, can be found when one considers the whole question of positive feedback – i.e. learning from experience and applying this experience to subsequent projects.

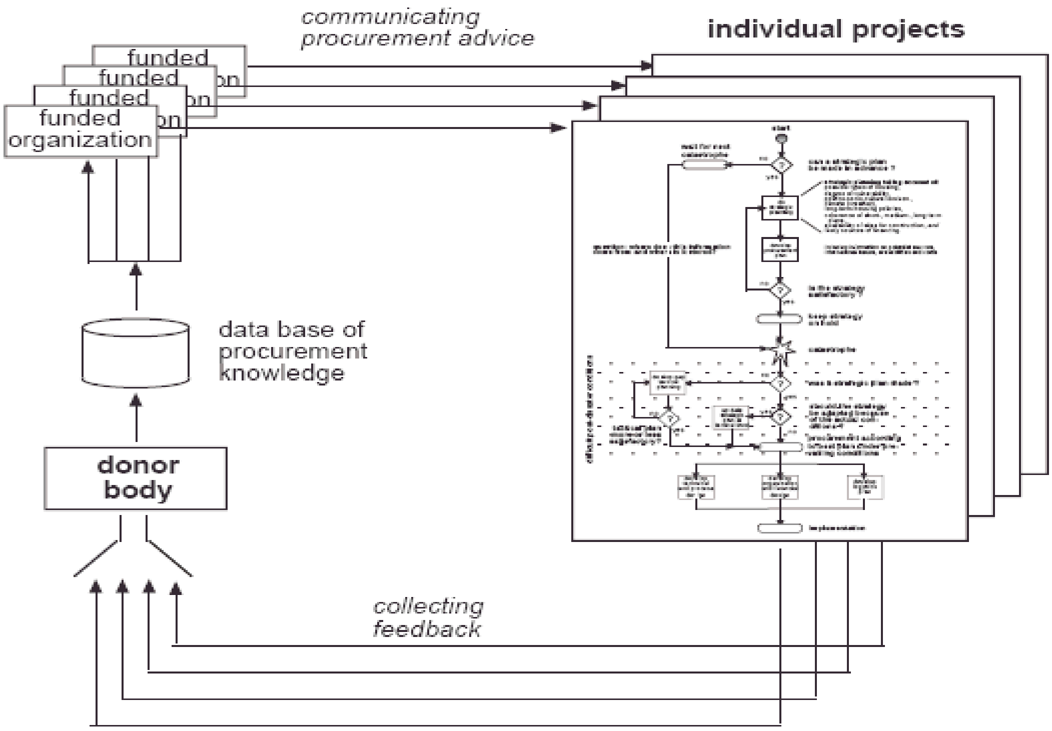

Figure 2. Collection and processing of feedback information.

One of the characteristics of all *construction* projects (and reconstruction is no exception) is that they are carried out by a heterogeneous group of participants (a multi-organization, euphemistically called "the project team"), brought together for a single project and probably not for any more (Davidson, 1988). This means that despite the continuity of its individual participating organizations, it is extremely unlikely that they will ever work together on a subsequent project. Consequently, the experience they each accumulate will probably not be applicable to the later projects they are involved with, because of the different roles and relationships they each encounter within the new multi-organizations. Thus, the experience acquired the hard way by the so-called team cannot be reapplied, since the team no longer exists as such the end of the project, and indeed there is no "learning period".

However, in the specific case of reconstruction projects, major funding bodies (such as the World Bank) do intervene in an extended series of projects, placing them in a good position to collect the learned experience, to process it and to make it available for following projects - its use could even be made a condition of subsequent funding (see Figure 2, previous page).

We have suggested this role for funding agencies elsewhere (Lizarralde *edt al*, 2004); here we add safeguarding the procurement-related dimension; we propose that a database be set up for stocking the kind of supply information needed for continuously using economical procurement strategies.

References

Davidson, Prof. Colin H, (ed.). (1998). *Procurement – the way forward/La maîtrise d'ouvrage de demain*, Montreal, IF research Corporation and Rotterdam, CIB, xvi+94 pp.

Davidson, Prof. Colin H., and Dr. Tarek Abdel Meguid, (eds). (1997). *Procurement – a key to innovation/La maîtrise d'ouvrage – clé de l'innovation* Montreal, IF research Corporation and Rotterdam, CIB, xxii+850 pp.

Post-Disaster Reconstruction

Davidson, Colin H. (1988). "Building Team", *in*: Wilkes, Joseph A., and Robert T. Packard (eds.), *Encyclopedia of Architecture: Design, Engineering & Construction*, New York, John Wiley & Sons, pp. 509-515.

Davis, Ian. *Shelter after disaster.* Oxford: Oxford Polytechnic Press, 1978.

Johnson, Cassidy, Gonzalo Lizarralde and Colin H. Davidson (2005). "Reconstruction in developing countries – a case for meta-procurement", *The impact of cultural differences and systems on construction procurement*, Proceedings, CIB W92/TG23/W107 International Symposium on Procurement Systems, Las Vegas, NV. 8-10 February 2005.

Lizarralde, G., C. Johnson, and C. Davidson. (2004). "Learning-oriented evaluation of reconstruction projects." *Planning for Reconstruction,*Proceedings, 2nd International i-Rec Conference on Post-disaster Reconstruction, Coventry University, United Kingdom, 22-23 April 2004.

Quarantelli, E.L. (1995). "Patterns of shelter and housing in US disasters." *Disaster Prevention and Management* 4[4], 43-53.

UNDRO. *Shelter after disaster: Guidelines for assistance*. New York: UNDRO, 1982.

DEVELOPING A MODEL FOR COMMUNITY INVOLVEMENT IN POST-DISASTER HOUSING PROGRAMMES

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Abstract

The problems related to post-disaster housing process have been continuing for years in Turkey and the victims of the disasters have been complaining about these problems. The diverse problems can be categorized such as design problems, construction problems, environmental problems, socio-cultural problems, etc. Community involvement in housing recovery process after disasters is seen as one of the major problems. In this study, the post-disaster housing process or housing recovery process in Turkey is examined very briefly under the illumination of two examples, a rural post-disaster housing settlement of Senirkent (constructed after 1995 Senirkent flood disaster) and an urban post-disaster housing settlement of İkitelli (constructed after the Marmara Earthquake of 1999). The households have been complaining about the housing recovery process and the complaints are seen as the important indicators for the failure of the projects. The aim of this study is to develop a discussion related to constructing a model for development and enhancement of the community involvement in housing recovery process post disasters. So, the post-occupancy evaluation examples are used to illuminate the aim of the study. The study could be also beneficial in constructing a sustainable model for housing recovery programmes post disasters especially among vulnerable communities.

Keywords: community involvement, disaster, housing recovery process, post-disaster housing, sustainability.

Introduction

Disasters are hazardous events which effect communities in such adverse ways that essential social structures and functions are distrupted (Disaster Terminology, 2005). In all countries, but especially in developing and undeveloped countries, the communities are more vulnerable to disasters if they are not resilient enough. Coping with disasters and enhancing the coping capacity of the community are the prior targets of governments in vulnerable countries such as Turkey. The most important disaster risk for Turkey is the earthquake risk because the country is located in one of the most seismically active regions of the world. However, beside the earthquake risk, there are some other natural disaster risks such as the landslides, floods, drought, rockfalls, and avalanches.

In order to cope with disasters, most of the governments have been using a model which is called "disaster management". Disaster management is a collective term encompassing all aspects of planning for and responding to disaster including both pre and post disaster activities. It refers to the management of both the risks and the consequences of disasters (JICA, 2004a). There are four main phases of this system which are seen as a cycle, a series of interlinked activities; Mitigation, Preparedness, Response, Recovery and Development. These activities do not start and stop with each disaster occurance (JICA, 2004b). It can be also asserted that they are the activities between the occurrence time of two following disasters. The destructive effects of disasters on economy, and social and physical structures have been forcing the governments to take serious measures in Turkey. So, the governments have been studying on the construction and strengthen of a holistic disaster management

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system in order to cope with disasters and reduce the effects of the disasters on the social, economical, and physical structures of the community.

The recovery and development phases or in other words rehabilitation and reconstruction phases post disasters have important roles in success of the current disaster management strategy in Turkey. In a holistic disaster management approach, the four phases are needed to be used effectively before, during, and after a disaster. However, the mitigation and preparedness phases are generally not given much importance in vulnerable countries, and usually the management system begins with the response step and finishes with the recovery and/or rehabilitation step. This situation is criticized and it is pointed out as the primary reason of the vulnerability of a community in a disaster situation. Moreover, it is seriously asserted that the efforts which are done before a disaster occurrence are more important and beneficial than the response and recovery efforts. This point of view does not mean that the search and rescue, and rehabilitation phases are less important, but it means that if the mitigation and preparedness steps are constructed well, during the emergency situation and the reconstruction phases post disasters, the coping capacity and the resilience of the affected community will be constituted much better. On the other hand, in developing countries such as Turkey, planning and developing a holistic disaster management system is a long term effort. However, the occurrence periods of disasters have been becoming frequently because of some reasons such as the effects of environmental degradation, global warming etc. Adding to this, the effects of disasters have been widening which can be bounded to the rapidly growing urbanization, consumption and destruction of the nature, side effects of rapidly industrialization, and so on. So in short and long term, it is inevitable that Turkey will be effected by the predictable and unpredictable disastrous events.

The aim of this study is to develop a debate on the ways of constituting a community involvement approach in rehabilitation and reconstruction phases post disasters. It seems as an urgent need and necessity in order to construct a sustainable and disaster resilience community in short and long term. Two case studies which were conducted by the researcher in different times are used to catch the important views and problems related to the community involvement in the reconstruction phase. So, firstly the case studies are presented very briefly with the findings. Following to this part, a debate is constituted on the findings and how to use these findings in developing a community involvement model for rehabilitation and reconstruction programmes post disasters in Turkey. A conclusion part is going to be the final part of the study.

The Case Studies And Research Methods

The two case studies were conducted in different times and places in Turkey. On the other hand, the case study instruments (survey instruments) and methods were very similar to each other. However, both of the case studies investigated the post-occupancy problems of the post-disaster housing in Turkey. The problems were investigated mainly under the items of design, construction, management, and socio-cultural problems. The investigations of post-occupancy evaluation of the two cases were conducted in different regions of Turkey. One of the regions is a district of Ikitelli in the metropolis of Istanbul in Marmara Region and the other is a small town of Senirkent in Central Anatolia (Özden, 2004).

The earthquakes which hit the Turkish towns of Izmit and Duzce in 1999, known collectively as the Marmara earthquakes, not only took a terrible human toll, they also cost the country around US$20 billion in damage alone, equivalent to over 10 per cent of annual gross domestic product (GDP). Two earthquakes of 1999 left up to 20.000 people dead and 50.000 injured in north-western Turkey (World Disaster Report, 2002). Ikitelli district, located on European side of Istanbul, was one of the case study areas. An area in the borders of the district was chosen to construct the post-disaster housing settlement by the Ministry of Public Works and Settlement.

In June 2000, the construction started under the control of The Ministry of Public Works and Settlement. The project was composed of 810 dwellings (Figure 1). Both the project and the construction were entrusted to the contractor firms by The Ministry. The selected firms finished the first 650 dwellings in September 2001; and the rest, 160 dwellings, were finished at the end of year 2002 (Özden et al, 2003).

Figure 1. Exterior views of the Ikitelli post-disaster housing settlement.

At the end of year 2002, in October and November, a case study was conducted in the Ikitelli post-disaster housing area related to the post-occupancy evaluation of the new settlement. The methodology of the study was based on site observations and application of the household survey, consisting of 50 questions, addressing, among other things, (1) demographic characteristics of the household; (2) sequence, duration, and number of household movements post-disaster; (3) satisfaction levels with former houses (pre-disaster housing) and satisfaction levels with post-disaster housing: (4) satisfaction levels with pre-environment and current environment (Özden, 2005).

Another case study was conducted in an Central Anatolian town, Senirkent, in 2003. The area on which the town is located, is neighbouring the Mediterranean region. The town is 1010 meters high from the sea level and the population is 10.738 (Özden, 2004).

On 13th of July, 1995, soon after a heavy rain at the evening hours, a huge and destructive mud flood destroyed a total number of 320 dwellings, of which 195 were completely destroyed, 18 moderately destroyed, and 107 lightly destroyed in Senirkent. The disaster killed 74 people and injured 46 people. Dwellings that were constructed with mud-brick could not resist to the flood, also called as cold lava by the authorities (Özden, 2004).

Soon after the disaster, The Ministry of Public Works and Settlement started to look for an area for constructing post-disaster housing. The general approach in the preference of a new area for the new houses was depending on the resettlement of victims far from the affected area. The main criterion which was used by the government in determining the new area was the geographical position of the place, that means the new place was far enough to the risky area.

The methodology and approach for the post-disaster housing project and construction were the same as in the Ikitelli example. The ministry entrusted the reconstruction of the post-disaster housings to a private firm. In fact the projects had been designed for another post-disaster housing area previously, so the revision and application to the new area would not take the authorities of the ministry too long. They could finish the projects nearly in 10 or 15 days, and send to the contractor firm. The construction started in August 1995 and finished in December 1995. 188

dwellings were constructed which were composed of 16 blocks, 15 of which were three-storey blocks and one of which was two-storey (Figure 2).

Figure 2. Exterior views of the Ikitelli post-disaster housing settlement.

In July and August in 2003, the author conducted a survey in the region. The methodology of the survey was very similar to the one employed in the Ikitelli example. A similar type of questionnaire with the Ikitelli survey, consisted of 31 questions was used. However, site observations were also used in forming the survey results.

The Research Results

The results which were found out from the both surveys are carrying similarities in terms of problems related to the post-disaster reconstruction process. These problems could be set in order under the following titles; socio-cultural, economic, infrastructure and planning, construction quality, and decision taking process (Özden, 2005).

Socio-cultural. the new settlements were constructed far from the affected areas, that it was seen as a risk reduction policy by the government. On the other hand, it was really a long period and process for the victims in terms of adaptation to resettlement. They were generally emphasizing that they were missing the pre-disaster environments. It was pointed out that they left lots of things behind such as neighbours, friends, shops and outlet places, streets, natural and built environment covering the pre-disaster housings, memories, social interaction and gathering places etc. which were all have very important places in their lives. This dramatic view was growing in the adaptation period to the new settlements. The new areas were seen as full of unknowns with the new natural and built environments. The victims had been trying to reconstruct the neighbouring relations and socio-cultural structure of the new settlements. So, the adaptation process had been taking a long time which had been also causing more unhappiness and despair. Some of the victims asserted that they were sometimes feeling themselves as refugees, migrants. The pre-disaster areas had the structures of the social and cultural interaction spaces such as mosques, coffe shops, green areas, parks etc. which the new settlements had any or very few. These problems are indicating some strong clues related to the insufficient socio-cultural structures and mechanisms in the post-disaster reconstruction process.

Economic. the main problem which was complained related to the economic difficulties facing in the post-disaster settlement areas was the distance of new settlements to the working places. Most of the working population in the settlements had jobs and working places in or near the pre-disaster areas. So, the transportation had become a serious problem. However, people did not prefer to move their working places to the new area and also most of the workers did not have much chance to find a new job near to the post-disaster housing settlement. The transportation and proximity to the working places had seen most important economic difficulties. In addition to these, especially in Senirkent, the valuable productive agricultural areas were used in reconstruction of the new settlement. The economic losses and the degradation of agricultural land could cause some serious problems in the future which could not be exactly estimated from now.

Infrastructure and planning. the most important problems were seen as the insufficient infrastructures such as uncompleted roads, unconstructed natural gas pipe lines which were needed for heating, cooking etc., and the insufficient telephone lines. Also in both settlements, the landscape design had not been developed. Especially in the Ikitelli settlement, the main road which was linking the area to the neighbouring areas had not been finished. Moreover, the nearest school and shopping center were a few kilometers away and there were very few transportation vehicles which were passing through the new settlement rarely. So, the transportation to the social, cultural, education, health centers was very difficult, especially for the disabled and elderly people, and children.

Construction quality. the households were usually complaining about the low quality of construction. The water installation systems (such as bathroom installations) were causing some serious problems in most of the dwellings. The exterior walls, facades were not water-resistant and there was always water leakage from the exterior walls of the dwellings. The building materials were of low quality (installations, windows, doors, paintings etc.). Water leakage and humidity were some of the problems faced in the basement floors. There were serious problems with the roofs of the blocks, especially the water leakage from the roofs were causing important problems.

Decision making process. the findings presented above and some other ones are all indicating that the victims could not find any chance to participate in the reconstruction process. In fact, the formal administrative strategy of the government is to take all the responsibility both in the planning and construction phases of the post-disaster reconstruction. So, in the decision taking process, generally the community could not take place. The problems presented above titles have in fact very strong relations with the lack of community involvement during the planning and construction steps.

The above results are very briefly given and can be multiplied. The post-occupancy evaluation examples are indicating an important issue which can be generalized as the lack of community involvement in rehabilitation and reconstruction post disasters. The similar studies conducted in Turkey are giving the similar problems related to the post-disaster housing process (Oliver, 1987; Oliver-Smith, 1992; Enginöz, 2004). Disaster is first of all seen as a crisis in communicating within a community _ that is, as a difficulty for someone to get informed and to inform other people (Quarantelli, 1998). The failure and success of rehabilitation and reconstruction projects are definitely depending on public involvement in the projects. The victims wait in tents and/or prefabricated temporary shelters for months, even years for a lottery which the ministry will organize in order to give the permanent houses. So, the households are unaware of their new houses and environments until the lottery is organized.

Constructing the Community Involvement Approachin Postdisaster Reconstruction Programmes

A similar finding such as the above ones was stressed by Enginöz (Enginöz, 2004) in an other example of post-disaster housing settlement of Dinar in Turkey. He said that distrubuting the post-disaster houses to survivors by a lottery and a new experience living in apartment life, make deep social problems. He continued that the lottery caused people to stay in different parts of the city far away from their previous neighbourhoods. Because of that, families and close neighbours were separated from each other. They were forced to live in apartment buildings with many families who never knew each other before. The socio-cultural problems caused people to adapt their new environments very late. The additional problems related to the new buildings such as low structural and construction material problems also increase the delay in adaptation to new surroundings, the psychological and physical problems began to occur among victims. During one of the conversations in the Ikitelli case study, a household said that "we did not understand that we were victims of a disaster during the emergency and temporary housing periods because we could reach everything, we were living with our relatives in rented houses in the regions where we prefered, just when we resettled to post-disaster housing site, than we understood that we were really victims" (Özden, 2005).

Buckle stressed in his paper (Buckle, 2004) that effective management in disasters can occur without planning but it is fraught with risks, suffers delays in start up and is usually inefficient in resource use. Disaster management practitioners generally accept that effective management derives from effective planning. Effective planning needs to include all stakeholders, including voluntary agencies and community representatives. The three very significant points are given by Buckle for the reasons to the need of public involvement in the process; firstly, the government cannot do it alone. Governments are rarely able to meet all the needs of affected communities immediately. Secondly, Government resources are limited. The resources of Government, emergency services and local government are limited, even for major disasters and there is a simple, practical need to rely upon the knowledge, skills, capacities and resources of local people to meet initial needs and, in some importantly, to meet the needs of people weeks, moths or years after the event when the attention of Government has been directed to other priorities. Thirdly, local engagement will occur inevitably. Local people will be involved whatever the planned arrangements. All our research shows that local people will assist each other.

Permanent housing is one of the major objectives of post-disaster surveys which is to provide the affected populations with permanent shelter (Ergünay, 1999a). This is accomplished in accordance with the guidelines contained in Law No. 7269-1051 (in Constitution of Turkey) as follows:-

- Determination of individuals to be aided.
- Provision of new settlements.
- Allocation of building materials.
- Construction activity.

Reconstruction of the stricten area is the final activity. For this, one of thefollowing methods may be chosen:-

- Construction tendered to contractors,
- Construction by the Ministry itself,
- Aided self-help.

According to Ergünay (Ergünay, 1999b), there are two important deficiencies in physical planning which are making the population more vulnerable to disasters: Land Use, a major deficiency which needs to be addressed is the lack of accurate Microzonation maps for a better evaluation of the natural disaster hazard on a local scale so that a more rational use of the land can be planned by local governments which have tended to overlook this component when making landuse decisions within their jurisdiction. Construction, another major deficiency relates to the supervision of building construction, and the legal responsibility for substandard building practices. These deficiencies in fact continue in postdisaster rehabilitation and reconstruction process. While the disaster management system in Turkey requires the integrated cooperation of a large number of ministries and other agencies, it does not contain instruments or mechanisms, which would force the active participation of the communities at risk.

The rural settlers can be taught to build their homes with using the traditional materials and techniques. The local government or the rural architects could be the leading project managers in the affected areas such as Istanbul and Senirkent. Especially, the rural areas such as Senirkent have great potentials for this kind of approaches post disasters. This effort will be also a part of community involvement approach. So, an education strategy could be developed which will be used in disaster prone areas. According to this strategy the local governments, architects, contractors, community representatives, and other stakeholders will attend courses. It will be more beneficial if the courses could be organized all over the country, in every region, but for the short time strategies, they could be organized in the regions which are seen more risky and given precedence. In the future, the system could be enhanced and expanded to the all regions, that means the courses could be the important parts of national disaster risk reduction strategy. After the disaster, the educated architects and engineers can go to the stricken area and in a few week-courses, seminars, and meetings they can teach the techniques to the victims. So, the victims do not need to wait in their temporary shelters for the post-disaster housing lottery. It seems better than waiting the development of unknown future projects related to their lives. In this process, the mukhtars (or muhtars) have important roles. Mukhtar is the elected person as the head of a village or of a neighbourhood within a town or city (Ingilizce Sözlük, 2006). Mukhtar is the closest governor in the community in which he or she is the representative. So, the ministry and municipalities could be in contact with them both pre-disasters and post-disasters in order to develop a sustainable and efficient disaster management programme. Mukhtars can easly orient and organize the communities of their region. In the emergency times and rehabilitation process, the central and local governors cannot easily communicate with the victims of the striken areas. In those times, mukhtars could be the mediators and communicators between the community and government. But, they should be trained about the disaster management strategies before. The education and training of them could be developed by again another civil initiative, non-governmental organizations (NGOs).

NGOs can also be able to reach the striken area before the government many times, and they can have more possibilities for relief works. The representatives of the community, mukhtars and NGOs can construct the public involvement in the rehabilitation and reconstruction projects. They can be the managers, supervisiors of the projects which have been including the community and user participation. It is seen clearly from the case studies that the households had important difficulties in informing the responsible institutions about their problems. If a management system can be constructed among the users post disasters, the representatives in this system will settle the communication with the responsible institutions.

As Prof. Alexander stressed that (Alexander, 2004), it is axiomatic that reconstruction would be more effective and less onerous if it were well planned. Planning need to be holistic, in that it is not merely a question of replacing damaged building stock and infrastructure, but also one of reconstructing communities, ensuring equity, access to resources and equality of opportunity for the most disadvantaged members of those communities, and reducing community vulnerability to hazards. The user participation, the involvement of people who are benefiting from the projects are needed to be taken into consideration by the authorities. It seems a necessity to be given priorities to the awareness of vulnerable communities in order to construct a sustainable disaster management strategy, disaster resilient communities and sustainable living environments. The only way in reaching such an awareness is seem to ensure the education and training of the communities. Again, the local people of vulnerable communities, such as mukhtars, local NGOs are seem to be the leading mediators in this education process. So the primary objective of such a strategy could be oriented to the education of educators (or mediators). The lackness of the communication is seen as, said before, one of the main reasons of most disasters.

One of the most striken cities in 1999 earthquake of Marmara was Kocaeli city. The ministry of Public Works and Settlement constructed by the help of World Bank some permanent work-places in a district of Kocaeli, Gündoğdu. But the half of the victims have not prefered to relocate to the new work places because they are too far to the city center and the victims think that they can not use the new places efficiently and economic. On the other hand the other half have relocated to the new places and have began to use their shops (Cumhuriyet Newspaper, 2006). However, the local government has not given them building licence because there have been some problems between the Ministry and local government. The victims have been complaining about the issue. This event is also another common example which has been faced, related to the lack of the community involvement in post-disaster reconstruction process. If a commision could have been developed before the reconstruction phase and the representatives of all sides in the region could have been worked on the projects and desicion taking process, probably the problems such as mentioned above could be overcomed easly.

Post disasters, a commision is needed in order to ensure the involvement of all actors in the striken area to develop a rehabilitation and reconstruction plan. Such a commision has developed in New Orleans after the cyclone of 2005 (Gökbayrak, 2006). The commision, Bring New Orleans Back Commision, has started to study firstly for developing sub-commisions related to the city planning, education, culture, infrastructure, management, health and social services. The most important objective of this commision has been declareted as to mobilized all of the sectors and actors in the region by using internet and all public communication channels in order to ensure the involvement of the city residents to the reconstruction process.

The World Bank has important policies targetting the community participation in resettlement activities (The World Bank, 2001):-

- A description of the strategy for consultation and participation of resettlers and hosts in the design and implementation of the resettlement activities,
- A summary of the views expressed and how these views were taken into account in preparing the resettlement plan,
- A review of the resettlement alternatives presented and the choices made by displaced persons regarding options available to them, including choices related to forms of compensation and resettlement assistance, to relocating as individuals, families or as parts of preexisting communities or kinship groups, to sustaining existing patterns of group organization, and to retaining access to cultural property (e.g. places of worship, pilgrimage centers, cemeteries) and,
- Institutionalized arrangements by which displaced people can communicate their concerns to project authorities throughout planning and implementation, and measures to ensure that such vulnerable groups as indigenous people, ethnic minorities, the landless, and women are adequately represented.

Conclusion

There are lots of efforts to develop community participation in every step of disaster management process. The reconstruction phase is one of the four main steps of disaster management, and it is the most known part especially for the vulnerable communities. Mitigation and preparedness policies generally have not been taken into consideration by the vulnerable countries. A holistic disaster management approach can be developed with a long term strategy and planning, on the other hand the devastating disasters are continuing to occur, and even the occurrence frequency and affects have been growing time by time. This is because of some specific, estimated and unestimated reasons such as rapidly growing population, insufficient and vulnerable construction, lack of building supervision, lack of educated manpower, global warming etc. In order to cope with disasters, it seems a certainty that every actor in the community is needed to share the responsibility of the risks, and communities are needed to involve the risk management pre-disasters, rehabilitation and reconstruction phases post disasters. The governments cannot cope with disasters lonely, the community is needed to assist the government. However the government is needed to take into consideration the potentials of community involvement and develop strategies for improving the community participation in the process. It is important to see that the disasters are infact local events and the better solutions can be developed from the local environment and users via the local capabilities.

One of the most important steps for local holistic recovery is the involvement of the public (Natural Hazards Informer, 2002). Participatory processes are the essential aspects of the sustainability involving the inclusion of all the stakeholders in recovery and in creating the vision of what the community should be like after the recovery is complete. A community that seeks sustainabiltiy need to be committed to such involvement and, at this point, the community begins to design public participation into all phases of its recovery. The opportunities for participation could be publicized through a variety of media, including flyers, posters, local newspapers, local television stations, and the internet.

The local governments, the local community representatives (such as Mukhtars, NGOs), and the local architects and engineers could be the important people in the disaster management cycle. If these people could be educated for the aim of constructing a disaster resilience community, they will have very important roles in both pre and post disasters. As it is learnt from the findings of the case studies, the victims need to be convinced in resettlement activities. The convincing process is a serious and long period activity but it is a necessity because this process could be the first step of the community involvement in the post-disaster reconstruction process. So, the stakeholders given above have important roles in this process. A convincing commission could be formed in which all the stakeholders will attend post disasters. This commision will also work with the affected community on the planning and the construction period of the post-disaster projects. If the community will be convinced on the resettlement projects, the success of these projects will be much greater than the current situation. However, the future problems (post-occupancy problems) could be reduced and also this commission will be also helpful in organizing a management system in the resettlement area among the users. So, this management group could have important roles in developing a communication link related to their problems between the affected community and the institutions. The local professionals such as architects will be the important mediators in the communication process. In order to achieve the community involvement approach in disaster issue, the government urgently needs a national education strategy related to disaster risk reduction. The first step seems to be formed an expanding education and awareness approach among the community.

As the last words, the lessons from the past events have not been used by the decisionmakers efficiently. So, after every new event, the same approaches are tried to be implemented and the same failures are occuring. The decisionmakers are not aware of the potentials of the community involvement in the rehabilitation and reconstruction process, however the public is not aware of the same potentials too. To develop an awareness in order to cope with disasters and reconstruct the affected community as a disaster resilience community, the strategy and models could be developed by the involvement of all the stakeholders.

References

Alexander, D. (2004). *Planning for post-disaster reconstruction*, Conference Proceedings, Second International Conference on Post-disaster reconstruction: Planning for Reconstruction, 22-23 April, Coventry University,
http://www.grif.umontreal.ca/pages/irecpublicns.html

Buckle, P. (2004). *A comparative assessment of community based recovery management in England and Australia*, Conference Proceedings, Second International Conference on Post-disaster reconstruction: Planning for Reconstruction, 22-23 April, Coventry University,
http://www.grif.umontreal.ca/pages/irecpublicns.html

Cumhuriyet Newspaper (2006). *Ruhsat sıkıntısı*, Cumhuriyet Anadolu, January 18, Turkey, p. 38

Disaster Terminology (2005). *Prehospital and Disaster Medicine*,
http://pdm.medicine.wisc.edu/vocab.htm

English Dictionary (2005). A web based dictionary, www.ingilizcesozluk.gen.tr

Enginöz, E. B. (2004). *A study in post-disaster home environments: a comparative case study between people living in villages and in the town center of Dinar, Turkey*, Conference Proceedings, Second International Conference on Post-disaster reconstruction: Planning for Reconstruction, 22-23 April, Coventry University, http://www.grif.umontreal.ca/pages/irecpublicns.html

Ergünay, O. (1999). *A Perspective of Disaster Management in Turkey: Issues and Prospects*, Urban Settlements and Natural Disasters, Proceedings of UIA Region II Workshop.

Gökbayrak, P. (2006). *Doğal afetler mimarlar için yeniden bir düşünme fırsatımı?* January 25, http://www.arkitera.com/news.php?action=displayNewsItem&ID=6812

JICA (2004). *Country Strategy Paper for Natural Disasters in Turkey*, Final Report, Japan International Cooperation Agency [JICA Turkey Office]

Natural Hazards Informer (2002). *Building back better – creating a sustainable community after disaster*, January,
http://www.colorado.edu/hazards/holistic_recovery/

Oliver, P. (1987). *Disaster housing*, Dwellings: The House Across The World, Phaidon Press, Oxford, p. 212-234.

Oliver-Smith, A. (1992). *Problems in post-disaster resettlement: cross cultural perspectives*, Disaster and the Small Dwelling, Chapter 8, James and James Science Publishers Ltd, London NW1 8PR, England, p. 58-67.

Özden, A. T., Ekizce, S., Sarı, B. and Görmüş, E. (2003). *Post-occupancy evaluation of Ikitelli post-disaster housing*, Unpublished Research Report, Social Sciences Institute, Istanbul Technical University.

Özden, A. T. (2004). *Evaluation of post-disaster housing in Senirkent*, Unpublished Master Thesis, Institute of Natural and Applied Sciences, Istanbul Technical University.

Özden, A. T. (2005), *Evaluatıon and comparison of post-disaster housing in Turkey; lessons from Ikitelli and Senirkent*, Conference Proceedings, p. 561-571, The Second Scottish Conference for Postgraduate Researchers of the Built and Natural Environment, 16-17th November, Glasgow, UK.

Quarantelli, E. L. (1998). *What is a disaster? Perspectives on the question*, p. 16, Routledge, London.

The World Bank (2001). *Involuntary resettlement instruments*, The World Bank Operational Manual, p.1-6, March 6,
http://web.worldbank.org/WBSITE/EXTERNAL/PROJECTS/EXTPOLICIES/EXTS
AFEPOL/0,,contentMDK:20543978~menuPK:1286647~pagePK:64168445~piPK:
64168309~theSitePK:584435,00.html

World Disasters Report (2002). *Reducing Earthquake Risk in Urban Europe*, p. 109, International Federation of Red Cross and Red Crescent Societies.

SOCIAL DYNAMICS IN PARTICIPATORY RECONSTRUCTION: AN ANTHROPOLOGICAL ANALYSIS FROM EL SALVADOR

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Abstract

Participatory methodologies are regularly used by NGO's in post-disaster housing reconstruction projects addressed to poor victims of rural origin, especially in the developing world. One rationale behind the choice of such methodologies is that they are supposed to encourage people's appropriation of project objectives. A corollary aspect refers to the communitarian ideal. In other words, the active participation of beneficiaries – often as manual labour – is believed to enhance a shared sense of community. This presentation addresses these issues as they revealed themselves in a reconstruction project taking place in a Salvadorian municipality after the 2001 earthquakes. The objective is to explain how the success -or failure -of participatory methodologies depends on their appropriateness to the local context, including cultural values and the economical well-being of beneficiaries. This paper will discuss how models that inform the day-to-day practices of a reconstruction project clashed with the local values and social structure of the people involved. Research suggests that a lack of consideration for socio-cultural factors, expressed in terms kinship support networks, economical needs and political organisation delayed the construction process. Participation became quasi-forced labour and the communitarian ideal remained precisely that, an ideal that did not adequately reflect beneficiaries' motivations.

Keywords: reconstruction; participation; community; culture; INGO.

Introduction

Participatory methodologies are often used in post-disaster housing reconstruction projects (Arnstein, 1969; Choguill, 1996). They refer to the implication of beneficiaries in project implementation, however the nature of their involvement can vary depending on what is meant by participation from one project to the next. For many international NGOs that undertake such programmes, participation is viewed as a positive and cost-effective methodology that can yield a variety of outputs, not only from a building perspective but also from a social point of view. Here, beneficiaries' active participation is hoped to enhance people's level of appropriation of project objectives and to foster a shared sense of belonging or of community. Indeed, what is often termed community participation has become a cornerstone in the debates regarding post-disaster reconstruction. According to many expert opinions, a project may greatly suffer in terms of its effectiveness, efficiency and sustainability if community groups and networks are not included as active participants or players during the project cycle. However, the notion of community has become a highly polysemic one (Davidson *et al*, 2005). And when it is applied to reconstruction projects, it is important that the concept refer to an objective and historically constituted social group whose members share, for example, cultural values, kinship ties and participate in a variety of social, political and economical arenas. In this sense it is important to understand that a community is much more than a group of chosen bene-

Post-Disaster Reconstruction : Meeting Stakeholder Interests : Proceedings of a conference held at the Scuola di Sanità Militare, Florence, Italy 17-19 May 2006, edited by David Alexander, Colin Henry Davidson, Andrew Fox, Cassidy Johnson, Gonzalo Lizzaralde, ISBN 978-88-8453-611-2 (online), ISBN 978-88-8453-612-9 (print), © Firenze university press, 2007

ficiaries who participate in a given project. In other words, what is at stake in the discussion of this paper is the difference between the application of communitarian ideals in reconstruction methodologies and their appropriateness to adequately define a given local context.

Hence this paper concerns the politics of participation and community building in a post-disaster reconstruction project that took place in El Salvador following the 2001 earthquakes. The perspective adopted here stems from social anthropology and focuses on the social dynamics between a group of selected beneficiaries and project supervisors. The discussion aims to illustrate how the project logic, i.e.: the application of participatory methodologies and a communitarian ideal, ran counter to the social structure and cultural values of the people involved. Through this case study, the objective of the research is too caution reconstruction practitioners to the risks there are in applying conceptual models when they do not adequately correspond to the social reality and lived experience of the people they most want to help.

Methodology

The methodology used for this research followed traditional anthropological guidelines, namely the practice of daily participant-observation on the construction site over a period of eight months. During this time, and aside from daily conversations, formal and semi-structured interviews were done with all the beneficiaries and project supervisors. The same were undertaken with representatives of other local institutions involved in the humanitarian response and reconstruction initiatives, such as the mayor's office, the local Red Cross and Health Unit, Church representatives, etc. Further interviews were done with NGO representatives also working in reconstruction in the area and with UN agencies such as the World Food Program who played an important role in these projects. It is important to stress that many issues that are presented in this paper could not have been clearly identified without communicating over an extended period of time with all the different stakeholders involved.

A Disaster in Context

Over the centuries the small Central American country of El Salvador has known many disasters, especially earthquakes, as two tectonic plates, the Coco and Caribe plates, regularly collide into one another thereby creating intense seismic activity. Salvadorians even call their land the "valley of the hammocks" due to the cyclical nature of these happenings. Hence, the 13th of January 2001, an earthquake of magnitude 7,6 on the Richter scale shook El Salvador. A month later, to the date, a second quake further impacted the nation. The town of Lamaria,[1] located in the western department of Sonsonate, was one of the municipalities affected by the first disaster. With a population of a little under 24 000, 13 440 people became either homeless or saw their houses damaged to various degrees. Although this part of the country is not considered among the poorest, the majority of disaster-victims in Lamaria can be said to belong to the more marginal segments of the population: households located in rural zones, built in traditional adobe and whose monthly income fall below the poverty line.

If emergency assistance and temporary shelters were delivered in a timely manner, reconstruction projects for permanent housing started only in May 2001. There were various kinds of reconstruction initiatives depending on the socio-economic

[1] Names are fictitious in order to respect confidentiality and anonymity of informants.

status of the victims. Indeed, some local and foreign initiatives targeted homeowners or landowners whose houses were partially damaged, others targeted landless and homeless families who had lost most of their belongings and who found themselves without a place to live. These families were the principle target group for foreign NGOs who implemented reconstruction projects in the municipality. At the time of study, there were four such initiatives, three of which took place side by side on newly acquired and adjacent land plots located a few kilometres away from the town centre. Their overall objective was to create a "model neighbourhood", serviced with water and electricity, for 200 families who were categorized as the most vulnerable people - meaning the group of disaster-victims who were both landless and homeless and who were living in the temporary shelters erected by humanitarian NGOs such as *Doctors without Borders* and the *International Federation of the Red Cross* shortly after the disaster.

The idea of creating a model neighbourhood is not uncommon in post-disaster settings. In the case of Lamaria, it entailed that the foreign NGOs work in coordination with the mayor's office that designated the area it thought most proper for such housing projects addressed to the poorer segment of the population. So the area selected was precisely one which the local authorities envisioned as an important potential development zone for a number of characteristics: it has fertile soils, an elementary school, a newly built hospice for the elderly run by nuns, and is close to the Pan-American highway and therefore transport is easily accessible. Indeed the entire initiative, the first of its kind in the municipality, was termed a "pilot project", implying that its long-term objective was to enhance the socio-economic living conditions of this vulnerable group.

Two plots of land that previously served as sugarcane fields were therefore acquired, a larger one where the three NGOs started their respective projects for some 150 families and a smaller one located 500 meters away where one of the NGOs erected 50 houses for the remaining beneficiaries. This site, named La Hermandad, is where most of the research was undertaken. It was headed by a European Red Cross agency that also financed various other reconstruction initiatives in the area, such as repairing the elementary school, funding the construction of a cafeteria at the nuns' elderly hospice, while also putting money for the renovation of the local Red Cross office and the Health Unit. Clearly, this foreign NGO became highly visible in Lamaria and played a major role in reconstruction.

It is worthwhile stressing that, although these three NGOs worked in a designated area, they worked independently of each other and did not use the same construction methodologies: while two hired contractors with heavy equipment to accelerate the building process, the European Red Cross relied entirely on manual labour from the beneficiaries and masons hired in Lamaria. The rationale behind this decision was to enhance beneficiaries' sense of appropriation of the project and to boost the local economy by providing salaried work for professional masons who had also suffered from the earthquake but who, for the majority, were homeowners and thus did not meet the NGO's selection criteria.

The Project's Logic

As previously mentioned, selection criteria for this project targeted the "most vulnerable" population and were the following: potential beneficiaries must be 1) disaster-victims, 2) who never owned a house nor a plot of land (they were thus either renting or living with family members at the time of disaster) and 3) whose income did not exceed the minimum monthly salary which amounted to US$ 97.00 per person in 2001 (PNUD, 2001). Although young families were preferred, the project also considered the elderly and single mothers. In fact, in La Hermandad, around 15 family groups consisted of singles mothers and their children. The majority of beneficiaries had been living in the temporary shelters but it must be emphasised that they did not previously live in the same *canton* prior to the quake. Indeed, Lamaria's administrative district in divided into 10 *cantones* (referring to the more remote rural zones) and 28 *colonias* (meaning an urban zone) and the homeless gathered in the shelters came from all over. This means that the beneficiaries did not form a homogeneous group, albeit the fact they all responded to the selection criteria: some families were of rural origin, others from the town itself, some were used to hard labour as daily workers in the nearby plantations, others were out of a job for a long periods of time. Moreover, not all families originated from Lamaria. A third came from the Eastern provinces of the country and had fled these intense conflict zones during the civil war, which ended in 1992. These emigrant families were living along the railway line at the time of disaster in shanty dwellings which all collapsed during the earthquake. Among the beneficiaries, this group was considered as the hardest working, especially in comparison to the city tenants who, for the most part, did not occupy a steady job.

The selection process did not last very long because the needs were so great. The project started in May with the arrival of the first beneficiaries who had to weed out the sugar cane field. The others followed in June and July. For those who had been living in the temporary camps, the shelters themselves were transported to the construction site. These consisted of aluminium sheeting and of heavy plastic cubicles, which had been given to the families by the humanitarian NGOs. All in all,over 300 people including children lived permanently on the site.

The most important aspect of the project logic was the following: in exchange for their manual labour, beneficiaries would become the private owners a new anti-seismic brick house. The process was described to them as a non-monetary exchange. This type of project is called a "food for work" project, meaning that beneficiaries work full-time in construction, abandoning their regular remunerated activities and, to compensate the lack of income, food rations are provided by the World Food Program on a monthly basis. There were dozens of such initiatives in El Salvador at the time of study.

Furthermore, there were a series of rules and regulations that had to be observed. Nuclear family groups had to live on the building site with no other kin members allowed; men had to work 164 hours/month, single mothers 120 hours/month and married or accompanied women 64 hours/month. A chart was kept to assess the man days worked by each family group. Most had to abandon their regular remunerated activities in order to comply with these regulations. However, in the case of seven families, the men kept their outside job while their spouses worked full-time in construction. It is important to stress that the women who were active in the building process were participating in a typically male occupation. Indeed, in this society, masonry is not a traditional activity for women. Hence many were proud of this fact, especially the group of single mothers.

In terms of organisational structure, and aside from the European representatives who only came twice to the field site, the project was headed by a civil engineer who was present on a daily basis. There was also a supervisor who hired seventeen masons, all from Lamaria, who trained the beneficiaries in construction and provided technical supervision. A social worker was also hired whose mandate was to create various social committees such as one concerning the cleaning of the communal latrines, another on food distribution, a third on the environment. In short, the purpose of these committees was to enhance participatory activities on the site. The social worker, who would regularly speak of herself as a feminist, targeted mainly women. With respect to the project logic, this aspect was supposed to balance the more "physicalist" side of the reconstruction process.[2]

Indeed, in conceptual terms, the way the project was structured aimed to create various participatory activities, which covered both the physical side of construction, meaning the construction work itself, and what was termed the social side of reconstruction. Here, complementary activities were hoped to encourage people's sense of belonging, of working towards a common objective, namely the creation of a new model neighbourhood. Something akin to a communitarian ideology did indeed frame the entire initiative and this was discussed with the beneficiaries themselves during monthly general assemblies were the social worker and the engineer would reiterate this overarching objective.

The project started in May-June 2001 and was supposed to end in February 2002. In fact, construction terminated at the end of June 2002, meaning that many families did not reintegrate their economic activities before one year. There were various reasons for this delay, which will be explained further, but the most important one was the overall fatigue and lack of motivation of workers. In comparison, the other two projects of this initiative were completed in March 2002 principally because project officials had opted for a different construction methodology, that is the use of heavy machinery and the hiring of contractors. As mentioned, in La Hermandad there were none as construction relied on manual labour.

There were fifty houses to be constructed and everyone worked on all of them so that no one knew before hand which house would become their own. Each family would receive an 80 m^2 house on a 200 m^2 plot of land. All houses followed an identical model that had been approved by the beneficiaries at the beginning of the project. Each house was composed of three rooms, two smaller ones of 20 m^2 each and a living room of 40 m^2. The roof was made of aluminium sheeting. Washrooms were not incorporated inside the house because the ground water was too elevated. Instead, dry latrines were built outside at the very end of the project. Everyone thought them quite un-aesthetic. Each lot was bordered by a little brick wall that delineated the limits of one's personal property. Procurement of all materials came from Lamaria: tools and cement were bought in local shops, black earth was collected from nearby riverbeds and the NGO received free access to gather white earth from one of Lamaria's various quarries. All agreed that the houses were of good quality, especially considering their solid metal frame. Indeed, market value for one house amounted to US$ 4500, a rather high price for a reconstruction initiative. In fact, for the same amount, two houses could be constructed, albeit using other materials and construction methodologies. This reflects a choice from the NGO: Project leaders opted for this design not only because it was the families' preferred one, but also for development reasons. Indeed, it was argued that families' standard of living would improve once they became the owners of such an economical asset. And to ensure that this medium-term developmental goal could be reached, a special clause was included in the project forbidding the selling or leasing of the house to any third party for a period of ten years. The extent to which this clause was respected after project completion was not verified in this research. However it is worth mentioning that this clause goes against usual property rights as they are encoded in the law.

Hence daily life on the site was punctuated by work activities. Men were assigned to the more heavy chores and the majority of working women were assigned to two workstations: the assembling of metal structures and the compacting of foundations. Children were encouraged to attend the nearby school, however many did not and so working women would ask a neighbour or someone they trusted to keep an eye on their children.

[2] See Lavell, 1999 for a discussion on the physicalist versus social aspects of reconstruction.

A river bordered the southern side of the site in which families bathed and washed their clothing or cooking utensils but potable water was delivered on a daily basis for consumption. There was no electricity so at nightfall all activities stopped and families retired in their respective cubicles. As time progressed and construction advanced, families had to dismantle their living quarters and reassemble them elsewhere, some as much as three times, in order to allow for the erection of the new houses. This moving around could create some tension among the beneficiaries who did not always appreciate their new location, or more specifically, their new neighbours. Indeed, social relations between beneficiaries, which were hoped to evolve along a communitarian ideal, deteriorated as time passed causing an important delay in construction.

Community Building and its Impasses

Although in conceptual terms the project seemed to be well organized and designed, it followed a very top down approach for its entire duration. Because many aspects of social life were dependent and structured by the NGO, daily life became problematic for various reasons. Furthermore, subtle processes of social differentiation between beneficiaries consolidated themselves over time, which are better analysed when research is undertaken over an extended period. The analysis of social dynamics between the beneficiaries and their superiors and between the beneficiaries themselves reveal the extent to which participation became an obligation and the communitarian ideal remained precisely that, an ideal which cannot adequately describe reality as it unfolded in the very special time and space of this reconstruction project.

Gender relations at work. A first area where problems arose concerns the working relationships between men and women. If at the early stages of the building process things appeared to proceed smoothly, the situation changed radically. The fact that many single women participated in construction meant that they mixed more than what is customarily appropriate with married or accompanied men. Proud of doing a typically male activity, they would often joke and talk to their fellow workers. However, friendship between the sexes is not common in Salvadorian society hence, for the women who did not work, this situation became a source of tension. Their reaction followed traditional ways, namely the production of gossip. This is not to be taken lightly, indeed, gossip has a definite social function in maintaining boundaries between what is culturally accepted and what is not. Gender roles in rural Salvadorian society are still very traditional, and in the enclosed space of the reconstruction site, where everything is known, jealousy and gossip became a permanent source of dissension between beneficiaries. The outcome of this situation was the polarization of the group of single mothers from the other women living in La Hermandad.

Relationship with superiors. The most important aspect of the social dynamics between beneficiaries and project superiors concerned working relationships. But first, it is important to understand that it is customary for Salvadorians to describe themselves as hard workers. They often say this with a sense of pride. It is a positive cultural marker, which one can often hear when speaking of working conditions in the country. This entails that appreciation and positive evaluation at work are not taken lightly.

Beneficiaries were thus trained by the masons and complied with working hours. However, not all were considered good workers. Some men were much more assiduous in their tasks than others and therefore were more positively valued by superiors. Those who complained about the working conditions, about the fact that they were not receiving any salary, that they were treated as cheap labour, even though they would receive a house at the end, were considered lazy. What happened as months went by is that some people had built a reputation as either hard working or not, and this line of differentiation also followed another cultural marker, that of being of rural or urban origin: people from the *campo*, from the rural areas, were generally considered better workers while the city dwellers, somewhat unaccustomed to this kind of intensive work, were not as positively valued.

Furthermore, if relationships to figures of authority are generally ones of deference, there were a few individuals who were not shy to express their views in public, openly criticizing the organization and the project leaders. This was particularly the case during the last three months, when people felt a general fatigue and were anxious to earn a salary again. When this occurred, the engineer and the supervisor would quickly call for a general assembly where they would exhort beneficiaries to understand that this was a humanitarian project were everyone had to give their fare share of labour. They would invoke the fact that all the families should try to get along because they would form a new community.

Problems with food distribution. Another source of problems pertains to the irregularity in food distribution. Most families were not receiving any income during the construction process and relied on the monthly food rations distributed by the World Food Program (World Food Program, 2001). Aside from this, there was another food distribution headed by the Office of the Archdiocese and distributed by the nuns who lived nearby. This second food distribution targeted families with children under the age of seven who were considered underweight for their age, which was the case for almost all the children. While this distribution never failed, there were problems with the WFP one, namely important delays in delivery sometimes lasting over a month. This happened once the social worker, who was in charge of this aspect of the project, left in January 2002.

The delays in distribution did not affect all families equally. Indeed, if selection criteria had targeted poor disaster-victims sharing a same socio-economic status, some were much poorer than others. This was particularly the case for seven families who relied entirely on the outside food distributions. Health problems related to malnutrition and lack of essential vitamins became more apparent, thereby causing fatigue and slowing the work activities. As of March 2002, many asked for day permits to leave the site in order to go the local clinic in Lamaria. Some men who had been working full-time developed health problems that required them to stop working, and their wives had to take over. At the same time, project leaders were under pressure to terminate construction. The combination of these factors created tension on the site and work relationships became uneasy. At the end of the project, almost a third of the beneficiaries would not show up for work and some men had even reintegrated the outside workforce.

Political initiatives thwarted. A revealing event illustrates the extent to which community building was not only arduous but how it could also be seen as a potential risk from the supervisors' perspective. After the earthquake, many *colonias* and *cantones* had to organize themselves in order to facilitate the humanitarian aid distribution. People were called to form small representative bodies named ADESCO (community development association). Some did exist before the events in other parts of the municipality, but for many people the earthquake gave them the impetus to elect representatives who would interact with the mayor's office and NGO representatives in order to explain and defend their needs. Thus an ADESCO has a recognised legal status.

When the other two projects part of the model neighbourhood initiative were terminated, the new owners decided to form an ADESCO. When the beneficiaries of La Hermandad heard of this, they wanted to do the same, even though in their case the project was far from completed. We were in February 2002. However, when project leaders realized that this was the intention of "their" beneficiaries, they strongly recommended waiting before undertaking this project. The reasoning behind this interdiction was simple: NGO representatives did not wish to see their authority undermined by a newly elected ADESCO, which could voice its concerns to other institutions. In terms of community building, this decision ran counter to the development of a communitarian feeling among the families. Arguing that there were already too many social problems on the site, projects leaders were fearful that more dissension would arise with an ADESCO.

Factors of social differentiation. When speaking of the process of social differentiation amongst the beneficiaries themselves, and aside from those directly related to the work activities, there were two important vectors: economical factors and cultural markers.

First, although all families' income did not exceed the minimum wage, once on the building site, certain individuals showed a clear sense of entrepreneurship. This was particularly the case with two women, one belonging to the group of single mothers whose eldest son complied with the working hours, and the other one married. Both had decided early on in the project to cook hot lunches for the masons and anyone else who could afford it. They baked *tortillas* on a daily basis and also sold various food and household items from their respective cubicles. Quickly their businesses thrived and a sense of competition developed between them. Each had her clientele of beneficiaries (those who could afford it) and of professional workers. However, with the problems in food distribution which clearly affected many members of La Hermandad, the fact that these families seemed to get by much easier and even making a profit engendered jealousy and envy from those struggling harder to put food on the table. Extended families with six to eight children were not uncommon and with the lack income their situation became more difficult.

Envy is a traditional mechanism of social regulation in Central American societies that is more apparent in small peasant communities than in our larger industrialised societies (Foster, 1967). It manifests itself when an individual acquires a good in socioeconomical contexts where the acquisition of goods is limited. Many things can become the object of envy: a newborn child, a husband, food, an unsuspected source of revenue, the acquisition of furniture, etc. Hence the fact that two families seemed to be economically thriving compared to the others created much envy in La Hermandad, an envy that could only be attenuated through the use of ties of reciprocity between people. And here again, there were none available because the project guidelines forbade the presence of kin on the site thereby isolating beneficiaries from their mutual aid networks.

A process of differentiation between the haves and the have-nots therefore appeared and consolidated itself through gossip and envy. And this situation did not facilitate the emergence of a sense of community nor of social cohesion amongst participants, quite to the contrary. As economical differentiation between the beneficiaries became very apparent towards the end of the project, people would disengage themselves from work and group activities. A sense of divisionism reigned and families would keep to themselves.

The second vector of differentiation refers to cultural markers. Here, issues on cleanliness versus dirtiness or on religious affiliation became factors of dissension between them. Certain women would regard with disdain other families and hoped they would not have them as future neighbours because they kept their cubicles untidy or because they were of a different religious denomination. Since it was only at the end of the project that each family group would know which house would become their own -after a secret ballot where only the project supervisors attended -

much speculation circulated on this topic. Again, such talk did not reflect a growing sense of cooperation and community between the families.

During the last two months of the project, more and more beneficiaries would disengage themselves from work activities. This became problematic because the latrines and the walls still remained to be built. The engineer and his superiors convinced the beneficiaries to erect the walls using the participatory construction methodology but for the latrines, they decided to pay the more experienced workers who would accept to do this specific job. In effect, at this time, the masons contract had been terminated. The predominant discourse from the beneficiaries at this time did in no way reflect the formation of a sense of social cohesion. Recorded conversations and interviews reveal that many were untrusting of others, "there is no community here, people are all hypocrites" – would mention various women.

Problems with design. Once the houses were completed and allotted to each family, women realized that something was lacking in terms of design: there was no adequate roofing to cover them while they would cook. In rural Salvadorian society, it is usual for women to prepare meals outside. But when the sun is hot or when it rains, obviously one needs some form of roofing for protection. The design of the house did not take into account this customary practice and therefore many women wanted to extend an aluminium sheet from the roof for shade. The material was even at their disposition as they had been living for the past months in the cubicles, that is the temporary shelters that had been given to them by the humanitarian NGOs that first arrived in Lamaria. But the project leaders refused, arguing that it would hinder the overall design of the houses. Their decision was to oblige each family to redistribute without fee the materials to some kin member of their choice. Although most were reluctant, project leaders were adamant about this. But many people confided that they disagreed with this decision, believing the NGO was using too much authority because the temporary shelters had been *given* to them. Nonetheless they complied.

Conclusion

In mid-June 2002, La Hermandad was inaugurated in front of journalists, Red Cross officials, the mayor and other representatives of local institutions. Beneficiaries had mixed feelings. On the one side they were relieved the construction work was over because many were anxious to find or reintegrate their jobs but, on the other side, they were a little worried at the thought of the European Red Cross leaving them. Indeed, for this population who is usually ignored or forgotten by government institutions, this whole experience put them at the forefront of NGO considerations. They had been beneficiaries, and in a way proudly so, albeit all the problems that emerged. This said, they remained also rather critical of the overall process, thinking of it as too long and costly for them.

From an analytical point of view this research reveals various issues. First, participation does not guarantee the emergence of a sense of social cohesion and belonging between participants. As a construction methodology, it can become a rather costly decision, in both financial and social terms alike. As the preferred means to foster a communitarian feeling between members of a project, there is again no guarantee. When experts talk of community participation in reconstruction projects, this does not necessarily reflect an objective reality where all members share a sense of belonging or thriving towards sustainable common objectives. In this case, there was somewhat of a misconception regarding beneficiaries' motivations. They did not partake in this adventure to form a new community, but to have access to an important economical asset, a new house they could claim their own. Motivations are better understood in utilitarian and individualistic terms rather than corresponding to a communitarian ethos. When this is accepted, it becomes easier to understand why this group of beneficiaries developed tensions and divisions among them. In various aspects, the project challenged cultural values by mixing women in the work force, by showing favouritism towards some individuals, by forbidding the presence of other kin members on the site that could have led a helping hand, by letting some beneficiaries develop micro-enterprises that exacerbated the underlying social stratification that already existed among the selected families. Peoples' reaction followed customary ways, namely the incessant production of gossip and avoidance of disdained individuals or families.

Nonetheless, this does not mean that community participation in itself has to be rejected. Nor does this research suggest that reconstruction projects should strictly follow a customary division of labour along gender lines, in this case the exclusion of women from construction. What this case study does recommend, however, is that reconstruction initiatives can benefit from more in depth understandings of local custom and ways and must beware of certain ideals that still permeate humanitarian action worldwide.

References

Arnstein, S.R. (1969). «A Ladder of Citizen Participation», *Journal, American Institute of Planners*, vol. 35, No. 4, pp. 216-114.

Choguill, M.G. (1996). «A ladder of Community Participation for Underdeveloped Countries», *Habitat International*, vol. 20, No. 3, pp. 431-444.

Davidson, C., Johnson, C., Lizzaralde, G., Dikmen, N. and A. Sliwinski. (2005). «Truths and Myths about Community Participation in Post-Disaster Housing Projects», paper submitted to *Habitat International*.

Foster, George. (1967). *Tzintzuntzan. Mexican Peasants in a Changing World*, Boston: Little, Brown and Company.

Lavell, Alan. (1999). «The Impact of Disasters on Development Gains: Clarity or Controversy », Paper presented at the IDNDR Programme Forum, Geneva, 5-9th July 1999.

PNUD. (2001). *Informe sobre desarrollo humano*, San Salvador : Programa de las Naciones Unidas para el Desarrollo.

Vargas, Oscar. (2001). *Diagnostico de situación del municipio de Lamaria después de los terremotos de 2001*, San Salvador : Fundación Dr. Guillermo Manuel Ungo (FUNDAUNGO), 24 augosto 2001.

World Food Program. (2001). EMOP 10022.0 El Salvador 2001. Assistance to Earthquake victims, World Food Program.

THE EVALUATION OF COMMUNITY PARTICIPATION IN HOUSING RECONSTRUCTION PROJECTS AFTER THE DUZCE EARTHQUAKE

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Abstract

Housing reconstruction after earthquakes is a crucial issue because of physical, social, psychological and environmental effects. However, natural disasters may also cause the generation of physical, social and economic models that can realize urban and rural renewal in the settlement. Therefore, an improved strategy is the key to accelerate the reconstruction process for upgrading condition of human settlements. This paper examines the housing reconstruction process carried out in Duzce city that was heavily damaged by the Marmara Earthquake of 17 August 1999 and latterly Duzce Earthquake on November 12 1999. Priority of the Turkish government can be summarised as: firstly, physical reconstruction by means of reconstructing or improving the existing infrastructure and superstructure of the city as soon as possible and secondly, construction of houses for house owners only. The social and psychological situation of the affected population seemed to be not clearly considered in all reconstruction phases. In this study the problem of sheltering and housing after the disaster is determined and evaluated from emergency shelter to temporary housing and permanent housing in case of Duzce. For this purpose, primarily interviews are made with the administrators. Latterly questionnaires were conducted to determine users' expectation level about the shelters, housing units and their environment. Permanent housing projects are comparatively analysed according to the community participation level. Post disaster housing implementations are studied in a broad view including social, psychological and environmental variables. This study aims to assist design and planning guidelines for future housing project implementations.

Keywords: housing reconstruction; post-disaster housing; community participation.

Introduction

This study examines the impact of the social facts in housing reconstruction projects after earthquakes. Community participation is a key term to understand the communities social needs. The housing projects evaluated from social reconstruction point of view so that physical reconstuction is not solely give an answer to community needs. Also the interaction between social and physical reconstruction tried to be pointed out by criticizing:-

Is there a direct relationship between social and physical reconstruction of the community after earthquakes?

Does the community participation affect the succes of housing reconstruction projects?

The goal of the study is to find more satisfied solutions for victims by evaluating the housing reconstruction projects from social point of view. Turkey is exposed to various kinds of natural hazards sometimes causing substantial losses of life and property as a result of its geological, seismological, topographical and climate features (Tercan, 2000). In the last six decades the effects that natural disaster caused directly economic losses in Turkey approxiametly at the rate of 4% of the Annual Gross Income per Person (Ergünay, 1996). Turkey is located in the "Alpine-Himalayan Zone", which is the most seismic continental zones in the world. Most earthquakes take place in zones between gradually moving tectonic plates (Tercan,

Post-Disaster Reconstruction : Meeting Stakeholder Interests : Proceedings of a conference held at the Scuola di Sanità Militare, Florence, Italy 17-19 May 2006, edited by David Alexander, Colin Henry Davidson, Andrew Fox, Cassidy Johnson, Gonzalo Lizzaralde, ISBN 978-88-8453-611-2 (online), ISBN 978-88-8453-612-9 (print), © Firenze university press, 2007

2000). In the last 14 years approximately 385.000 houses were destroyed or damaged (Figure 1). Specially, after Marmara and Duzce earthquakes approximately 300.000 houses are collapsed or damaged. Emergency shelters were needed for 600.000 people. The shelter needs in Turkey after disasters cause different habitation modes, which can be summarised in these alternatives: i) Moving to shelters of friends and relatives ii) To move to a second undamaged house or rent a house. This option also includes using of empty public buildings iii) Organisation of camps or tent shelters beside the damaged buildings (Price et al., 2000).

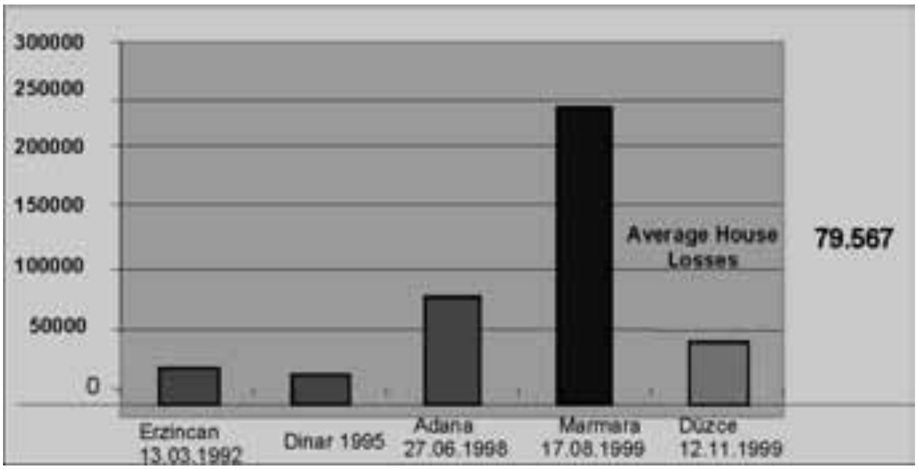


Figure 1. Distribution of housing losses in Turkey due to earthquakes (1992-99).

Results of the 1999 Earthquakes in Duzce

Duzce province is located on the North Anatolian fault line in Duzce plain (Figure 2). As a result of the rapid industrialization in 1980-1998, migration to the city from the rural areas increased and therefore housing demand rapidly increased. The total area of the city is 2593 km² and the population is 307.056 according to 1997 census, the density of 111 people/ km² which is much more than Turkey's average (83 people per km²). Rapid migration caused unplanned constuction in the city where users often added floors to old buildings which had been constructed on weak soil. New buildings were constructed rapidly with untrained labour and substandart material. Furthermore, there were no reliable control systems for building construction (Duzce Municipality Chairmanship, 2000).

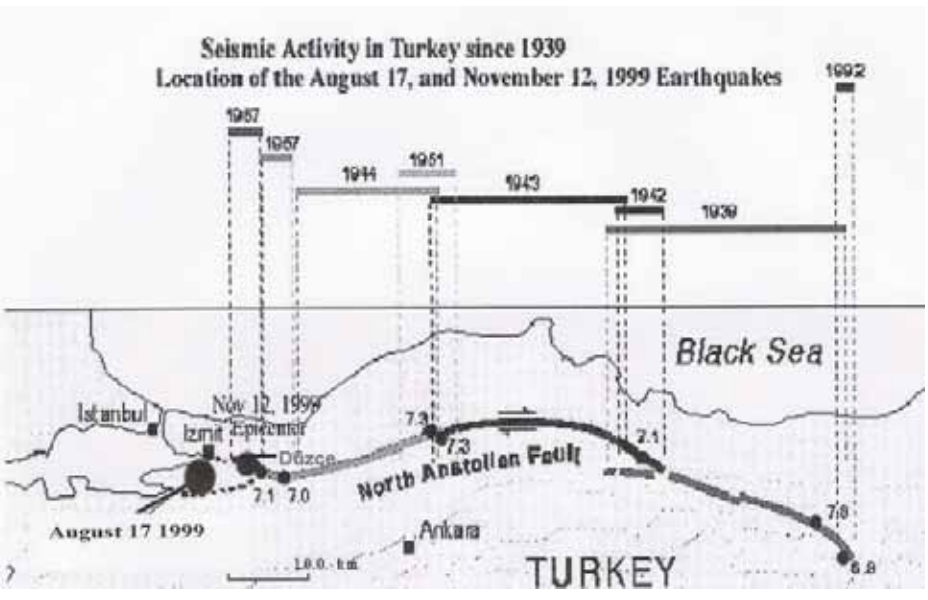


Figure 2. North Anatolian fault line and lof Duzce.

The devastating earthquake with, 7,2 magnitude occured in Düzce province on the 12th of November, 1999. Approxiametely 43000 buildings were damaged. Generally damages occurred 84% in houses and 16% in work places, 980 people died and 38939 were injured (Ministry of Public Works, 2000).

The Case of Duzce Post-Disaster Housing

This study examines emergency shelter and temporary housing implementations in Düzce. As well, the permanent housing process of three sites are evaluated and comparatively analaysed within the context of social approaches and community participation.

The studied areas are:-

- Permanent Housing Site
- World Bank Housing Site
- Beyciler Social Housing Site

The inititiative is given to construction of houses by the ministry of Public Works and Settlement in Turkey. The Ministry of Public Works and Settlement produced houses only for the home owners through the agency of contractors. In addition to this, Catholic Relief Services (CRS) and International Blue Crescent (IBC) gave donations for housing for the low income victims as well. But there was no effort on the tenant's housing problem. The only study was made by DEPDER (Association of Earthquake Victims), an NGO established after the earthquake but is still at the level of obtaining property for housing and therefore has not yet built any houses.

Post-Disaster Housing Processes in Duzce

National and international aid organizations, with the help of Red Crescent and civil defending directors, established tents cities; distributing 26,665 tents to 112,000 earthquake victims. However, some victims built the tents on their own. The first precaution that governorship took was to settle some victims to the state buildings in other provinces. Most of the victims refused to leave the city, since they wanted to be in contact with their relatives and friends, they also wanted to be in charge of funerals and they desired to stay in the areas of damaged and collapsed buildings. In the following phase, the decision for building a temporary earthquake house was taken by the Ministry of Public Works because of insufficient infrastructure of tent cities, the lack of protection from the climatic conditions and long construction time of permanent houses (Duzce Municipality Chairmanship, 2000). In duzce province, 6,669 temporary houses were constructed. More than half of the houses were donated by national and international aid organisations. Priority in rehabilitation process is given to the public property for temporary housing areas. Infrastructure facilities were made by the General Directorate of Construction Affairs (Duzce Governorship Public Relation Director, 2002). Altough 6 year passed after Duzce earthquake, 10 % of temporary housing areas are still in use.

The most important problem occuring in tent cities was the location of toilets-baths which were mostly located at the end of the sites. The location of hygene areas were difficult to reach especially for children and elderly peoples at night. In emergency shelter phase, central government was late in evacuation and demobilization phase of tent cities. So by time, the disaster region pulled the migration from the outside the province. The causes of migration were the desire of people who had insufficient income level to benefit from shelter and food services in the disaster region.

In the emergency shelter process, the community participation was at the lowest level. Because most of the victims were in a traumatic case even they had no injuries or damaged buildings. They were all in need for help. From the view points of organisors, these periods could be used for evaluation of the damages and effects of the earthquake and predicting the tool for the development of planning actions in temporary and permanent housing processes based on existing resources.

Temporary Housing Settlements

The bid with contractors for the construction of temporary houses were made after the selection of the sites and 3258 temporary houses were constructed by the ministry of Public Works and Settlement and 3.411 were donated by various national and international aid organisations. These houses are generally constructed in the state property especially in rural areas.

Generally social areas are found insufficient by the users (Figure 3). (Cosgun and Arslan 2004).

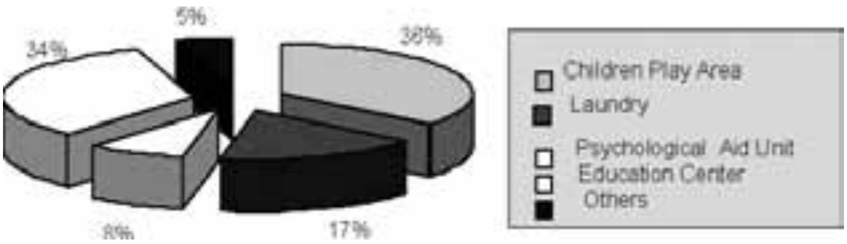


Figure 3. Expectations of social needs in Duzce temporary housing sites.

The construction process does not cover the community participation (Cosgun and Arslan, 2003). Thus, the lack of participation caused low maintenance and damages after the evacuation (Figure 4).

Figure 4. View of the temporary houses after evacuation.

Studies in Duzce showed that there was a gradual evacuation plan for temporary housing areas. The house owners were moved to permanent houses. Tenants were collected in two big temporary housing sites however the real situtiom was not as planned. Temporary houses were occupied by new settlers from different social groups. The existing users denied evacuating the houses. As a result the Central government used intended to turn off electricity and water of the sites for evacuation and demobilization.

Permanent Housing Settlements in Duzce

The Ministry of Public Works and Settlement was obliged to construct permanent Houses up to the number of house owners who were influenced by the disaster. The selection criteria were;

- Appropriate Soil Structure
- Property of the State

Some 8004 housing units were constructed in Duzce and primarily the ministry gave a grant to house owners who are willing to buy houses or to construct houses in their own properties.

New permanent housing sites were constructed by the Public Works after the occupancy of the temporary houses. The new settlement was 6 km away from the city center and was located in the northeast of Duzce between Kazıkoglu, Sallar and Nalbantoglu villages (Figure 5)(Ministry of Public Works, 2000).The permanent housing site is located on the outskirts of the Duzce Municipality boundaries and its size is approximately 350 hectares.

There are 14 regions in the new settlement and 7000 housing units. The houses are designed as 3-5 storeys. The victims moved to their permanent houses after the establishment of building lots (Figure 6-7). There are reserved housing lots in the settlement as well. The development of existing axis between the old and new settlement caused serious problems. In a prospective way new houses wil be built on these enriched agriculture property and this will change the whole ecosystem in this area. New houses have been built in this axle in last 2-3 years.

Although the decision for relocation of the housing site is given after the earthquake the transportation between old city center and permanent housing or work places have not been established yet. The filling of the property between these three points is not possible because of social and political forces of social groups which had work places in the old city center. The permanent work places in the permanent housing sites are not still fully used. The old city center has become more active by time and the city could not enlarge the outskirts of the new settlements

Figure 5. Duzce city and location of new permanent settlement.

The interesting situation is; although the central government transferred resources for infrastructure and construction of houses the connection way which is 6 km long between the new settlement and old city centre has not been finished yet.

The region can not adequately benefit from the municipality services because of still being outside the municipality boundaries. The striking point is that the religious buildings are constructed rapidly usually by the community donation. All the open spaces are arranged but the users have a low tendency to use these spaces (amphi-theatre, public gardens).

Figure 6. Permanent house type F plan.

Figure 7. View of the houses.

Yıldırım and Arslan stated the lack of community participation both in design and in construction processes of permanent housing site. They also found in a public survey which is conducted from 100 permanent house settlers that:-

- They had no information about the house cost and re-payment process
- They had transportation problems / options between the old and new settlement
- They expect to live in 2 storey houses rather than apartment blocks.

People coming from different income levels and social statue began to liveside by side in the same housing blocks because of the arrangements of building lots. Some of the house owners were village settlers before the earthquake and they reject to live in this type of life style. This shows the lack of organisation and effects to the social re-construction. People live in rural areas may have houses in their own places. Donating those houses in a new settlement does not mean they will live there. These social facts must be taken into consideration during the planning phase of post-disaster housing. Another problem is exposed from the old city settlers which had different life habits when they live in the old city. The work places are close to their houses so they do not use transportation vehicles and majority of them had houses with gardens so they have neighbourhood relationships. But new settlement offered them a public life, re-sponsibilities and much more isolation. But some users have not even left their old habits and they continued growing vegetables in the new settlements.

World Bank Permanent Housing Site

During the reconstruction process, the World Bank gave grant for construction of 622 houses. These houses projects were type (Figure 8). Social and cultural differences in occupants were not very well considered in the design process. Using typical housing layouts, cues or phrases in architectural and planning actions should cause critical solutions especially in flexible use of spaces implemented by The World Bank. Thus, the congruence level with behavioral pattern issue is completely neglected even in World Bank implementations (Ünlü, 1998).

Figure 8. World Bank typical house plan.

The houses were constructed with tunnel moulding system type and eventually this construction system blockades the flexibility of living in there. The height of the floor is 2.52 m and it is found low by the users. Houses had 2 rooms and 1 living room. The toilet and bathrooms are shared. The Europen-style toilet is found inappropriate by the users so that they were shared by the households. The plans were typical and they were not designed due to number of families and family composition. The window in the living room is found nonfuctional by the existing users. The flexibility of living room due to occupant's satisfaction level in World Bank Houses and Permanent Houses were shown in Table 1 (Uzun, 2006).

Different arrangements in Living Room and Satisfaction		Permanent Houses		World bank Houses		Total	
		F	%	F	%	F	%
Different Arrangements	Appropriate	48	48	31	31	79	39,5
	Inappropriate	49	49	64	64	113	56,5
	Undecided	3	3	5	5	8	4
Satisfaction Level	Appropriate	50	50	31	31	81	40,5
	Inappropriate	44	44	67	67	111	55,5
	Undecided	6	6	2	2	8	4

Table 1. Flexibility of living room and occupant's satisfaction.

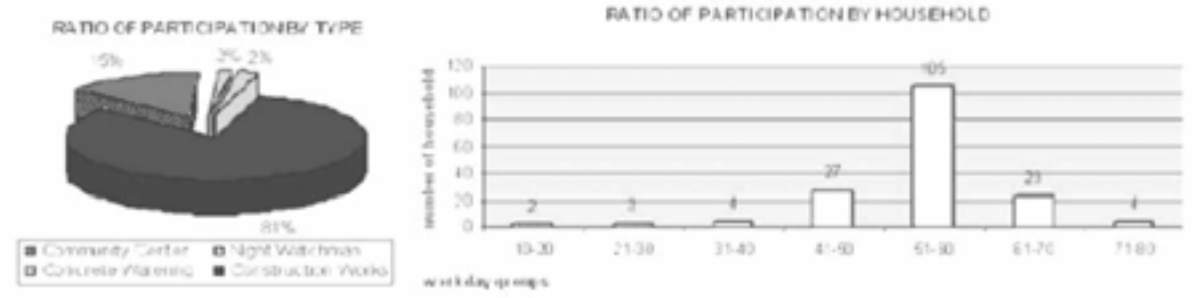
Table 1 indicates that % 55, 5 had dissatisfaction and 56, 5 % of occupant's think that they had no chance for different arrangements.

Beyciler Social Housing Site

By cooperation of IBC (International Blue Crescent) and CRS (Catholic Relief Service) Beyciler Social Housing Project started as a result of this cooperation. By the light of data IBC provide, CRS donate 2.500.000$ to the housing project prepared by IBC. IBC construct 168 house projects with social and management center to families which had no security.

The first duty was to select house owners in the project. Families were at the lowest income level. Construction of houses began in the first months of 2003. House owner's worked and participated in construction process (Figures 9 and 10).

Four independent houses were designed in adjacent order as a block type. Houses had an independent house characteristic. This approach is considered for efficient usage of the property and supported "neighbourliness" concept in a physical scene.



Figures 9 and 10. Community participation level in Beyciler.

Beyciler social housing project had an "Incomplete" delivery approach which the houses were constructed by the NGO's but interior of houses should be finished by the users (Figure 12). The ground floor serves a standard living area for an average family and is a "new beginning" opportunity. The users had a change to enlarge by their own efforts as well. "Incomplete approach" preserve low-priced, social characteristic of the houses and gives opportunity to construct more houses for families.

Families had chance to make changes in interior design. The flexibility of housing plan motivated the occupants to alter for their families. The observed attemptions can be indicated as below:-

- Living room and children room can be joined together and became a bigger living room,
- A door can be added to the hall,
- The living room's door can be eliminated and joined with the hall,
- Selection of Toilet (Either European Style or Turkish Style)
- Selection of interior paint colour due to choices.

Figures 11 and 12. Public participation in the construction of new houses.

Consequently, when Beyciler Social Housing Project and World Bank-Permanent Housing Project are compared according to their advantages as disadvantages. It can be pointed out from Beyciler Social housing Project that:-

- Were only open to low income families

- The houses constructed by the social house Project is 168 and has a small scale whereas the total house need is nearly 8000
- The people benefits from the project need help and organisation for the sustainability of the sites in future. This new NGO's should not be easily produced by the efforts of these low income families. So they need to be strengthened by the other NGO's.
- People can participate in different stages with different roles and tasks in the housing process.
- There is flexibility in design which includes possibilities for future changes.

On the other hand World Bank and Permanent house projects had;

- In the long run finance are made by the earthquake victims
- The users own completed houses and environments. But the lack of participation in housing processes caused not to meet their expectations and broken down their old social relations.
- There are no flexibility in house plans so that the construction systems were with tunnel moulding system type and with reinforced concrete skeleton.

Conclusions

The implementation of post-disaster housing showed that decision makers in disaster housing should consider all phases of housing process not only from physical point of view but also socially as well. The psychological reconstruction of the affected society should be considered from a humanitirian point of view as well as physical approaches. Determination of user expectations is the key word that should be used in design process and, it should convey a multi disciplinary approach to housing.

Participation of the victims in reconstruction process will not only help to produce sustainable environment but also it accelerates the reconstruction of the affected region. The Case studies in Duzce showed the lack of community participation in housing projects. The participatory planning process has a small ratio when compared to total housing. Thus, altough 6 years passed after earthquakes some of the victims are still living in temporary houses and some of them have dissatisfaction from the permanent house which they live in. The central government had a great impact on housing decisions in Duzce whereas the local government's role in the housing has not been defined yet.

Social and physical reconstructions seemed to be independent from each other, but they had an interation and they affect each other in the spatial usage decisions reciprocally. After the disaster or NGO's low level perception of the local culture may prevent to produce original synthesis for housing implementations. Thus, The success of post disaster housing implementation is much related to the planning and preparation process of the organizations and decision makers before the disaster.

In order to increase the community participation level and satisfaction of expectations is appropriate for small scale housing projects like Beyciler had to be joined. In this way, big housing projects which the municipality and NGO's had more contribution should be formed. This project should be planned according to cultural, social level of the countries and their ideological perspective so that they could be sustainable. So, housing reconstruction will be quicker.

Relocation of affected population to new and safe sites can be an effective tool to reduce the probable future seismic risk and to create a resilient community. But the evaluation of the case studies are pointed out that relocation has always effects on the behavioral attitude of the disaster victims by means of changing their daily activities like transportation, traditional life style, etc. Different people with different social statue and their old neighbor relations must be taken into consideration in order to gather them in the same or close neighboorhood. This approach will accelerate the congruence level of the society and will blockade the social segmentation. Adaptation problem for victims to the new settlement will be minimized as a result of change in the spatial organisation.

Evacuation and demobilization processes are crucial and they must be planned well either in emergency shelter or in temporary housing sites. Social mobility must be taken into the consideration and future projections should be made. The method of evacuation must be considered from social points of view as well.

Different organisations and stakeholders (not only house owners and low income families but also the tenants) should have roles directly in the housing process. Tenants had great impact on existing damages of the affected regions and poor quality construction of buildings rooted from the tenants demand.

For producing high quality buildings disasters may also boost for providing high quality buildings at the region, and this also make political changes. In that way, affected population should respond to their own needs. This should be done for accelerating the congruence level of the occupants, moreover social ties and bounds rather than separate them from each other. Therefore community consciousness should be formed. This will not only help the affected population to form new settlements but also new and sustainable communities quicker. Finally the reconstruction of the city will be in a short time and more effective.

References

Arslan, H. (2004) "Study of Temporary Housing Planning, Organisation, Production Phases and Research of Re-Use Potentials After Usage; Example of Duzce Province", Master Thesis, Gebze.

Cosgun N. and Arslan H. (2003) "Afet Sonrası Geçici Barınma Sorununun Planlanma-Organizasyon Açısından irdelenmesi", DepremSempozyumu, Kocaeli.www.beycilerevleri.org.tr (Accessed 20.01.2006)

Duzce Municipality Chairmanship, (2000) "12 September 1999", Duzce.

Duzce Governorship Public Relation Director (2002) New City New Life, Duzce.

Ergünay O. (1996) "Afet Yönetimi Nedir? Nasıl Olmalýdýr? Erzincan ve DinarDepremleri Isıgında Türkiyenin Deprem Sorunlarına Çözüm Arayısları", TÜBÝTAK Deprem Sempozyumu, Ankara.

Ministry of Public Works (2000) Research-Planning and Coordination Committee Chairmanship, Ankara.

Price R., Bibee A., Gonenc R., Jacobs S. and Konvits J. (2000) "Turkey Post-Earthquake Report", Report by OECD Secretariat.

Tercan, B. (2000) "*Post Earthquake Relocation Process in Yalova*", Master Thesis,Middle East Technical University, Ankara.

Unlu A. (ed) (1998) *Cevresel tasarımda ilk kavramlar*, ITU, Istanbul.

Uzun O. (2006), "Islevsellik ve Esneklik Kavramlarının Salon iç Mekanı ve DonanımıBoyutunda Analizi", Yüksek Lisans Tezi, Gazi Üniversitesi FBE, Ankara.

Yıldırım T. and Arslan, H. (2003) "Düzce Ili Kalıcı Konut Yapılanmasının Degerlendirilmesi", Deprem Sempozyumu, Kocaeli.

BUILDING CAPACITY FOR SUSTAINABLE AND PARTICIPATORY POST-TSUNAMI REBUILDING

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Abstract

Past experience has shown that through the need for swiftness of response, agendas in post disaster situations have tended to be driven by governments, donors and implementing agencies. Though acknowledging the need to contribute towards sustainable development through community involvement and processes of empowerment, programmes have tended to be delivered with a top-down and short-term approach. Practical Action that has set examples of the feasibility of sustainable development initiatives believes that recovery and reconstruction plans need to result in sustainable environmental and human development and be inclusive of marginalised sections of the society. Practical Action with its rebuilding objectives to inform and influence the rebuilding policy makers and planners and to build capacity of implementers, developed and disseminated information on the technologies and approaches, offered training for the professionals in rebuilding, provided on site technical assistance, and influenced the planners thus creating awareness. During the first year of reconstruction Practical Action has been able to introduce participatory approaches and community specific technologies that ensure environmental, conflict, gender and disability sensitivity, include disaster preparedness, build capacity at the local, and level leads to sustainable development. Namely they are community based boat building, road construction, and waste management approaches, decentralised disaster preparedness planning, disaster resistant housing, and sustainable livelihood development.

Keywords: disaster preparedness; environmentally sensitive; csensitive; gender sensitive; disability sensitive.

Introduction

The damage. In Sri Lanka, the tsunami that struck on the morning of December 26, 2004 left behind widespread destruction and killed over 35,000 people, completely destroyed over 50,000 homes, and damaged natural ecosystems, and coastal infrastructure. The North East region was worst affected by the tsunami.

The percentage of the coastal population affected ranges from an estimated 35 percent in Kilinochi to 80 percent in Mullaitivu and 78 percent in Amparai coastal district divisions compared to the southern districts of Galle, Matara, and Hambantota with less than 20 percent of the coastal population affected, albeit with scattered pockets of severe damage.

The waves penetrated inland areas up to 500 meters in many places, leaving behind few intact structures and killing or injuring tens of thousands of people. Coastal Infrastructure systems, including roads and railways, power, communications, water supply and sanitation facilities and fishing ports were severely damaged.

Official figures indicated that more than 35,000 people in SriLanka were dead and approximately 6,300 were reported missing; Displaced person estimates stand at 443,000, while the affected population is estimated between one and two million, out of a total population of approximately 19 million people. Estimates show the number of damaged houses at more than 85,000, of which more than 50,000 have been completely destroyed. The tsunami also damaged 24,000 boats (about 70% of the fishing fleet), and 11,000 businesses.

Post-Disaster Reconstruction : Meeting Stakeholder Interests : Proceedings of a conference held at the Scuola di Sanità Militare, Florence, Italy 17-19 May 2006, edited by David Alexander, Colin Henry Davidson, Andrew Fox, Cassidy Johnson, Gonzalo Lizzaralde, ISBN 978-88-8453-611-2 (online), ISBN 978-88-8453-612-9 (print), © Firenze university press, 2007

The damage to Sri Lanka's infrastructure is estimated to be over $1.7 billon dollars.

Problem. Globally Practical Action has witnessed that due to the urgency and scale of relief and reconstruction operations, the special needs of particularly vulnerable groups are often overlooked and participation in general can be minimal. In planning and implementing relief and reconstruction activities, it is vital to consider the needs of differing groups (e.g. of women and men and of ethnic and religious groups). Practical Action believes it is essential to ensure the needs of highly vulnerable people such as very poor households/communities, female-headed households, the elderly, orphans and people with disabilities.

Poor people are the most vulnerable to disasters and while this is understood by many agencies and relief practitioners, many programmes lack the practical approaches required to operate these concepts. In this light Practical Action recognised the need for practical demonstration of activities and support literature outlining processes in capacity building, along with supporting advocacy and influencing activities aimed at supporting these and achieving lasting change.

Agencies frequently overlook locally available resources, both human and physical has within relief and reconstruction operations in the region, with inappropriate materials and technologies and regionally inexperienced staff being used by many agencies. Within its own work Practical Action has also seen the direct correlation between community participation and the long term acceptance and sustainability of interventions across a broad range of disciplines and sectors.

This is the first national scale emergency response programme in which Practical Action Sri Lanka has been involved, previous interventions have been on a much smaller geographic level, affecting small population groups. In the Tsunami relief operations, we planned to gain greater insight in to the impact and appropriateness of its approaches at this larger level/scale of operation and also its capacity to influence the mode of operation of a range of actors with whom it does not routinely operate (i.e. expatriate heavy humanitarian organisations and wholly operational relief NGOs). We also are open to learning new approaches to advocacy and information exchange within this different operational environment.

The scale of the international response to the Tsunami disaster means there will be a large number of organisations implementing hands on programmes of relief and rehabilitation in Sri Lanka for some time. These range from large donors/implementers to government authorities, NGOs (both national and international), CBOs, individuals, private companies, religious institutions and community groups. These come with differing agendas, modes of operation, commitments (in regards to their time and duration of operation), technical capacity, outlook and previous in-country experience. Many were here for the relief phase only so could not be expected to have the long term impacts of their interventions foremost in their plans, whilst the vast majority (numerically) has no previous experience of working in Sri Lanka.

Due to the vast influx of organisations in to the country and the poor and deteriorating coordination offered by the government, standards and practices, both in terms of technical implementation and the level of involvement of communities affected in relief and reconstruction programmes, have been poor.

The exceptional financial response to the tsunami has also meant financial resource considerations have been less restrictive to the actions of implementing agencies than would be ‘normal’, a factor which may not necessarily be to the long term benefit of those affected, unless well managed.

Practical Action believes unless top down planning and resource intense approaches are changed, the long term recovery and sustainability of communities affected will be greatly harmed. It believes unless genuinely participatory processes, both in planning and implementation, are institutionalised within all implementing agencies, policies and programmes will both fail and fail those communities they aim to assist.

Project

The objective of Practical Action rebuilding programme was to influence the plans and practical implementation of reconstruction activities in Sri Lanka (and South Asia more generally), so that integrated, sustainable and participatory approaches to re-construction are practiced and promoted.

Practical action planned to achieve this through enhancing implementation capacity of a broad range of actors and dissemination and promotion of knowledge on the use of technology and participatory approaches to poverty reduction and disaster risk management.

More specifically practical action set up targets to ensure re-construction in Ampara, Batticaloa, Trincomalee Hamabantota, and Matara are disaster resistant, community based and participatory, ensuring social inclusion of people with disabilities and addressing, gender, environmental and conflict sensitive concerns for sustainable development of the affected areas.

Building capacities of a range of implementation organisations, including NGOs, Provincial and Local Authorities, Community Leaders and the Government agencies engaged in the implementation of the re-construction programme, for adopting/adapting pro-poor sustainable technologies and approaches was the key strategy for achieving these targets.

To take the messages across and to enrich the information base for rebuilding, information on pro-poor sustainable approaches were made available by Practical Action for appropriate use by relevant Government, Local NGOs and other Partner Organisations such as UN system Organisations and stakeholders in the areas of road, housing, coastal resource management, fisheries, livelihoods, solid waste management and Disaster Responsive Development.

Implementing Organisation

The *Intermediate Technology Development Group (ITDG)* was set up in the mid nineteen sixties, in Britain, by E.F Schumacher, economist and the author of the book "Small is Beautiful". After 40 years in 2006, ITDG changed its name to *Practical Action*. Today, Practical Action has widened its reach and works with communities in 7 countries – Bangladesh, Kenya, Sri Lanka, Sudan, Nepal, Peru and Zimbabwe with the head office in UK.

Practical Action is concerned about people whose needs often remain unheard or ignored. Practical Action uses technology that is people centred, to bring about positive changes to the lives and livelihoods of the poor and marginalised majorities. Our definition of technology is not confined to hardware; it takes into account skills, processes and relationships. We innovate and introduce technologies to help reduce people's vulnerability and increase their self-reliance.

To make informed technological choices, people need to understand their options, know what is possible, and choose - or create - what suits them best. ITDG facilitates access to the knowledge and experience needed to make these decisions.

To be effective facilitators, we learn from people, and share with them what we know. We find out what people are doing; and help them do it better.

We help local groups to strengthen their institutional capacities. We exchange views with professionals and academics involved in our areas of work. We work in partnership with people to stimulate imagination and creativity. This process helps to increase our knowledge and experience and to design technologies with a human face.

Impacts

Influencing for community centered approach to housing reconstructions. An analysis undertaken by Practical Action to understand the perspectives and issues in the housing reconstruction sector revealed certain gaps: inadequate community participation and consultation in the overall rebuilding process, lack of strategies to adopt participatory methods during planning and implementation, negative public perception on the progress of reconstruction efforts, with more emphasis on rebuilding fast, rather than rebuilding efficiently in a sustainable manner, lack of public awareness on technical aspects, such as the real time needed for constructing a house, and inadequate collaboration and coordination among and within the key stakeholders in the implementing and monitoring process.

Given this context the following mechanisms were introduced to the implementing organisations to integrate community participation in the planning process:

- Include both women and men from the community in the assessment, planning and implementing of housing programmes.
- Invite women and men who are leaders in the community to strategic planning meetings and discussion, to enable a better focus on ground realities, leading to more targeted strategies. . Identify and plan out the most useful forms of communication that can highlight and address the needs and concerns of women, men, and marginalised communities such as people with disabilities.
- Bring together the different village-level organizations working in the area and share the focus/mandate of these organizations and
- Make sure that community-level practitioners/CBOs secure the involvement of both women and men in the community in local organisations.

The approach promoted included the introduction of sustainable building material, disaster sensitive approaches to planning the reconstruction of devastated homes, how to minimize future disaster risk in housing design & construction, quality assurance measures of the construction process, and various cost effective construction technologies & options of providing access to basic services (roads, bridges, culverts, water, electricity, waste management, recycling etc.).

The technological options provided by Practical Action are Foundations using dry rubbles, stabilized soil in-situ formed walling, walls using interlocking stabilized blocks, walls using rap trap bond, arches technology, filler slab roofing options, timber "I" channels for roofing, Ferro cement shelving, and finishes to exposed brick walls, filler slabs, & floors.

The advocacy, awareness creation and capacity building efforts of Practical Action have been able to convince more than 16 organizations including the National Housing Development Authority and the Tsunami Housing Reconstruction Unit (THRU), the institute set up to coordinate post Tsunami house reconstruction, to adopt technology options and approaches that respond to community specific needs based on the community's own analysis, and respecting the community's rights.

Advocating for accessing community knowledge and skills for rebuilding fisheries. After the disaster, several government and non governmental organisations and individuals initiated the replacement of damaged boats, in particular, small and medium pelagic (sea-going) fishing vessels. These organisations used the standard designs of boats and fabricated in large quantities in existing boat yards mostly situated in major cities (Colombo, Negombo, Baticaloa, and Jaffna) transported to rural locations and distributed among the communities. Most of the organisations purchased boats and the other fishing gears and distributed among the affected communities based on the beneficiary lists that is prepared by themselves based on the surfacing factors or influenced by the powerful figures. This has resulted in real beneficiaries not getting what they lost, some getting more than what they had and many not getting what they need allowed by the local rules. However, it soon became apparent that in many cases the well meaning gestures were not of practical use to the fishermen, because the boats donated were mostly of a fixed design and not suited to the specific location. The designs differ from landing site to landing site in Sri Lanka based on many factors including the terrain and the types of fishing done in a given stretch of water. In a typical coastal fisheries village in Sri Lanka there are different types of fishing practices by community members agreed among them and in practise for generations.

The following gaps were identified in the replacement programmes:-

- Beneficiary selection process was unsatisfactory due to disputable nature and
- lack of transparency.
- Lack of community participation in the rehabilitation process, leading to a mismatch of needs with supplied resources.
- Potential and existing capacity of affected fishermen to contribute towards re-building their livelihoods was completely ignored.
- Oversupply of fishing vessels, hence potential danger of over fishing.
- Unseaworthy vessels being manufactured and delivered (poor quality). . Fishermen lacking confidence to resume their livelihood, due to the receipt of inappropriate gear.
- Lack of attention on quality control support to industries (eg. Boat yards).
- Communities lacking confidence in certain rehabilitation programmes due to lack of transparency and due to not meeting the community needs.

In order to avoid further aggravating the above problems, an alternative approach to rebuilding fishery livelihood was needed. Practical Action believes that communities affected are not just victims that they also have capacity and knowledge that should be taken into account in rebuilding programmes. Therefore Practical Action adopted and advocated a community based approach to repairing and building boats damaged and lost. Understanding the specifications of the type of craft fishermen need helped to modify standard designs of craft, to suit fishermen's requirement that varies based on the location. The specification of a craft that is used in a location will depend on, local sea conditions, wind speeds, fishing methods, etc. The process of participation also allows understanding the likes and dislikes of communities and specificities that will make the outcomes of the programmes sustainable.

The pilot demonstration of the community based boat building process and the awareness it created managed to convince the leading fisheries organisations such as Ministry of Fisheries and the FAO, the organisation mandated for coordination of fisheries rebuilding, to review the factory based boat building and distribution process and advocate ceasing that practice and adopting community based approach. FAO in collaboration with Ministry of fisheries also started off a post Tsunami recovery assessment on the fisheries sector, to find out how many fishing vessels were being used by fishermen, and if they are not used then the reasons that they are not being used.

Advocating for better coordination and sustainable livelihood development. It is estimated that almost 60,000 micro enterprises, employing approximately 275,000 people were totally destroyed by the tsunami disaster. The government introduced a three phase strategy to guide the implementing agencies: 1) immediate cash transfers to the affected communities; 2) cash for work programmes; 3) livelihoods rebuilding and economic activities.

However the livelihood rebuilding efforts by these organizations has the following shortcomings:-

- Confusion of the three instruments mentioned above, that are used in livelihood development and their use in different time frames.
- Less attention on knowledge transferring, more focus on donation of physical assets.
- Less attention on value chain development, mostly concentrating on superficial aspects.

- Less consideration on inclusion of disabled, gender sensitivity, conflict sensitivity, etc.
- Low awareness of the disaster resistance sustainable livelihood approaches.
- Lack of coordination between livelihood rebuilding agencies and duplications of efforts.
- Lack of experiences and know-how of agencies that are rebuilding livelihood.
- Lack of consideration on participatory approaches.

In this context Practical Action proposed a post-disaster livelihood development programme that focuses on long term economic development of the affected communities through building human capacity & infrastructure, proper natural resource management, and building sustainable linkages that finally reduce vulnerability to future disasters. Disaster resistance sustainable livelihood (DRSL) development approach that was developed by Practical Action through more than 10 years experience working with communities in disaster prone areas in the south Asian region was then adapted to the post tsunami context. The DRSL framework focuses on securing what has remained from the asset base and generating lost assets in a sustainable manner which is fundamental to livelihood rebuilding of affected communities. A community owned rural business incubation model has been suggested as a way of increasing access to asset bases that have been lost by the disaster.

The community owned rural business incubators designed to provide necessary infrastructure on shared basis, to coordinate livelihood development interventions within the village, to mobilise resources, to provide information to its members, to build entrepreneurial capacity, and to facilitate linkages.

Practical Action's role in the rebuilding was mainly on training of the livelihood rebuilding persons employed by NGO's and government organisations, lobby for coordinated livelihood development and advocating for disaster resistance livelihood rebuilding. Our efforts soon started having an impact on the livelihood development committees comprised of government and national/international NGO's requested Practical Action to facilitate development of district level strategies and plans for the livelihood rebuilding in Matara and Hambantota in the South. The approach was further recognised at national level by the Reconstruction and Development Agency (RADA), the new organisation established directly under the president of the country for coordination of the post Tsunami rebuilding. RADA requested Practical Action's assistance to formulate divisional level livelihood development plans initially in the districts of Hambantota and Ampara, the worst hit districts by the Tsunami in the South and the East. This will be replicated in total of 37 divisions along the Tsunami hit coast.

Influencing and capacity building on community based rural roads building approach and the technology. The tsunami caused serious damage to rural roads, including feeder roads, bridges, culverts, footbridges and access roads, in the Western, Southern, Eastern and Northern Provinces. Difficulty of access to some of the affected areas delayed rehabilitation activities including urgent construction work and distribution of relief and humanitarian assistance. This followed the destruction of linkages with service centres that served the coastal area communities.

Transport undoubtedly plays a positive role in the overall development of the affected areas. Re-building of rural regions has to be a major planning issue as a large proportion of the population still live in rural areas that are plagued by inadequate services and facilities and limited scope for improving living standards. Many research studies have well established the potential role of rural transport infrastructure including roads, bridges & culverts in facilitating flows of people, goods, services and information to villages to promote development.

In the rebuilding process priority has been given to the urban transport infrastructure, highways, railways and the bridges & culverts associated with those. Only few

NGOs paid attention to the rural transport infrastructure. These organisations with good intentions immediately attended and started repairing the roads through contracting firms but these projects resulted in poor quality and wrong designs. This was mainly due to two reasons: in comparison with the rebuilding of houses or fisheries there was no coordinating body to look into the rural transport infrastructure and the organisations who came forward to rebuild rural roads handled the reconstruction the way they saw fit. Secondly due to no consultation from the communities living in the area who had been using these roads, the implementers or the contractors did not get any understanding of the local conditions. For example some roads flood and erode during the rainy season if not properly designed. Unless the implementers allow the communities to participate in the designing stage this aspect wouldn't have incorporated into the designs and thereby constructions.

In response to this situation, Practical Action focussed mainly on creating a system that coordinated rural roads rebuilding and supported rebuilding plans and implementation programmes to adopt community-centred transport infrastructure and transport modes to affected communities in the East and the South.

To date we have been able to set up coordination committees for rural roads (grade D and E roads under the roads classification system in the country) Baticaloa, Ampara districts in the East and Hambatota, Matara districts in the South. These committees are comprised of the Pradeshiya sabas; the village level administration unit, Assistantcommissioner of Local government office and NGO's involved in the subject.

Through these coordination systems, the concept of community based earth road building approach and the technology was introduced. By now 37 km of damaged road strips in the costal villages of Baticaloa, Ampara and Hambantota districts were rebuilt using proper technology and with community participation by 10 government and non government organisations with Practical Action technical guidance.

The guiding principles advocated by the programme for the restoration of the rural transport infrastructure ravaged by the Tsunami were as follows:-

- Transport infrastructure provision should be location specific.
- Designs should be appropriate to the traffic, climate, terrain and environment.
- Local construction materials should be used where ever possible.
- Construction techniques should be appropriate for small contractors and local employment.
- Maintenance requirements must be in line with local government authority and Community resources.
- Connectivity provided should be reliable.

Advocating for decentralised disaster preparedness planning. Practical Action through its experience in the South Asian region has shown that without incorporating disaster sensitivity into development planning, desired impact can not be achieved from any development activity. One important precursor for this is the availability of an officially recognized, appropriate disaster management plan for any given area. As a response to the lessons learnt during the floods in May 2003, Hambantota district administration started to develop a district level disaster management plan. To strengthen the process with divisional level disaster management plans (not just disaster response plans but comprehensive disaster management plans which includes various mitigation, preparedness and response plans to minimize the impact of socio natural disasters on humans), Practical Action started to facilitate the divisional level disaster preparedness plan preparation process in Hambantota prior to December Tsunami. In this exercise the National Disaster Management Centre and the office of District Secretariat of Hambantota took the leading role while offices of Divisional Secretariats were assisting. The exercise facilitated by Practical Action covers 11 divisional secretariat divisions in Hamabantota while a disaster management plan is being developed for the remaining one division in Hambantota with the facilitation of UNDP. As a response to tsunami in December 2004, the same process was started in Ampara district as well. In Ampara plans are being developed for all the 20 Divisional Secretariat divisions in the district.

To develop a comprehensive disaster preparedness plan for any given divisional secretariat division requires a large amount of data. As this plan develops in line with the Disaster Management Act of Sri Lanka (No. 13 of 2005), the services of village level officers (Grama Sevakas) were obtained. In addition to that other village level government officers like Samurdhi animators, Agricultural Research and Production Assistants were also consulted when collecting relevant data.

The information that were collected at village level covered the broad range of village administrative, weather and climate, natural disasters, safety infrastructure (in a disaster), natural resources, human resources, institutional strengths etc. This information is useful in conducting the necessary analysis for disaster management strategy and plans development so as to understand and establish inter linkages between poverty, vulnerability, disaster and development.

There were many attempts from various organizations to develop 'isolated' disaster preparedness plans or disaster response plans in Sri Lanka. They were not widely accepted by the government or by the district administrations of respective districts as many of them were of 'project focused' and planned and implemented by NGOs without proper consultation of government mechanisms. The other gap in these plans is that they are very high focus on disaster response rather than other disaster management. As current exercise has taken steps to rectify these problems, for the first time the district administration has a uniform data base giving all information relevant to disaster management at their finger tips. The demand for this data alone is very high as at now but we hope once the disaster management plans are developed those will be a rich resource for any development organisations to design their interventions.

Advocating for adherence to the guiding principals of rebuilding and reconstruction. When the grief and horror of tsunami devastation seeped in, the concerned, and more than willing individuals, and organisations, helping the affected rebuild, found solace in the idea of 'building back better'. But, as focus shifted from rescue and relief to reconstruction, it became more than obvious that it is difficult to translate these ideas into reality. Some humanitarian agencies and professionals, who really understood the importance of the qualitative aspects in the process of building back better, raised this issue at first at the national level, making the government, with the support of UN agencies, set up guiding principles to oversee the recovery plans. These were:-

- The allocation of resources based on identified needs and local priorities.
- The principle of subsidiarity (decentralized approach)
- Consultation with affected communities and stakeholders.
- Communications and transparency in decision making and implementation.
- Reconstruction processes should reduce future vulnerabilities to natural hazards.
- Analysis of individual interventions.
- A co-ordinated approach to recovery.

Civil society organizations (CSO), in a statement to coincide with the Donor Forum in mid-May, strongly supported these guiding principles but expressed concern that 'in practice the almost complete opposite is happening'. The CSOs called for 'the Government to take action to ensure that mechanisms are immediately established to put into practice the guiding principles'.

Practical Action, as an organization that has set examples of the feasibility of sustainable development initiatives, believes that recovery and reconstruction plans need to be met if they are to result in sustainable environmental and human development and to be inclusive of marginalised sections of society. Our position is that reconstruction activities should be:-

- Participatory/consultative.
- Include disaster preparedness.
- Community specific.
- Environmentally sensitive.
- Conflict sensitive.
- Gender sensitive and
- Disability sensitive.

There is similarity between Practical Action and the Government's guiding principles. We give higher and explicit priority to the inclusion of marginalised groups, to the environmental impacts and to conflict sensitivity. Both sets of principles provide a sound basis for assessing the development effectiveness of reconstruction and to hold Government, donors and INGOs/NGOs accountable. However, very often there are many instances of CSOs & NGOs frequently not adhering to these principles. The gaps and issues which have surfaced in the tsunami recovery efforts is an example where the guiding principles have not been adhered.

In one way Practical Action throughout its interventions made an effort to conform to the guiding principles set out by it. The approaches promoted by Practical Action always made sure that those guiding principals are base for rebuilding. The approaches promoted by Practical Action such as community based boat building; the community based rural roads construction, Community centered house reconstruction, disaster resistant livelihood rebuilding, community based waste management and village level disaster preparedness planning well adhered to the above guiding principals. This has allowed us to influence large number of organisations to adopt approaches that are within the frame work of the guiding principals.

One year after the start of the recovery programme, Practical Action identified the need to review the extent to which the rehabilitation and reconstruction processes complied with these principles. Accordingly a workshop named "Building Back Better" was conducted in collaboration with the Disaster Response Monitoring Unit of the Human Rights Commission of Sri Lanka with the objectives of: establishing the extent of compliance with the principles during the past year, identifying problems and issues in applying the principles in real life, devising measures to overcome the problems and address the issues, and modifying the monitoring system to capture future compliance.

The workshop was well attended by more than 150 participants from government institutions, international NGO's UN agencies, local organisations and selected community representatives. The workshop deliberations which recommended means and ways of conforming to the guiding principals and further strengthening adaptation and monitoring of adherence were highly appreciated by the rebuilding agencies. Practical Action believes that this a great achievement in terms of our advocacy efforts to ensure building back better the lives of communities affected by the 2004 December Tsunami.

Key Lessons Learnt

Practical Action set up its core principals of rebuilding based on our experience on community based approaches that builds on the local capacities and strengthening village level systems. Through our experience we have validated that these approaches lead to sustainable development. The seven core principals for rebuilding adopted and promoted by Practical Action has now impacted the rebuilding process in Sri Lanka to a greater extent. Therefore the key lessons drawn from Practical Action rebuilding programme are that the rebuilding of lives, livelihoods and infrastructure of communities affected by a disaster should be *consultative, community specific, environmentally, conflict & disability sensitive, and includes disaster preparedness.*

Apart from the above key recommendations that one should follow in any development intervention including post disaster rebuilding there are other best practices that could be drawn from the Practical Action experience.

Conforming to the Rules that Govern Local Lives

In a panic situation after a major disaster organisations and individuals coming forward to help rebuild the community lives act in urgency not respecting to the rules govern the local lives such as interrelationships between the communities and the cultural/local values, ecosystems, frequent disasters, power structures and local administration systems. Therefore the interventions made in good faith can most of the time make the communities further vulnerable to complex environment they are pushed towards. Replacing of boats and fishing gears of fisheries communities is a good example of such situation. The case as explained in page 6 the fisheries rebuilding ended up in distributing inappropriate boats and fishing gears among affected fishing communities. The District Fisheries Office (DFO - government service providing and regulatory body) had a record of the boats that are licensed under it (after the Tsunami it was found that all the boats and traditional crafts are not registered) and had information about the different government approved types of fishing gears for the area. But the organisation did not refer to these practices, regulations and information has created greater conflict among the communities as well as between the communities and the local authorities. The process promoted by Practical Action well referred to these information and community self governed regulations and government regulations in place through community meetings, getting approval from the DFO and public hearing at village level. It has resulted in 100% accurate replacements of boats and fishing gears. It has given the lesson of the need to follow and conform to those rules and regulations that are practised within the communities as well as the local administration.

Interagency Co-ordination

The community based damaged rural roads rebuilding exercise can be used to draw another important lesson. In absence of a plan or a place to discuss the issue of rural roads infrastructure rebuilding many NGOs came forward to rebuild the village level infrastructure particularly roads rebuilding. Within weeks, their interventions faced many difficulties either due to inappropriate designs/construction or lack of permission from the local authorities. There were also situations where NGOs competed for roads that they wanted to build.

Understanding this context Practical Action first intervened to establish a system that coordinates this aspect of the Post Tsunami rebuilding. Practical Action knew through its experience in the rural roads sector that the Pradesiya Sabas and the Office of the Assistant Commissioner of Local Government jointly share the responsibility of construction and maintenance of rural roads classified as grade D & E. Therefore Practical Action invited these organisations and organisations interested in rebuilding these roads to come to one table, discuss, plan and implement the rebuilding. This resulted in greater coordination between the organisations through monthly meetings and frequent dialogue. This example highlights the need for coordination between the relevant administration authorities, line ministries, implementing organisations and the communities.

Need for Guidance and Capacity Building

The rebuilding programme of Practical Action during its first 9 months of implementation has build capacities of 114 professionals of 39 organisations, 5081 technicians/craftsmen, and 2805 Community leaders on various aspects of rebuilding explained in the paper above who are now engaged in rebuilding work satisfactorily. The requests for similar capacity building programme have ever been increasing. The programme also have shared on request 20 copies of the Video "Facing Disasters Making Decisions; Gender Dimensions in Disaster Management", 14 copies of the book "Disaster Communication" and 17 copies of the book "Gender Dimensions in Disaster Management; A Guide for South Asia" with different audiences. This shows that there is a great need for information, capacity building, and guidance among the implementing organisations in a rebuilding context.

The 'Building Back Better' workshop has got the attention of almost all the leading INGOs and the government rebuilding agencies (150 attended).All the participating organisations are in consensus that guiding principles and implementing mechanisms plays an important role in effective and sustainable rebuilding. They are also on the agreement that constant monitoring and evaluation of adherence to guiding principals should be an essential part of the rebuilding. The interest shown by these organisations on the consequent discussions and implementation of the recommendations of the workshop further confirms the need for proper guidance.

In a post disaster situation it is a fact that a country receives fairly large response from foreign agencies new to the country context. It is also clear that a post disaster rebuilding efforts create much higher demand for professionals and construction technicians to be within a very short period. It is therefore can conclude that the rebuilding policy makers should ensure capacity building and guiding plans are in place for the benefit of the organisations coming forward to assist rebuilding.

CULTIVATING RESILIENCE: THE REHABILITATION OF HOMESTEAD GARDENS IN POST-TSUNAMI SRI LANKA

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Abstract

Agricultural rehabilitation is a key sector in disaster management as it links food security, livelihoods and environmental management. The overall aim of this study was to identify conditions that affect the resilience of agricultural systems, and how rehabilitation approaches can contribute to strengthening resilience, as well as meeting immediate needs. Household and organisation interviews were carried out in Sri Lanka, focussing on the impacts and recovery of homestead gardens that had been affected by the 2004 Indian Ocean Tsunami. This study identified agronomic, social and developmental pre-disaster conditions that impacted the resilience of homestead garden systems. Ecological agriculture approaches, agronomic and livelihood diversity and community networks were found to strengthen the capacity of the households to withstand and recover from the tsunami. Inappropriate development appeared to have increased vulnerability of households. A range of approaches to agricultural rehabilitation was being implemented; this study ascertained that they are likely to have variable positive and negative impacts. This research adds to the new and expanding body of work on agricultural rehabilitation and linking relief and development and will be used to develop a tool for agencies to improve the sustainability of agricultural interventions.

Keywords: agricultural rehabilitation; ecological agriculture; homestead gardens; livelihoods; resilience; sustainability.

Introduction

The agriculture sector can be severely affected by disasters, and particularly in lower income countries where agriculture is frequently the primary livelihood for the majority of people. Agriculture can be affected in many ways, through the destruction of crops, soil fertility, infrastructure, inputs, land and human capacity. In terms of agricultural systems resilience refers to the food security, income and cultural functions. The investigation of factors that contribute to agricultural resilience is a relatively new field, however the identification and development of approaches to improve the resilience of agriculture to disasters is an increasing priority for many organisations working in relief and development and innovative approaches to rehabilitation are being developed to this end.

Recent research on the impact of disasters on agricultural systems and the sustainability of agricultural development and rehabilitation have highlighted cases demonstrating greater resilience of traditional and ecological agriculture over high external input conventional agriculture. For example ecological agriculture practices, such as terrace bunds, cover crops and agroforestry, were found to be more resilient to the impact of Hurricane Mitch in Central America in 1998 (Holt-Gimenez, 2000, 2002). Social systems are also important and a study across six countries identified the vital role of community based organisations in supporting the recovery of agricultural livelihoods (Battista and Baas, 2004).

Disaster management actors are increasingly conscious of the potential longer-term impacts of post-disaster agricultural rehabilitation approaches. For example, recent research has found that the distribution of imported seeds to farmers can un-

Post-Disaster Reconstruction : Meeting Stakeholder Interests : Proceedings of a conference held at the Scuola di Sanità Militare, Florence, Italy 17-19 May 2006, edited by David Alexander, Colin Henry Davidson, Andrew Fox, Cassidy Johnson, Gonzalo Lizzaralde, ISBN 978-88-8453-611-2 (online), ISBN 978-88-8453-612-9 (print), © Firenze university press, 2007

dermine growers' choice of crop diversity and local seed markets and lead to the introduction of inappropriate crop varieties. In response to this a seed fair and voucher system is now used by some NGOs (non-governmental organisations), to facilitate farmers access to seed from regional seed merchants in exchange for vouchers, thus enabling farmers choice of locally appropriate crop varieties and supporting regional seed systems (Sperling and Longley, 2002).

A higher-level approach to linking stages of the disaster cycle to improve agricultural resilience has been developed by the UN Food and Agriculture Organisation (FAO) in the form of a Resilience Analytical Framework for assessing the health of food security systems and their capacity to withstand a shock. The framework addresses both the immediate and longer-term needs of communities by providing outlines relating to immediate access to food and methods for improving rural development and productivity. Based on this framework, intervention strategies that will improve the resilience of a food system should be based on four principles: strengthening diversity; rebuilding local institutions and support networks; reinforcing local knowledge; and building on farmers' ability to adapt and reorganise. The approach prioritises both technical aspects of production such as access to inputs, land, infrastructure, credit and markets, and the knowledge and social aspects such as community networks and social safety nets (Pingali *et al*, 2005).

The research on which this paper is based was carried out in Sri Lanka following the Indian Ocean Tsunami of 26th December 2004. Sri Lanka was one of the countries worst affected by the tsunami, both proportional to its size, and in absolute terms. 68% of the coastline was hit, causing over 35,000 fatalities, and displacing over 500,000 people. The impact on livelihoods was severe, and in the affected areas nine out of ten income earners lost their source of livelihood. Although less widely covered by the media, agriculture was the most severely affected sector after fisheries. While the coastal areas are not the most important in Sri Lanka for agricultural production, agriculture is a very important part of the livelihoods of many coastal dwellers. The tsunami affected over 4,200 hectares of agricultural land and over 9,000 farming families and, in addition to this, an estimated 27,710 homestead gardens, which are an important source of fresh and nutritious food and income for many families (UNDP, 2005, FAO, 2005, Green Movement of Sri Lanka, 2005).

The tsunami had many short and long term impacts on agriculture. Inundated ground crops were invariably destroyed, either being washed away, or dying later from the increase in salinity. Many trees were uprooted and, of those that were not, many species were killed or badly damaged. In some areas a thick layer of sediment was deposited, and fertile topsoil was also washed away. Large debris prevented cultivation on many areas of land, and the clearance of these was one of the first tasks in the recovery effort. Inundated land was contaminated with salt, although well-drained areas were desalinised following rains and flooding shortly after the tsunami. There were also significant losses of livestock, stored equipment and inputs such as seed, tools and irrigation and processing equipment, and infrastructure such as sheds and roads (FAO, 2005, Green Movement of Sri Lanka, 2005).

Aims of the Study

The aim of this study was to identify conditions that affect the resilience of agricultural systems, and how rehabilitation approaches can contribute to strengthening resilience, as well as meeting the immediate need to improve production and livelihoods. The study builds on previous research on the resilience of agriculture to disasters and different approaches to rehabilitation and their potential impacts on the longer-term sustainability and resilience of agricultural livelihoods. The research used indicators of resilience and long-term sustainability to evaluate the impact of the tsunami on agricultural rehabilitation approaches.

The main objectives of the research were:-

- To identify social and ecological pre-disaster conditions that affected the impact of the tsunami on homestead gardens and/ or facilitated its rehabilitation.
- To identify the agricultural rehabilitation activities of government and NGOs and evaluate how they impact the longer-term development and resilience of homestead garden systems.

Methodology

The survey focussed on homestead garden production in three districts of Sri Lanka affected by the tsunami. A combination of agronomic, social and economic resilience indicators were investigated, based on existing research and analysis of agricultural resilience and sustainability. A qualitative research approach was the most appropriate to address a broad range of issues in sufficient depth, given that respondents were diverse and that no pre- or immediate post-disaster baseline data was available on individual interviewees. The survey was carried out in three districts of Sri Lanka to represent different agro-ecological and socio-economic regions: Matara, Hambantota and Ampara districts. The selection was undertaken with the help of the University of Ruhuna and national and international NGOs.

Household and focus group interviews were held with homestead growers affected by the tsunami. Information was gathered on the agronomic system (types of crops, methods of cultivation, processing activities); the impact of the tsunami on basic needs, cultivation, food security and income; whether cultivation had been resumed; and any assistance that had been received. The information was triangulated through observation during plot walks and information from neighbouring growers. Interviews were held with government organisations and NGOs working on agricultural rehabilitation and development and further information was gathered through participation in meetings, informal discussions, email correspondence, and participation in a web-based discussion group on agricultural rehabilitation.

Discussion

This study identified several key themes relating to the pre-disaster conditions that impacted the resilience of homestead garden systems to the tsunami, and the potential short and longer-term impacts of agricultural rehabilitation aid on food and livelihood security and resilience, discussed below. These themes substantiate the emerging concerns relating to agricultural resilience and rehabilitation aid, which should form the basis for further in depth investigation and analysis.

Pre-conditions Relating to the Resilience of Homestead Gardens

The sustainability and resilience of locally adapted natural resources. Following the tsunami coconut palms were one of the few crops to consistently survive the inundation. Coconut trees are superbly adapted to coastal conditions being salt and drought tolerant and with flexible trunks, which absorb the energy of wind and waves. Although some trees were uprooted, because of their adaptation most withstood the impact and survived the increased soil salinity levels. All households interviewed for whom a significant proportion of their income had come from coconut production were still making this income following the tsunami, and for several households this meant that they were still earning about half of their pre-tsunami income.

Farmers around the world use specifically adapted crops to spread the risks relating to hazards such as climate fluctuations and pest attacks. For example, in drought prone areas farmers have traditionally included some drought resistant crops in their cultivation. Flood prone communities, such as those in Bangladesh, also manage this risk by using adapted rice varieties and other crops. However, within current trends towards the intensification of agriculture and focus on commercial crops such adapted varieties are being less utilised and lost (Mogina, 1999, Mortimore and Adams, 2001, ITDG-B, 2002). The coconut industry has traditionally been fundamental in the Sri Lankan economy and coconut products are used in food, industry (eg. rope, sacks for tea) and construction (eg. roofing, timber). However competition from other products such as plastic rope and sacking is impacting the market for coconut products. In response to this there are calls to modernise the traditional coconut industry rather than allow other products to take over.

Living barriers – the multiple functions of hedges. The large-scale protection provided by natural coastal buffers such as mangroves and other natural coastal vegetation has been confirmed by countless examples following the 2004 tsunami. A United Nations Environment Programme (UNEP, 2005) study found that, even on a small scale, natural barriers such as mangroves lessened the force of the wave, protecting both property and lives. This study found that living fences planted as part of an ecological farming system offered similar protection. This was clearly demonstrated by two adjacent holdings surveyed in this study, one of which was surrounded by a living fence, while the other was exposed to the sea (as shown in the pictures below). Both of the householders suggested that the vegetation had made a difference in the impact between them. Several other households mentioned living fences and vegetation as a mitigating factor to the tsunami impact. Furthermore it was observed that all surveyed households that had traditional diverse homestead gardens received generally lower impacts on home infrastructure and basic needs, such as shelter and access to water and sanitation facilities.

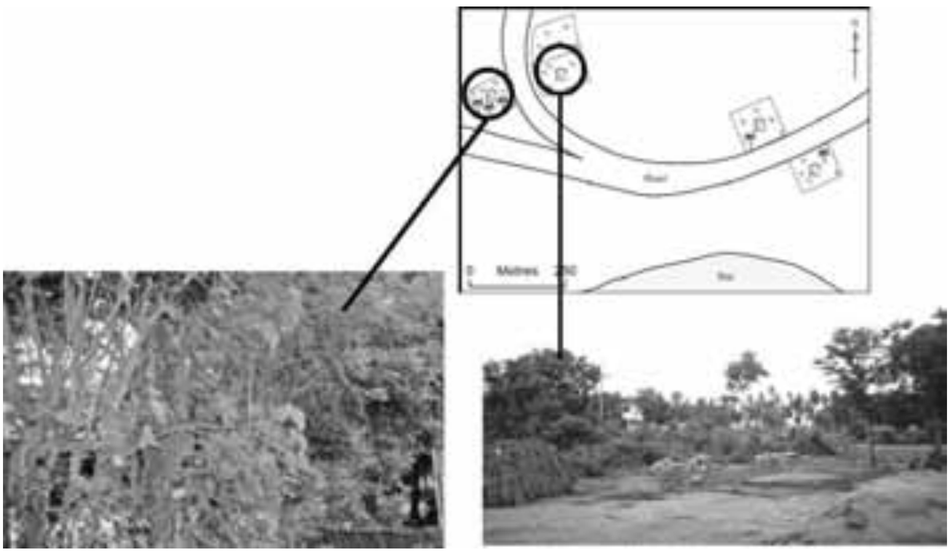

Figure 1. Differing impact of the tsunami on neighbouring plots.

Figure 1 shows the different impact of the tsunami on neighbouring plots as shown on the sketch map. Both were about 470m from the coast, however one household was surrounded by a living fence. The exposed house was completely destroyed along with crops and possessions. The other house was only partially damaged and many of the trees survived.

Living fences in Sri Lanka comprise a variety of species, often including leguminous (nitrogen fixing) species such as *Gliricidia* and *Leuceana*. They are particularly beneficial for tropical soils as they enhance fertility, provide shade from intense heat, and the leaves of many species can be used as a mulch to add organic matter to the soil, or as animal fodder. These species also seem to have been resilient to the impact of the tsunami, with many surviving sea-water inundation and, in one plot, numerous *Leuceana leuceophala* appearing as volunteer plants and growing vigorously.

Trees have multiple functions that can mitigate the impacts of such hazards: root structures stabilise soil, reducing erosion and the risk of landslides; in an agronomic context trees add nutrients and organic matter to soil, improving water retention and fertility, and many species provide food and animal fodder; trees form a barrier, slowing strong winds and the process of water inundation, and, as a last resort, can also be used by people to cling on to in such events (Sivakumar *et al.*, 2005). A key characteristic of ecological farming systems is the integration of multipurpose trees. The Holt-Gimmenez study (2000, 2002) in Central America following Hurricane Mitch found that ecological farms were more resilient to the impacts of the hurricane as a direct result of the different practices, specifically the greater density of trees acted as a barrier and mitigated erosion.

The importance of community networks. This study has found numerous examples of individuals and community groups facilitating their own rehabilitation, and mobilising to assess needs and request appropriate external assistance. Several farmers CBOs (community based organisations) established before the tsunami had reconvened in order to access inputs, identify needs and apply for funding to meet them. They were aware that they had a greater capacity and chance of being responded to as a group than as individuals. One group had collected some money from each member to send off a soil sample to test if their soil was suitable for cultivation. On finding that it was suitable for cultivation they made applications for assistance to several NGOs in the area.

Many individual households displayed a great degree of resourcefulness towards reestablishing their livelihoods and those of their community. One individual, from a community that had lost many of its agricultural inputs, had accessed seeds from some distance away for himself and other community members, although this was not under the umbrella of a community group.

People have always had to manage catastrophes and, before the advent of the institutionalised humanitarian response, coping methods were based within family and community networks. The vital role of community response to disasters is increasingly recognised by the disaster management sector, and the 2004 World Disasters Report (IFRC, 2004) focussed on community resilience in situations such as the Bam earthquake and the Afghan crisis. The local communities are present at the impact of a disaster and know the culture, landscape and infrastructure of the area and are thus able to direct the recovery and rehabilitation process appropriately.

Resilience through diversification of livelihoods. Diversification of income generating activities and off-farm employment in rural communities are recognised as important factors in the development of sustainable livelihoods. Many households take on additional activities such as processing and sale of agricultural produce, contract work, crafts and niche foods and products (Hussein, 1997). Many of the interviewees in the survey were engaged in off-farm employment, such as office work or contracted farm labour, or non-land based agricultural activities, such as coir processing, mushroom cultivation or seedling production.

All of the interviewees who had diversified sources of income, had continued to gain some earnings following the tsunami. Those engaged in off-farm employment had resumed this work following the tsunami, and none specified that this employment had been severely affected by the disaster. The households surveyed that made their main income from coir processing, mushroom production, and seedling cultivation had been able to resume their work, albeit on a smaller scale. Two significant factors appeared to contribute to this. As the activities are not landnificant factors appeared to contribute to this. As the activities are not land-based, they were not constrained by damage to land, and growing substrates and necessary equipment could be brought in from unaffected areas. This facilitated the rehabilitation of such livelihoods, as the inputs and equipment required were specific and could be readily identified by the householder and aid organisations for replacement.

The impact of inappropriate development. In one survey location in the Hambantota district all households interviewed remarked on a dam that had been built about 15 years previously. Prior to this seasonal flooding had brought fertile sediment to the land, but the dam had altered the river flow preventing the flooding. Agrochemicals were widely promoted by extension system in the 1970's, and growers mentioned that following the dam construction they had had to further increase their fertiliser use and that there were fewer coconut trees. The dam had been an Asian Development Bank (ADB) project aimed to increase irrigated land in the district and create a location where communities from other congested parts of Sri Lanka could settle. However, a combination of factors resulted in the project being - according to the ADB itself -"less than successful", and, despite some improved infrastructure in the area, it achieved none of the primary aims (ADB, 2000, Green Movement of Sri Lanka, 2000).

After the tsunami growers not only lost their crops, but still had the debt incurred from purchasing the inputs. One household was compelled to use government relief money to repay its debt, and would have to take out further loans to buy inputs for the following season. Several households mentioned the high cost of inputs, and one described that they took out a loan at the start of each season to buy inputs that would be repayed with income generated from the sales of the crops. However, one grower stated that profit margins were comparable in high and low input systems as the higher yield of the latter was offset by greater spending on inputs. The diagram on the following page shows hypothetical links between the dam construction, promotion of green revolution technologies and the vulnerability of the community.

Inappropriate development and natural resource management have frequently had unprecedented negative effects on communities' livelihoods and resilience. In the case of the tsunami, the unsustainable harvesting of coral reefs and mangroves was found to have increased the impact of the wave. Other impacts of development, such as the destruction of forests, increased dependence on external markets and the development of settlements in hazard-prone areas, have also served to increase vulnerability across the globe (Pelling, 2003).

The sustainability of agricultural rehabilitation aid

Due to the timing of the study it was not possible to evaluate the impact of agricultural rehabilitation approaches. However, initial activities and responses have been evaluated in the light of other research on agricultural rehabilitation.

Agronomic assistance. Although many of the agricultural rehabilitation programmes were only in the planning stage, several others were in the process of implementation. These included the distribution of hybrid vegetable seeds and packages of paddy seed and fertiliser. The longer-term impacts of the distribution of hybrid vegetable seed has potential negative impacts on local agricultural bio-diversity and the accessibility of appropriate planting material in subsequent seasons. In this survey almost all of the growers interviewed in the survey saved their own seeds for planting. Based on results from other research (e.g. Sperling and Longley, 2002) the distribution of imported hybrid seeds could undermine the use of locally adapted traditional crop varieties, challenge local seed saving and distribution networks, and may not comprise varieties best adapted to local growing conditions.

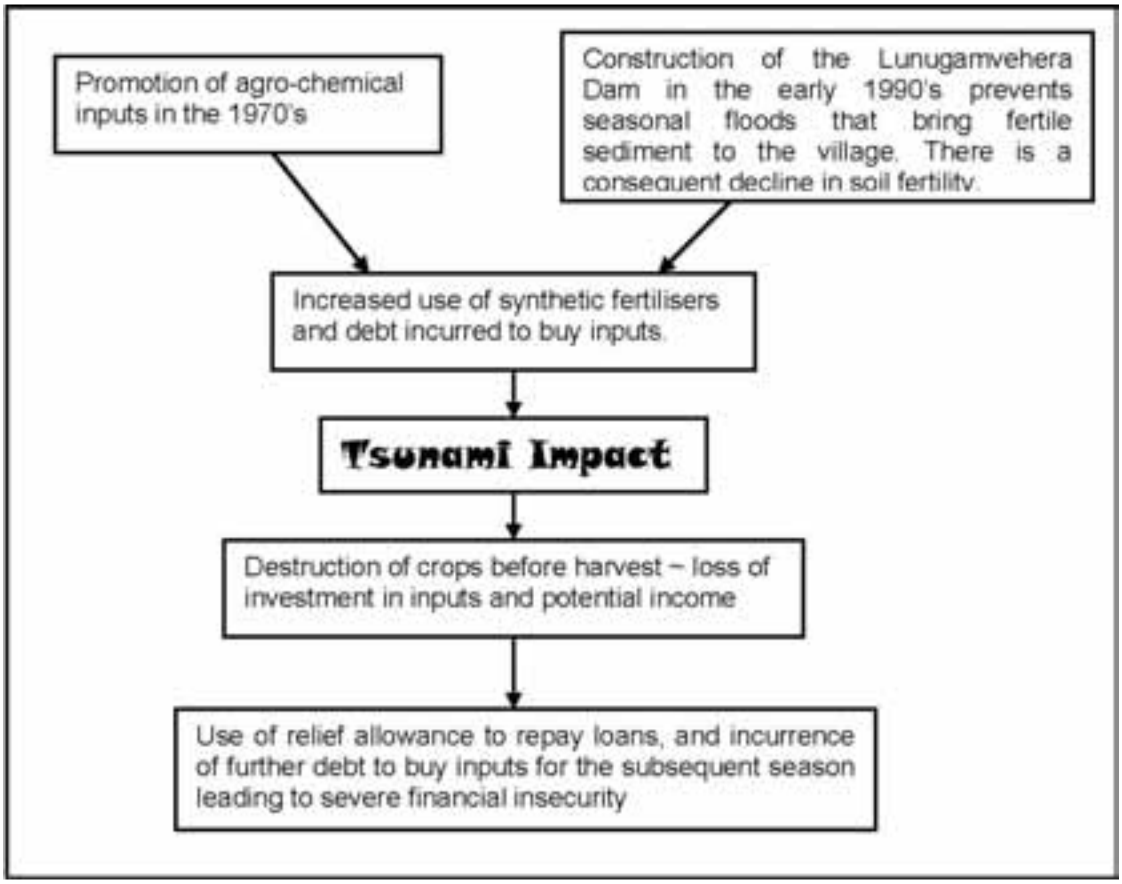

Figure 2. Hypothetical flowchart linking dam construction, promotion of green revolution technologies and vulnerability of the community.

An analysis of food security interventions in East Africa identified specific conditions in which seed distributions may be appropriate: when targeted households lack seeds; there is a general lack of availability of seeds of the right quality and; this lack is limiting production (Levine *et al*, 2004). The impact of the Tsunami was an unusual disaster in that the impact was limited to a small band along the coast. Thus, although many farmers own stores of seed may have been lost, there was no reason to believe that seed availability had been impacted on any larger scale. One international NGO, known for its innovations in agricultural rehabilitation approaches, had organised seed fairs at which farmers were given vouchers exchangeable for seeds from regional seed sellers. Along the same line, a national NGO had organised a farm fair where farmers were given vouchers to exchange against different inputs including a variety of tools, seeds, fertilisers and pesticides. Farmers had a choice of what to buy, but quantities of pesticides and fertilisers were restricted for environmental reasons. This approach can support local agricultural input systems and enable farmers to choose the products that are most familiar or appropriate to them.

Some of the post-tsunami agricultural programmes identified in the survey were designed specifically to minimise aid ineffectiveness and negative side effects. Some organisations offered distributions on a part grant/ part loan/ part training basis in order to stimulate beneficiaries' investment in the programmes and reduce the possibility of conflict over, or ongoing reliance on, handouts.

The methodological approach to needs assessments and project design can also impact the longer-term impacts of agricultural rehabilitation programmes. Several NGOs carried out assessments using PRA (participatory rural appraisal) methods or through community and regional committees. These approaches aim to stimulate community participation in, and ownership of, rehabilitation. In these cases the organisations anticipated integrated programmes, with agriculture likely to be a significant component, but also to include health, nutrition, education etc.

Psychosocial rehabilitation and agriculture. Since the 1980's there has been increasing attention to the psychological needs of disaster affected populations in addition to their physical and material needs. A diversity of relief and rehabilitation approaches have emerged to address these issues, including psychiatric care, counselling, religious/ spiritual ceremonies and community social activities. Due to very high levels of fatalities in certain locales, the tsunami had a severe impact on communities in terms of their human capacity: their well-being, households and livelihood resources, as well as their social networks, and these impacts were widely noted and many programmes implemented to address these issues.

Many householders expressed depression and a lack of motivation due to the loss of family members, insecurity from being in temporary shelters and fear of further tsunamis. Several organisations identified these problems as major constraints to the rehabilitation of livelihoods. There were several agricultural or agro-processing programmes with a specific psychosocial focus. For example, one international NGO was implementing community activities such as coir spinning, dying and weaving, and home garden promotion. The primary aim of these was to bring people together in order to build community spirit, motivation, confidence and skills, with a secondary outcome on potential income generation.

A subtle but potentially significant psychological effect was observed as a result of the emphasis on the impact of salinisation on agricultural lands, in assessments, the media and public information. Several growers stated that concerns about soil quality and salinisation were preventing them from re-planting. However, of those that did replant, only a few experienced lower yields than 'normal', and this was variously thought to be because of lower soil quality or lower rainfall than usual. Some growers seemed entirely satisfied with their crops, and one group had a soil test that showed no adverse levels of salt. However, many people were reluctant to invest in the work and inputs needed for re-planting when they were not convinced that the crop would be successful. Although there was some soil testing by the Department of Agriculture, primarily for paddy land, there seemed to be little institutional support for soil testing or assessing the viability of planting at the homestead garden scale. One individual had set up a small trial plot of several different crops to establish whether they would grow and thus would it be feasible to plant field scale crops. However information about soil quality testing and possible approaches to trials to test the land had not reached any of the growers interviewed. This impact of concern around excess salinisation was also observed in a post-tsunami programme in Banda Aceh where replanting was postponed by many organisations due to concerns about salinisation. However, one organisation that did replant trial areas of paddy found no adverse effect of salinisation and observed a hugely beneficial psychological effect from seeing the new crops growing (Bradbury and Stewart, 2005, Bradbury *et al*, 2005). This impact demonstrates the importance of accurate information provision in post-disaster situations.

Conclusions and Recommendations

This study has identified factors relating to the agronomic and social resilience of homestead gardens to the tsunami in Sri Lanka and the interactions between these and rehabilitation and development aid. The findings are supported by theory and the findings of other studies regarding disaster impacts and interventions, and thus lead to recommendations on approaches to rehabilitation and development and suggestions for further research. Because the context is geographically localised - impact along the coast and up to 5km inland - the issues around agriculture relate primarily to livelihoods rather than food security. However, if extrapolations are possible to other hazards with less localised impacts, food security may also be affected making the resilience of such systems imperative.

Enhancing the resilience of homestead gardens. This study identified agronomic, social and development pre-conditions that enhanced or weakened the resilience of homestead gardens. In terms of linking development with disaster mitigation, the findings of this paper and other similar research should be integrated into agricultural development programmes and information networks.

Resilient agronomic conditions identified were based on ecological agriculture principles of diverse cropping systems including the use of locally adapted crops, in this case often the coconut and multi-functional living fences. Households in this survey with diverse livelihood options were also found to have recovered at least part of their livelihood activities. Ecological approaches were not actively promoted in government agricultural extension or information networks, and only in a few NGO training programmes operating in the field sites. Given the good uptake of methods promoted through extension and training, it is important that this service provides balanced information on a variety of approaches, their problems and benefits. Development networks should also promote diversification of appropriate crops and livelihood options.

The impact of inappropriate development on vulnerability was demonstrated in this study through the example of the dam construction and the promotion of green revolution technologies. A disaster risk reduction lens can be applied to all aspects of development, and greater awareness of the potential of certain practices to improve resilience may be integrated into agricultural training and extension. More investigation is required in order to forecast the potential costs and risk reduction benefits of different methods in terms of sustainability and resilience.

This study identified the vital role of local communities and institutions such as farmer groups in terms of facilitating post-disaster rehabilitation. These findings support the increasing recognition by the disaster management community of the crucial role of local institutions and community networks in relief and rehabilitation. There are many opportunities for agricultural development programmes to work with community groups in order to build their capacity and strengthen them in the 'predisaster' phase. There is also great potential for rehabilitation programmes to work closely with established community groups so as to deliver appropriate aid and inform their activities. The documentation and dissemination of case studies where community based needs assessments and rehabilitation assistance delivery have worked (or not worked), could facilitate future disaster management programmes to make the most of these institutions.

Addressing the sustainability of agricultural rehabilitation approaches. Several different approaches to agricultural rehabilitation were noted in this paper, some taking a conventional approach of handout distribution, and some more innovative approaches. Due to the timing of this study, it was not possible to assess the impacts of the different approaches, however, in the light of other research it is likely that there would be a mixture of positive and negative impacts. As knowledge and understanding about post-disaster rehabilitation is constantly evolving, it is important that different approaches are monitored and evaluated and both positive and negative impacts publicised for learning.

A major component of psychosocial programmes is the development of human capacity, including livelihoods and skills. As agriculture and agro-processing industries are so fundamental to many people, they lend themselves to psychosocial rehabilitation activities. This may have a significant impact in terms of both confidence building and skill development, leading to livelihood development. Agricultural practice may have an additional psychological benefit as a therapeutic activity and demonstration of a return to 'normal' seasonal cycles. The psychological benefits of resuming cultivation and seeing crops growing has not been widely examined, but could be a valuable area for investigation.

References

Asian Development Bank (ADB) (2000). *Project Performance and Audit Report on the Kirindi Oya Irrigation and Settlement Project*, Asian Development Bank (electronic report on internet).

Battista and Baas (2004). *The Role of Local Institutions in Reducing Vulnerability to Recurrent Natural Disasters and Sustainable Livelihoods Development: Consolidated Report on Case Studies and Workshop Findings and Recommendations*, Rural Institutions and Participation Service, FAO.

Bradbury, H and Stewart, T.P. (2005). *West Aceh after the Tsunami*. Unpublished talk at Tropical Agriculture Association Seminar 'Recovery from the Asian Tsunami', October 2005.

Bradbury, H. Afrizal, T.P. Stewart, T.P. and Hasibaun, E. (2005) *A First Rice Harvest After the Tsunami: Approach, Methodology and Results of a First Rice crop on Tsunami Affected Land in Meulaboh, West Aceh* Tropical Agriculture Association Newsletter, Vol. 25, No. 4, pp. 17-19.

FAO (Food and Agriculture Association of the United Nations) (2005). *Sri Lanka Post-Tsunami Consolidated Assessment*, Food and Agriculture Association of the United Nations (electronic report on internet).

Green Movement of Sri Lanka (2000). *Kirindi Oya Project*, Green Movement of Sri Lanka, (electronic report on internet).

Green Movement of Sri Lanka (2005). *Post Tsunami Assessment for recovery of Agriculture and Livestock Sectors in Sri Lanka*, Green Movement of Sri Lanka, (electronic report on internet).

Holt-Gimenez, E. (2000). *Reasons for Resiliency: Towards a Sustainable Recovery after Hurricane Mitch*, World Neighbours, (electronic article on internet).

Holt-Gimminez, E. (2002). "Measuring farmers' agroecological resistance after Hurricane Mitch in Nicaragua: a case study in participatory, sustainable land management impact monitoring", *Agriculture Ecosystems and Environment.* Vol. 93, No 1-3, pp. 87-105.

Hussein, K. (1997). *Rural non-agricultural livelihood diversification and sustainable livelihoods in Africa and Asia: A review*, Unpublished project paper, Sustainable Livelihoods Programme, Institute of Development Studies.

International Federation of Red Cross and Red Crescent Societies (IFRC) (2004). World Disasters Report: Focus on Community Resilience, IFRC.

ITDG-B (2002). An Attempt on Application of Alternative Strategies for Community Based Flood Preparedness in South-Asia (Bangladesh), ITDG Bangladesh (electronic report on internet).

Levine, S. Chastre, C. Ntububa, S. MacAskill, J. LeJeune, S. Guluma, Y. Acidri, J. and Kirkwood, A. (2004) *Missing the point: An analysis of food security interventions in the Great Lakes*, Humanitarian Practice Network Paper. No 47. Overseas Development Institute.

Mogina, J. (1999). "Maintenance of crop diversity and food security in rural Papua New Guinea: Case studies from Cape Vogel and Goodenough Island", *Development Bulletin*, vol. 50, pp. 32-36.

Mortimore, M and Adams, W. (2001). "Farmer adaptation, change and 'crisis' in the Sahel", *Global Environmental Change*, vol. 11, pp. 49-57.

Pelling, M. (ed.) (2003). *Natural Disasters and Development in a Globalising World,* Routledge.

Pingali, Alinovi & Sutton (2005). "Food Security in Complex Emergencies: Enhancing Food System Resilience", *Disasters,* vol. 29, No 1, pp. S5-S24.

Sivakumar, Motha & Das (eds.) (2005). *Natural Disasters and Extreme Events in Agriculture,* Springer.

Sperling, L. and Longley, C. (2002). "Editorial: Beyond Seeds and Tools: Effective Support to Farmers in Emergencies", *Disasters*, vol. 26, No 4, pp. 283-287.

UNDP (United Nations Development Programme) (2005). *Restoring livelihoods still a key concern in Sri Lanka*, (electronic report on internet).

UNEP (United Nations Environment Programme) (2005). *After the Tsunami: Rapid Environmental Assessment*, (electronic report on internet).

ECONOMIC REGENERATION IN AREAS OF VIOLENT LONG-TERM CONFLICT: THE CASE OF KASHMIR

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Abstract

The objective of this work, which is based on primary research done through fieldwork in Kashmir, was to assess the impact of the conflict on the area of crafts. Kashmiri crafts employ over 500,000 people in the state. The conflict in the region between India and Pakistan has lead to over 60,000 dead and more missing since 1989, the count moves up on a daily basis. Personal interviews and meetings with Kashmiri crafts people, bureaucrats, widows, orphans and militants have contributed to this research. The conflict in the region has lead to increase in corruption and an upsurge in spending on defence. Crafts, which provide the highest employment numbers (second only to agriculture) have been affected by the lack of funding for development and shrinking tourist market. The conflict has changed the sex ratio; male deaths mean that increasing numbers of women are now involved in crafts. Being home based crafts are considered safe in this conflict torn region. Yet the shrinking markets push an increasing number of people below the poverty line and into the depths of conflict, where hiring people to shoot and kill is also an optional means of income generation. The symbiotic relationship between development and peace means income generation that combats base level poverty, could bring peace at some level. This research provides crafts development services to Kashmiri crafts people. Expertise in product design and market research is delivered through workshops. Women and their potential as wage earners and community leaders open a wide range of possibilities for development and reconstruction of the region. This reconstruction methodology could be applied for sustainable income generation through crafts training for the women in any conflict zone. This case study based research can enable people facing adversity in other areas plan their economic future.

Keywords: conflict; crafts; income generation; sustainability; reconstruction.

Introduction

This paper focuses on the attempts being made to reconstruct Kashmir's society and economy post the 17 year conflict. It proposes that one of the most promising paths for economic regeneration of Kashmir is via crafts with the involvement of the local stakeholders in income generation projects. These are the women of Kashmir.

After a short introduction to the conflict and its impact this paper shall look at the attempts being made to reconstruct the state. The constraints, within which this is being done, shall be looked at, along with a case study. The working premises of this research are highlighted to gain better understanding of the dimensions within which this research has been conducted.

A quote from Ameena in Srinagar, Kashmir:

> "Everything has gone; I don't recognize this place anymore. This is not my Kashmir. I have lost my husband, my brothers and two of my brother-in-laws. I don't know what I can do to feed my family. The guns don't go away and neither does the hunger" (Fieldwork, 2003)

Post-Disaster Reconstruction : Meeting Stakeholder Interests : Proceedings of a conference held at the Scuola di Sanità Militare, Florence, Italy 17-19 May 2006, edited by David Alexander, Colin Henry Davidson, Andrew Fox, Cassidy Johnson, Gonzalo Lizzaralde, ISBN 978-88-8453-611-2 (online), ISBN 978-88-8453-612-9 (print), © Firenze university press, 2007

The Conflict

Kashmir is divided into 3 international territories. To the west is Pakistan Administered Kashmir, which is also known as *Azad* Kashmir (Free Kashmir). Centrally located is Indian Administered Kashmir, which includes the Kashmir valley and the state capital of Srinagar. To the north east of this region is Aksai Chin which is China Administered Kashmir.

Conflict over Kashmir has its roots in India's colonial history and the British legacy of Partition. In 1947 India gained independence from the British rule and was split into a Muslim nation of Pakistan and the secular nation of India. During the partition princely states of India could choose which nation they wanted to be part of. The state of Kashmir had a majority population of Muslims, however the King was Hindu. The Hindu king signed the instrument of accession to India, thereby joining the Indian nation. Pakistan claims that it was created as a nation for Muslims in 1947, thus an adjoining state that has a majority Muslim population should rightfully have been a part of Pakistan. The issue has been on the United Nations agenda for a long time. The debate continues to the present day with both nations spending more than they can afford on defense budgets for the region. (Chagla, 1965).

The Impact

The human cost of the conflict in Kashmir has been estimated differently by various agencies. The government figures tend to be lower than those calculated by human rights and civil liberties activists. Definitive figures from Kashmir are hard to come by as the last census in the state was conducted in 1981. (Butalia, 2000) This is applicable to most statistics in this paper. The figures for people who have died vary. There are reports that up to 30,000 people have died since the struggle against Indian control became militarised 17 years ago (Amnesty International Report, Aug 2000). The Indian army puts the figure at 35243 dead since 1990. These figure don't include the 4636 people (including women) missing and the 16090 injured in the same time period. The total civilians killed in Kashmir are 15611. (www.armyinkashmir.org). There are more than 500 graveyards in Kashmir today and a daily death toll of 20. (Jalil, 2002)

The monetary cost of the conflict has been estimated by a BBC report to be £1 million a day, spent only in defense by the Indian army on the Line of Control. The budget of a project to buy new arms in 1999 was estimated to cost over 100 billion Rupees ($2.3bn). (Bedi, 1999)

This does not include statistics of loss of revenue from businesses immigrating to outside the valley and/ or the high levels of unemployment and the deteriorating living standards. The United Nations Military Observer Group in India and Pakistan was established in 1949, this peace keeping force cost US$ 8.37 million (gross) in 2005. (UN, 2005)

The real impact can be seen in the lives of the people who have survived the conflict. Families have been destroyed, communities have been broken up, and people have been displaced and impoverished. There is hostility, intolerance and animosity within communities. The migration of one million Kashmiri Hindus (Pandits) from the valley changed the socio-cultural structure of the valley. They left fearing their lives and moved to the neighboring state of Jammu between 1987 and 1990 (Bhati, 2005).This en-masse movement of highly educated people who were school teachers, University lecturers and Government servants left a gap in the infrastructure of the state, a gap which the people of the valley still acknowledge and regret. This migration created increasing communal tension which was never present in the valley. Kashmiri Pandits resent the fact that they had to flee from their homeland because of their religious beliefs. They faced harsh conditions in Jammu where they lived as refugees. The people of Jammu saw them as a burden on the resources of their city. Unemployment and frustration on their condition was rife in the camps and the new generation of Kashmiri Pandits who have been brought up in these camps nurture strong hatred of the Muslims that their predecessors never had. Thus the conflict has split open a cohesive community and reignited a flame of communal hatred.

'More than a decade of conflict has deeply affected people's livelihoods and living environments, their health, their eating habits, their work and their workplaces, their access to education. The impact of these things is felt most sharply in the lives of the women, and yet, few discussions on Kashmir pay attention to this'. (Butalia, 2002) The women have born the brunt of the conflict in many ways. This leads us to looking at the working premises of this research.

Premise 1. Conflict affects women more adversely than other members of society. They are most vulnerable to the direct and indirect affects of conflict.

The Platform for Action adopted by the Fourth World Conference on Women (September 1995) identifies women's development as an area of critical concern. It draws attention to the heavy increase in burden of women stemming from the rapid escalation of female heads of the households and from caring for large numbers of injured people (Date-Bah, 2003). There is a call for greater participation in decision making, conflict resolution and peace building; protection of women in situations of armed conflict; a reduction in human rights abuses; promotion of vocational and other skills training and self reliance of conflict affected women; and the promotion of human rights of women in such contexts.

It is widely accepted now that women rarely create or initiate conflict, they, along with children and the aged, are often the victims and sufferers of the conflict. 'Although consequences of armed conflicts affect all population groups, women appear to bear a disproportionate burden owing to the specific nature of the conflicts today' (Date-Bah, 2003) In Kashmir the conflict has caused many male deaths and disappearances. Thus there are a large number of widows. There are also a large number of women who are identified as 'half widows', these are women whose husbands are assumed dead but there is no proof to show they actually are. This has a deeper consequence as these women shall not be allowed to remarry till the body of the husband has been found and buried. In Islam declaration of widowhood or permission to re-marry is not granted till the coffin of the deceased husband has been buried. This also complicates issues of inheritance of property, which can not be transferred in the woman's name till there is evidence that the man who owned it has died.

The Kashmiri society had traditionally cocooned and protected its women, more so in the case of the Muslim population, which is a majority in the state. The Kashmiri women though of independent thinking, lead protected lives. Very rarely did they leave the confines of the house unescorted. Domestic male helpers were employed, when affordable, to do household chores which required stepping out of the house. The women of Kashmir were responsible for running the house, looking after the children and the older members of the family. It should be noted here that six months of severe winter involves a lot of planning for cleaning, collecting wood and gathering food for survival through the bitter winter with temperatures hitting -20 degrees Centigrade. The women seldom worked as employees and though educated, had never been the earnings members of the family. This changed during the conflict as more men were involved in the conflict – as participant militants or innocent bystanders. More men were dead and missing than women and children over the 17 years of conflict in Kashmir. Consequently the sex ratio of the state changed drastically. The young men in the state were often faced with a dilemma, to join the militancy or to flee from the state to save their lives. They were soft targets for militants who recruited people as well as the Indian army, who were highly suspicious of political affiliations of the Kashmiri youth. Thus the male population of the state changed dramatically.

Kashmiri women are now by default the bread winners in their families. A fact that is tough to imagine, for a woman who never moved out of the house except for social meetings and gatherings, had now to go out and earn a living. This accompanied with the fact that they have few 'marketable' skills means finding conventional employment in a shrinking economy would be difficult if not impossible. This increases the pressure on the women to find sustainable sources of income generation. This is important to bear in mind when one considers the constraints faced in reconstruction of this region.

Premise 2. For a society and economy that was heavily reliant on the crafts sector for employment and income generation, revival of crafts might be the first step toward reconstruction. Provision of appropriate training might ensure that crafts activity can provide sustainable income to the Kashmiri women.

The Indian crafts industry employs a sizeable percentage of the population. According to the 10th plan of Handicrafts schemes, published by the Office of the Development Commissioner (Handicrafts), Government of India, Ministry of Textiles, more than Five million craftspeople are dependent on the Handicrafts sector for their livelihood. This report also mentions that the handicrafts sector plays and important role in the country's economy not only because of the direct employment it creates but also the substantial foreign exchange it generates for the country. Pre 1989, Kashmir, more than any other state, exemplified the potential earnings from crafts because its primary source of income was tourism – which meant that there was a big market for handicrafts. There was a market for handicrafts which were in the form of souvenirs as well as products made for those who understood and appreciated crafts. Parallel to this was a thriving domestic market where in Kashmiri crafts were seen as exquisite pieces from the valley where they were made. Kashmiri crafts were appreciated for their aesthetic value as well as their functionality. The crafts were intertwined with the culture of the state and many hand made products were (and still are) used locally by the people of the state on a daily basis. The locally available raw materials such as wool, wood for manufacture of looms, locally produced dyes, and silk for embroidery grant this activity a level of sustainability, which is one of reasons that crafts have flourished in this region for centuries now.

Crafts are an essential part of the Kashmiri culture, society and economy. No marriages and births are complete without the essential Pashmina shawls being gifted. Any gatherings or social meetings are incomplete without the mandatory cups of Kashmiri tea made in the traditional metallic samovar, and winters are intolerable without the beautifully crafted *Kangri*. Culture in Kashmir is defined by its crafts. Crafts are intertwined with every aspect of life and thus the study of crafts reflects on the cultural development of the state of Kashmir.

Recent research conducted in Kashmir reveals that the trade in cultural (craft made) commodities is continuing, despite the adversities in the political situation. This could be attributed to two major reasons. It is proposed that more people have been involved in the production of crafts as it is mainly done indoors, thus is a relatively safe occupation. The fact that the people are familiar with craftwork makes it easy for them to adapt and learn to work. Another dimension to the involvement of people in crafts is the recent inclusion of women in what was mainly a male dominated sector. In Kashmir crafts previously meant male craft workers, now an increasing number of women are involved in the manufacture of crafts and thus there is a higher dependency on crafts for employment and income generation. Originally people used to work in the crafts sector in the cold winter months only, this too has now changed. Hence more people are now involved in crafts and as a consequence more are dependent on it for survival. Crafts of Kashmir thrived because of the high level of skills and abundantly available raw material. It was also a form of activity that would occupy people indoors during six months of winter, which they spent indoors. Post the conflict situation crafts were also considered safe.

For women of Kashmir, staying indoors was sometimes the only way of staying safe and surviving. Thus aid within the crafts development sector would have wider consequences/impact on the lives of the Kashmiri people.

Kashmir does not have any large scale or prominent NGOs. There is a presence of numerous small organisations that work in their local areas with the local community. Thus the stake holders are ordinary people who have suffered from the conflict. There is no presence of organisations like Traidcraft or Oxfam, which sometimes act like parent bodies by providing support and assistance. There are clusters of organisations where women are involved in manufacture of handcrafted goods. Most agencies that work in the area of reconstruction are small groups that run on personal donations of members of a charity and/or Zakat (Islamic taxation system) contributions. They are run by people who don't necessarily have qualifications or experience in running organisations and may also be people who have never worked before.

The women have knowledge about the crafts due to being observers in the background, while the activity was being carried out by the men. They have also been consumers of the goods and thus are aware of the standards of quality and workmanship within craft made goods. Their skill levels are medium to low and this is where the training and development activities focus. They also have limited knowledge of marketing and are rarely aware of markets outside the Kashmir state. These were some of the limitations that are faced while working in the crafts sector in Kashmir. There are many constraints to working in Kashmir. These were revealed during the course of fieldwork. A look at the case study of a crafts NGO in Kashmir highlights the potential focus of reconstruction and brings forth the constraints that are faced in working in Kashmir.

The Case of Zanana Dastkari Production Markaz (ZDPM), Srinagar, Kashmir

This NGO was contacted during research to understand their interests in the reconstruction of their city in Kashmir. They are the local stake holders in this case and were keen to start rebuilding their lives by earning a sustainable income through manufacture of crafts goods.

ZDPM focuses on assisting low income crafts producers, who are women, through crafts development and marketing. Most women they work with are poor, uneducated and unskilled. Destitute women and widows are involved in manufacturing textile crafts. They have been provided with rudimentary training in embroidery and stitching. They are unaware of concepts of product design or marketing, thus face problems in selling the products they manufacture.

ZDPM gets financial support from its member donors. They have no access to external funding and are unaware of the resources that are available to organisations such as themselves, outside the state. Their limited knowledge and resources have meant cutting of corners at various levels. It also means that reaching out to other government and non government agencies in New Delhi is expensive thus often of low priority. They pay the women approximately 50 Euros a month, provide free training in the area of crafts, assistance with medical bills and education of children, as well as with marriages of their daughters. The raw materials are provided free of cost.

Thus the NGO is providing multi faceted support to the women in Srinagar, Kashmir. They have financial and social restrictions and are desperate to make contact with other people like them, to share learning and resources.

ZDPM had for a brief period of time provided craft made goods to OXFAM, UK and were glad of the marketing that Oxfam provided. However this relationship broke down over a disagreement over pricing, which Oxfam allegedly felt were high. Thus the NGO has the ability to manufacture goods and export them. They are also aware of the larger income that can be generated through exports. Thus they were keen to gain skills in the area of product development and marketing.

The NGO requested assistance in craft development and training in the area of marketing. It was understood that such training would promote enterprise within the NGO and shall lead to an increase in income generation of the women. The aim was also to provide long term sustainable income generation thorough skill enhancement. This would provide self sufficiency and decreased dependence

The workshops devised were to provide knowledge of product development and marketing. Initial assessments revealed that basic workshops would be required to prevent intimidation and trepidation amongst the women. It was also noticed that familiarity with the women during the course of assessment was increasing their confidence and they were keen to talk about their experiences during the conflict. Most of them were keen to be educated and felt high levels of financial pressure. During the workshops they worked hard at grasping concepts which were new to them.

The shift from gazing in wonder at new products to volunteering to design and manufacture something independently was a slow one. The feeling of empowerment and rise in confidence levels of the women was visible soon after the workshops were concluded.

Knowledge of markets and concepts of market research were introduced with provision of local examples and built from there. Most have never been outside their own city and thus are unaware that they share their plight with many other women in India and abroad. This brought a sense of empathy and decreased levels of self pity that some women had. It also brought role models and real life stories into their lives.

It was observed that the women were ambitious and keen to change their lives. They were aware that there financial future is linked to their ability to adapt and change and gain skills needed to generate income. Application of learning from other such projects done around the world would help this attempt at reconstruction.

However there are numerous constraints, when put together reveal the reality of the situation in Kashmir and thus helps in defining and devising an approach to working in Kashmir. Constraints can be categorised into three broad areas – economic, social and political.

Figure 1. Haneefa, Guddi and Rafeeqa

Figure 2. Yasmin embroiders a green *numdah* rug us-

Figure 3. Chasweeda embroiders a *Numdah* rug.

Economic Constraints

A look at the economic constraints reveals barriers at three levels. The Government agencies, the international agencies and the local non government organisations in Kashmir.

The local (State) government. As in any developing country, widespread corruption and dogmatic bureaucratic procedures form a stumbling block in planning any development work. There is intense suspicion in Kashmir of anything Governmental. The fact that the Government of the state is part of the Government of India is not appreciated by the pro freedom, pro Pakistan groups that exist in Kashmir. The bureaucracy in Kashmir is mostly male and most have a condescending attitude towards women, which verges on being patronising and sometimes also pitiful.

Planning economic development models is often complex and complicated due to poor data that emerges from Governmental agencies. Census is not conducted regularly and most information that should be made public is kept under wraps.

Access to information about upcoming bids for funding and support frequently come with an unofficial fee for the officer providing such information. Finance schemes for procurement of raw material and enterprise development funds are very highly funded and the application procedures are long winded and complex. The bureaucrats within the state are regularly transferred and posted from department to department, which leaves a lack of continuity of contact for the people and also a lack of involvement on behalf of the bureaucrats. This complicated bureaucratic set up is shameful as well as disappointing. Counting it as a part of the support infrastructure in the state is impossible.

International Agencies. Many international agencies that work in the area of crafts and/or development steer clear of involvement in Kashmir due to the political sensitivity of the region. They are often unable to send their teams out to the area due to the very real risk of kidnap and death threats that any non Kashmiri could confront due to their appearance.

The Home Office, U.K, clearly defines Kashmir as an area of risk and advises people not to go there. Insurance agencies have high premiums on travel insurance to the state. The Lonely Planet guide also advises against travel to the state of Kashmir.

International agencies like the United Nations and USAID and their various departments and divisions have head offices in New Delhi. Applications for assistance and support often need backing from the Indian bureaucratic. The process of application for funding/assistance is complicated and the time lines between bidding for funding and the funds being transferred to the beneficiary are long. As mentioned before travelling to New Delhi is time consuming and expensive, thus the organisations from Kashmir would have limited access to International Support / Aid agencies.

Monies received, if a bid is won, when converted to the local currency, is a large sum. It is highly lucrative and attracts corruption at the stages of disbursement and rarely reaches the main beneficiaries for whom it was intended.

The policies and opening of bids, as well as advertisement for new projects is conducted in limited networks and thus remain vastly unknown to the Self Help Groups in Kashmir. Very often International agencies look for partners who are prominent NGOs, with well documented systems of operation and years of experience that has built credibility. Track records of performance, optimal utilisation of funds, and application of best practices that are well documented are appreciated and often surveyed by International Agencies. This effectively negates many local NGOs from applying for assistance, as they have only recently sprung up in response to the crisis.

International agencies often have a 'top down' system that rarely effectively percolates right down to the bottom. This approach needs to be rectified and local stake holders need to be interacted with at the grass root level.

Non-Government Organisations/ Agencies in Kashmir. There is very limited networking amongst NGOs that exist in the Kashmir valley. There are various reasons for this – Kashmiri organisations have varied political affiliations (Pro India/ Pakistan/ Independence) and perhaps even agendas. Groups that do not have similar political affiliations are very often critical and suspicious of each other. People are wary of connections to militants and sources of funding, as well as backgrounds of the people who hold the controlling interests of the NGO. NGOs are often financially supported by local donors. Thus there is no central infrastructure that provides shared space for exchange of learning or sharing of resources. There is also competition for services between NGOs due to limited resources. Thus there is no cohesion amongst groups that exists in Kashmir.

NGOs that exist outside the state of Kashmir and are known for their exceptional work in the field of income generation and crafts development are often reluctant to get involved in Kashmir. During fieldwork a prominent NGO categorically stated that there was enough work to do outside Kashmir and they would not be keen to go to Kashmir to work. They were willing to share learning but not resources. The other states in India which are known for their craft heritage provide a more lucrative base for such NGOs to work as compared to a conflict torn region of Kashmir.

Social Constraints

Kashmiri rarely trust people who are not Kashmiri themselves. Thus the nationality of the field worker is important to any future work in the state.

Women and men have formal relationships thus training of any kind has to be preplanned to avoid having men training women. While men feel at ease talking to women, a working relationship outside the house is very strained on both sides.

The Kashmiri society, as mentioned before was male dominated and the women were not known to be income generators in the family. Thus the working women in Kashmir are perceived in a different light. Often they are pitied for their need to work and this attitude causes a lot of shame and resentment among the women. They have an inner battle with themselves about needing to leave family (often little children) at home to go and earn, they are poor and can't afford childcare or support.

This also leads to feelings of desperation and despair.

Women have low educational qualifications as compared to men and are thus often unable to apply for jobs that pay more money. Lack of education leads to lack of confidence and awareness as well as makes them vulnerable to deception. Lack of education sometimes also reveals the existence of a language barrier with most women speaking only Kashmiri, they might have limited knowledge of Urdu and no knowledge of English in most cases. They often have very limited skills that can be applied towards income generation. Post Traumatic Stress Disorder is known to be rife in Kashmir with many cases going unreported. Living through a violent conflict has caused widespread depression and mental health problems which often go unacknowledged and unaccepted. Women are expected to cope with such issues and carry on without any support.

There seems to be an increasing desperation to earn money, yet low skills, lack of education, psychological problems make the women of Kashmir an extremely vulnerable group.

Political Constraints

The conflict in Kashmir is not completely over. Like most long term conflicts, the peace that exists is an uneasy one and violence is never very far away. The political future of the state is unknown and negotiations continue in the political arena. The defence budgets are still high, as is the military presence in the state. There is a steady stream of low intensity conflicts from various parts of Kashmir. Thus there is no assurance of safety. During the course of fieldwork, militant groups made there presence felt and made contact to ask questions. The Kashmir and Indian government are guarded about external intervention or interests in Kashmir. Foreign nationals are discouraged from visiting the state.

Thus Kashmir is in the post-conflict phase, yet the legacy of the conflict presents innumerable constraints in the process of reconstruction. Kashmir's political past comes in the way of its economic future at every stage. It is important to bear in mind that this knowledge could be possibly applied to reconstruction of any Muslim region that faces or has faced conflict.

Conclusions

It is understood that women are more vulnerable in conflict areas though they are rarely the initiators of the conflict. In Kashmir, after the conflict, the women struggle to find dignified ways of earning an income by using their current skill set. They are now heads of families and are also in most cases the sole or main wage earners in their families. Thus the Kashmiri women are the local stake holders and should be engaged with for planning reconstruction of the state.

The identity and profile of these women, their aspirations, their challenges, limitations and needs should to be assessed and borne in mind if reconstruction attempts in the state are to be successful. Their potential to become entrepreneurs as well as community leaders should also be acknowledged. It is vital to under stand the underpinnings of Kashmiri society and engage with these women for realistic development to take place.

It is important that plans for future economic growth link to the past systems of income generation. Assessment of the economy and the skills available locally points at the existence of a strong crafts tradition being prevalent in Kashmir. This system of income generation has been active and successful for centuries now. Using crafts as a means of generating sustainable income seems to be a logical direction for development and reconstruction of Kashmir.

Thus promotion of crafts as a means of sustainable income generation for the women of Kashmir seems to be a plausible focus area for the reconstruction of Kashmir. Development activities focussing on crafts would promote interests of the local stake holders, making post disaster reconstruction a reality.

References

Amnesty International Report, August 2000.

Chagla, MC, *Kashmir 1947-1965* Ministry of Information and Broadcasting, Government of India , Faridabad, 1965.

Butalia,U. (ed) (2002). *"Speaking Peace – Women's Voices from Kashmir"* Kali for Women. New Delhi.

Date-Bah (ed) (2003) *"Women and Other Gender Concerns in Post Conflict Reconstruction and Job Promotion Efforts"* in Jobs After War – A Critical Challenge in the Peace and Reconstruction Puzzle International Labour Office, Geneva.

http://web.amnesty.org/report2000/countries/576ee090d77ce017802568f20055292f?OpenDocument

http://www.armyinkashmir.org/v2/human_rights/cc_actual_data.shtml

Jalil, M. The Observer, February 2002

http://observer.guardian.co.uk/review/story/0,,647571,00.html

Bedi, R. India goes arms shopping, November 1999

http://news.bbc.co.uk/1/hi/world/south_asia/524819.stm

United Nations Peace Keeping Operations, United Nations Department of Public Information, January 2005.

http://www.un.org/depts/dpko/missions/unmogip/facts.html

Bhati, A. (ed) (2005) *"Kashmiri Pandits – Problems and Perspectives"* Rupa and Co in association with Observer Research Foundation, New Delhi.

RESOURCE MOBILIZATION FOR RECONSTRUCTION AND DEVELOPMENT PROJECTS IN DEVELOPING COUNTRIES: CASE OF KENYA

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Abstract

Reconstruction and development projects in developing countries are almost synonymous. Due to the high vulnerability of developing countries, development projects are often severely affected by natural and human-made disasters. The reconstruction efforts take long periods often for the very project to be destroyed by the next disaster before completion of the reconstruction process. As almost the entire effort by the various governments is lost in the re-construction works rather than new development, tangible development may not be realized. We discuss the practices of various methods of resource mobilization in developing countries for reconstruction and development by using Kenya as a case study. We discuss the practice of conventional resource mobilization approaches through loans, grants, appropriation-in-aid, and the practices of disbursement institutions such as World Bank and its affiliates in developing countries. We analyse the emerging indigenous approaches in resource mobilization including merry-go-round, the "harambee" system of resource mobilization and the community-work for development programmes in re-construction projects. An analysis of the role of micro-financing and domestic borrowing is given. The role played by technical assistance programmes is discussed.

Keywords: reconstruction; development; harambee; merry-go-round; self-help, technical assistance.

Introduction

Reconstruction of projects in developing countries, such as Kenya, after natural or human-made related disasters faces a daunting task. Often the available scarce resources are prioritized for provision of basic necessities such as water, shelter, food, education, sanitation and health. Without support by donors it near impossible for such developing countries to undertake any high capital development and reconstruction project. We discuss in this paper the challenges faced by Kenya in resource mobilization for re-construction and development through funds available through donors in the form of loan, grants, and other forms of technical assistance. We also discuss the indigenous approaches in pooling resources together at individual, community and even national levels. The famous "harambee" spirit that was embraced by the First Head of State, H. E. Mzee Jomo Kenyatta in mobilizing national resources for development is analysed.

By analyzing both the positive and negative sides of these approaches, we recommend the way forward for developing countries in situations where resources are scarce or even non-existent.

Objectives

The objective of this paper is to appraise the various methods used in resource mobilization in developing countries such as Kenya. In particular we discuss the indigenous methods for resource mobilization and analyze the implementation of

Post-Disaster Reconstruction : Meeting Stakeholder Interests : Proceedings of a conference held at the Scuola di Sanità Militare, Florence, Italy 17-19 May 2006, edited by David Alexander, Colin Henry Davidson, Andrew Fox, Cassidy Johnson, Gonzalo Lizzaralde, ISBN 978-88-8453-611-2 (online), ISBN 978-88-8453-612-9 (print), © Firenze university press, 2007

funds through various donors including the World Bank. We discuss the bilateral arrangements in resource mobilization in form of loans, grants and technical assistance to developing countries.

"Harambee" System in Kenya

The concept of *Harambee* has always existed in all Kenyan communities. These communities had different names for pooling of resources together, when confronted by individual, group or community tasks or calamities beyond the capability of individuals or families. The term "Harambee" was first used by a political activists, Omolo Ongiro during the late 1950's and early 1960's a time of the national political movement. He used to warm up people by shouting the term at the opening and closing of political rallies. During the last years of struggle for independence, the term was used as a rallying call uniting all Kenyans to fight the colonial Government. The term was, from 1963 onwards, popularized by the late first Kenyan President, H.E. Mzee Jomo Kenyatta who used it as a unifying factory for the young nation.

The word Harambee was accordingly embedded into the National Court of Arms. At independence, the Government's priorities were fighting poverty, diseases and illiteracy as described in the Kenya We Want and Sessional Paper No. 10 on African Socialism. The development needs were more than the public coffers could finance. The Government therefore used the slogan for mobilization of private resources to supplement the meager resources at its disposal for development. Harambee was thus officially recognized as one of the principal ways of taking development to the people. This led local communities to organize development Harambees in most parts of the country. The projects undertaken varied from one area to another and included weeding fields, building bridges, schools, hospitals, cattle dips and other basic facilities. Naturally, an area with more resources including organizational resources, the phenomenon was more successful than the in less endowed areas. During the first decade of independence Harambee was organized at three levels: Public Harambees; Private/Personal Harambees; and Group Harambees. Public harambees were for projects of public nature in which the Government was involved. Good examples of these types are construction of institutes of technology, schools and teachers' houses, health facilities and youth centers. Gatundu Hospital stands out among these. The Western College of Arts and Applied Sciences (WECO) that gave rise to the Western University College of Science and Technology (WUCST) is another example started as a community harambee project. Private or personal harambees were organized by individuals, with a view to solving individual problems like raising funds for students to travel overseas for education, payment of school fees in the country, payment of medical bills, reconstruction of houses destroyed by fire, lighting and floods. Group harambees were organized by particular groups, for example, women groups to put up a development project for themselves. In Kenyan tradition they are called self-help groups. This type of Harambee was given priority by the first Government as reflected in the document on Community Development in Kenya and the Government Circular by the Ministry of Cooperatives and Social Services of 25 May 1967. The most famous example was the Nyakinywa Mabati Women Harambee organized to ensure those with grass-thatched roofs converted to *mabati* (iron sheet) roofs.

Positive impacts of harambee system:-

- Harambee was/is inherently a noble spirit and beneficial to the citizens.
- Harambees have instilled a sense of sharing in nation building and hence ownership of national assets.
- They supplement government efforts towards the provision of essential services. These services and facilities include schools, health centers, water and sanitary facilities, electricity and security.

- Benefited the vulnerable members of the society. The many projects realized through Harambees have reduced human suffering by bringing services closer to the people in areas where the Government could not reach effectively.
- Harambees have helped women and youth groups to come up with income generating projects and access loan facilities from financial institutions. A good example is Nyakinywa Mabati Women Group. This group evolved from just raising money for improved housing to keeping grade cows, individual household and community water provision, ultimately to land ownership and other commercial activities.
- Most students from poor backgrounds have been able to access primary, secondary, and college/university education through Harambees. The pressure for continuing support of this contribution is reflected in various Constituency Educational Development Harambees.
- Many citizens have also been able to offset medical bills and seek specialized treatment abroad through Harambee.
- Harambee has enhanced social cohesiveness during good and bad times.

Negative impacts of harambee system:-

- The government abdicated its role and left the burden of development to the people. Harambee provides an avenue for the Government to abdicate its role of providing basic services, such as education, housing and medical care.
- It has led to unequal distribution of national resources and inequality in development. Areas, communities and regions having influential politicians/leaders were able to conduct grand Harambees and put up many projects at the expense of the disadvantaged areas of the country.
- A case study by Transparency International on Harambee contributions for the period January 2000 to September 2002 indicates that more than Ksh.1.53 billion was realized during the period from a total of 1314 Harambees countrywide. This translates to an average of Ksh.1.17 million per Harambee.
- Two of the seven provinces: the Rift Valley and Eastern Provinces accounted for 47% of all the funds raised in the Harambees for the period. The Rift Valley Province received the lion's share of the funds raised (Kshs.426.7 million or 27% of all the funds). Eastern Province got a close second with Kshs. 305 million raised or 20%. North Eastern Province had the least amount of funds raised in Harambees, Ksh.28.6 million.
- It induces leaders to acquire money through corruption in order to give people and buy power. This has affected the caliber of leadership at both local and national levels. The rich literally buy power through Harambee thereby distorting the memory of true leadership and democracy.
- Harambees have made Kenyans lazy and has created begging/dependency syndrome. Individuals collect money from the public for very bogus or non-existent problems/projects. There are cases of people collecting money for personal activities like engagements, weddings, education or medical bills that never existed.
- It is a known fact that funds collected through Harambees were never audited resulting in those involved not being transparent and accountable to any one.
- Promotions, demotions, intimidations and forced imprest acquisitions to meet preset targets were a norm in the Public Service. Preset targets usually have funds set for specific purposes diverted to meet those targets thus stalling the intended projects.

The Government has put in place elaborate provisions that lay down procedures for organization and control of Harambee. These include: Public Officers Collections

Act. Cap 106, Laws of Kenya; Public Officers Ethics Act. 2003; Anti-Corruption and Economic Crimes Act. 2003 and The Penal Code, Cap. 63 Laws of Kenya. There should be strict compliance to the provisions of the various Acts cited above and other relevant existing laws, to streamline the resource mobilization through Harambees in Kenya.

Local Community Services for Resource Mobilization

Local community service is a service in which people of a particular organization, arrange to do some work for the local community to save or reduce the cost of labour. The service is given free of charge. The community being saved may be informed in advance so that they choose the area that requires service. In other cases, the particular group offering the services selects a site that requires services and they work on it without notifying anybody. The motive for giving community services varies, per individual group. Some of the motivating factors include the following: -

- Seeking to be recognized by the local community. This is common with business institutions seeking market from the local community. A Non-Governmental Organization (NGO) may also be seeking recognition by donors.
- Seeking to instill the spirit of responsibility and unity in individuals. This is
- common
- in learning institutions especially schools and colleges.
- Seeking God's blessings.
- Seeking to put the word of God in practice e.g. Christian groups provide
- community services as a way to emulate the service done by Christ.

Advantages:-

- The spirit of unity is developed among the group members.
- The cost of labour for the services is cut down or reduced.
- Since the work is done by a group of people with similar motive, the service may be well done and within the shortest period of time.
- It enables some groups of people to be recognized by the local community, for example businesses and institution get a chance to market themselves and expand their market to the local communities.
- It helps young citizens to learn to be responsible, mindful, helpful and able to work with others.
- The less fortunate groups of people are assisted through such services like during clean up exercises in old people's homes or children's homes, slums and rehabilitation centres.

Disadvantages:-

- When the services are offered in very filthy environment, the group members become vulnerable to diseases.
- Lack of appreciation by the local communities discourages the groups.
- The groups may meet resistance in some communities due to cultural beliefs or gender issues: in some communities with strong cultural inclinations it is a taboo for a man to do some types of work such as sweeping, cooking and washing.
- Since the group may not be very familiar with the environment, they may easily temper with some delicate or sensitive areas of the communities.
- The community may be suspicious of the group providing the services hence create a hostile environment for them.
- Language barrier may hinder communication between the service group and the community and this will interfere with their performance.

Pooling Work and Self Help Methods

This is part of a systematic way of local group organization for the betterment of communities. Community organization therefore facilitates mobilization of action at the local level as well as utilization of local resources. With time community organization changed from being a welfare concern with self-improvement efforts.

Pooling work together with a common goal requires commitment and prescribed direction. Most self-help activities are community actions and are mostly seen in the developing countries like Kenya. They are viewed as traditionally oriented and focuses on *rural reconstruction.* Self-help activities are based on a notion that *"help people to help themselves"* Broad examples of self-help activities in Kenya that show pooling work include: people walking to raise funds for a particular cause such as the famous annual 'freedom from hunger walk'. In such activities one will see participants running to assist each other in combating and mitigation against hunger. This is seen as part of a mechanism of people assisting the less disadvantaged but they should also struggle to raise some food on their own. The following projects have benefited from this initiative: health facilities; schools; churches; sponsorship of scholars for education abroad; soil conservation programmes; tree planting and small dam construction.

Merry-Go-Rounds

Merry-go-rounds are self-help groups formed by individuals to pull their resources together for the purpose of uplifting their standards of life. These self-help groups acquired the name merry-go-round because they pull their resources for a member at a time until all members are served then start again from the first member to receive the pooled resources. So they keep on rotating like a merry-go-round. Women's self-help groups started in the 1960s when traditional type of women's groupings emerged in Central Province and Ukambani (Machakos and Kitui districts) and dominated the women's self-help movement. The groups in Central Province began contributing money for their members on a merry-go-round basis for buying utensils, paying school fees for members' children or for meeting other urgent needs. Members also helped each other with farm work and with other manual work like building houses. The groups gradually moved into assisting their members with money for purchase of mabati (corrugated iron sheets) for roofing their houses. They became known as Nyakinywa Mabati Groups. In Machakos and Kitui districts, *Eitu na Mbai (*girls of a clan) groups became prominent and competed with each other on uplifting their members by pulling their finances together or assisting each other in the farm on a merry-go-round basis.

In the Nandorobo Village of Naitiri township in Bungoma district groups like the once famous Kukutu Kutela had very noble ideas for community development. These self-help groups developed independently of the Maendeleo ya Wanawake framework, which was a national outfit. Most of the members were not literate, they wore uniforms and sang and danced for politicians or visitors to their areas. The groups were not organized in a modern way. They had no properly elected committees but were doing better than the Maendeleo ya Wanawake and in fact overshadowed it through out 1960s. By 1966 there were 1600 women self-help groups with 45,000 members in the country. These groups were doing well and were seen to be contributing to community development. Members were mostly women but certain technical functions such as book keeping were open to men as well (Orieko, P, 1999).

The idea of merry-go-rounds or women groups as they are popularly known has continued from 1960s up to date. Today there are so many merry-go-rounds that we cannot count. They are found everywhere in the country: be it rural or urban. At least every working class or businesswoman belongs to one or more than one merry-go-round. Today these groups do not belong to women only, even men have joined or started their own. Most if not all members of merry-go-rounds are literate and therefore operate the groups in a modern way. They appoint or elect their officials, chairperson, secretary, treasurer and the auditor. Most groups have a written constitution that guides them in the activities of the group. They keep records of the accounts and minutes of their meetings. Most groups hold their meetings in members' houses (in the house of the member whose turn is to receive the money).

How many times the meetings are held in a month, vary from one group to another dependent on the total number of members in the group. Some meet and contribute money for a member on a weekly basis, others after every two weeks and others once a month depending on their constitution. The amount of money each member contributes also varies from one group to another depending on their income or financial status. It ranges from Ksh.10 daily for small-scale business people to thousands of shillings a month for working and large business people. Such groupings have been known to help vulnerable groups such as house-helps.

Appropriation-in-Aid

When a disaster strikes, the government authorities involved in the rehabilitation program may look for funds from various sources. Some of these include; borrowing either domestically or externally, seeking for technical assistance, as for grants from other countries and established institutions. When there are no properly organized ways of planning for these resources, then there is always a delay in planning of reconstruction, which increases sufferings and other destruction. It is therefore imperative that resources are availed at the proper time in order that we have an effective and efficient reconstruction program. Appropriation in Aid in short is referred to as A-in-A are particular classes of revenue which the Treasury authorizes an accounting officer to use, in addition to the amounts to be issued from the exchequer, to meet expenditure. The accounting officer in the case of a ministry in Kenya is the permanent secretary in charge of that ministry. If it is in an institution such as a university then the Finance Officer is the accounting officer together with the Chief Executive. Exchequer is the consolidated fund, which is the main pool from which the government withdraws its financial resources after approval by Parliament. The consolidated fund is held by the Central Bank of Kenya. A-in-A is scheduled in the annual Appropriation Act, which grants formal approval to departmental supply estimates. Any excess realized over authorized A-in-A would be surrendered to the exchequer as extra exchequer receipts.

Two main forms in A-in-A occur in the development estimates: operational A-in-A which is derived from profits made from sale of goods and services, and non-operational A-in-A which is the carrying value of assets.

Appropriation in aid is a process conceptualised to reduce or limit bureaucratic controls of expenditure. Institutions need to run all the year round and sometimes governments may not release the funds in good time for continuity of operations. Appropriation in Aid therefore would assist in meeting the immediate needs that would otherwise be delayed until the treasury releases funds. The institution like Western University prepares a budget for the year and presents it to the treasury for approval and funding. For example, if the budget was Kshs. 600 million, the treasury may not fund this entire budget. It may only give say Kshs. 400 million where, already there is a deficit of Kshs. 200 million. The University upon receiving Authority to Incur Expenditure (AIE), may request Treasury to be allowed to raise the remaining funds in order to meet its budget obligations. This information is inbuilt in the proposed budget. The money may be raised through the Privately Sponsored Student Program (PSSP) in tuition payment, consultancy services, and other sources.

Micro-financing Institutions

Micro financing can be defined as the aspect of financing or giving of funds for purposes of starting and maintaining or running of small enterprises. Micro financing may be looked upon as some form of small loans, which are granted specifically for some specified function of funding entrepreneurial activities. Micro-financing is usually not done by large commercial banks but rather by smaller institutions with which the local people are familiar with. Some arms of the government also do participate in micro financing activities as was with the case of the 'Jua Kali Artisans Micro financing' in which the government acted as an agency of the World Bank to disburse money to 'Jua Kali' artisans to help them establish their small and micro enterprises. In the recent past there has been a mushrooming of many small micro-financing businesses, which target at providing financial assistance to small or micro-enterprises in a bid to better or improve the standards of living of people in the community. Micro financing acts as a basic fundamental tool used in resource mobilization and consequential generation and flow of income among different groups.

External Loans and Domestic Borrowing

A loan refers to provision of resources excluding food or other bulk commodities, for relief or development purposes that must be repaid according to conditions established at the time of the loan agreement.

Categories of loans include concessional and non-concessional loans. *Concessional Loan* involves provision of funds by a donor as a loan with minimum of 25% grant element. A loan can be converted into a grant especially when it's concessional. Non-Concessional Loan are funds provided by a donor that must be reimbursed over a period of time. In addition to provision of funds by donor, there is a local component. They can use 20% from Government like provision of land (site) while foreign exchange to import 80%. Sometimes the Government adjusts the cost of local component to international standards to carter for foreign participants.

Types of loans. This depends on the source, time period and interest rates:-

- Offshore Loan: These are external loans from another country where the government negotiates.
- Soft Loans: No interest is added during repayment or if any very low e.g. Higher Educational Loans Board (HELB).
- Short Term Loan: such as emergency loan. The interest is higher and repayment is within a short period.
- Long-term loan: such as mortgage loan where interest rates are lower and it takes a longer period.
- Defensive lending: the official lender provides loans to enable a borrower to repay existing debt hence loan rescheduling.
- Grant: A concessional loan can be converted into a grant where it doesn't require re-imbursement from recipient Government.

Domestic Borrowing. Borrowing by the government from within the country generally from individuals, businesses and banks. Borrowing is normally to cover expenditure in anticipation of revenue from donors or revenue. When a disaster occurs, the government may not have finances to enable it respond urgently, therefore if borrows by issue of bonds. This is done by sale of bonds to individuals or businesses in denomination such as Kshs. 500,000, Kshs. 1,000,000 and Kshs. 5,000,000. Domestic borrowing is to cover government's current deficit.

Bilateral and Multilateral Funding Arrangements

Bilateral agencies and funding arrangement. Bilateral agencies are governments or institutions which are friendly or on understanding terms to each other and can enter into agreement or arrangement to support a needy country or institution with funds or aid on the basis of their own agreeable terms and conditions between them. Bilateral funding or aid, usually refer to the assistance in loans in the form of grants or technical assistance given directly from a donor government to a recipient country. The donor government may provide this assistance directly to the recipient government or to non governmental organizations (NGO's) operating in the recipient country. The aid is sometimes managed by a government agency charged with this task. The arrangement of disbursement of the assistance therefore would be between a donor government/agency and the recipient country or through an agency operating in the recipient country.

Some of the examples of the bilateral agencies include: -

- African Development Foundation (ADF) - this is a principal agency of the United States government supporting community based self-help initiatives to alleviate poverty and promote sustainable development in Sub-Saharan Africa.
- Canadian International Development Agency (CIDA) -the Canadian government's aid and development organization.
- United States for International Development (USAID) - US government's agency providing humanitarian assistance around the world supporting US foreign policy goals.
- German Technical Co-operation (GTZ) - German government's aid
- organization for developing and transition countries.
- Swedish International Development Agency (SIDA) - the stated task is to create conditions conducive to change and to socially, economically and environmentally sustainable development with an emphasis on the prevention of conflicts and catastrophes. SIDA contributes resources and develops skills and competence in partner countries.
- Japan International Corporation Agency (JICA) - responsible for technical aid in Japan's Overseas Development Assistance (ODA) programmes.
- UK Department for International Development (DfID) - UK government department responsible for promoting development and poverty reduction mainly in the poorest countries in Asia and Sub-Saharan Africa as well as in Latin America, the Caribbean and elsewhere.
- Australian Agency for International Development (Aus AID) -Australian government's overseas aid programme.

Multilateral agencies and funding arrangement. Multilateral agencies are those institutions, which are multinational and collect resources from multiple countries and redistribute such resources to the recipients. Hence multilateral funding or aid involve multinational assistance which is administered by international institutions such as World Bank(WB) and International Monetary Fund(IMF) that collect resources from multiple member countries and redistribute them to recipient countries. Multilateral support involves certain regulations and/or conditions which a recipient country must fulfil in order to and observe, such as becoming a member state or affiliated to such international organizations in order to benefit from their collective resources.

One notable example of such conditions, which are closely associated with the IMF and WB is the so called Structural Adjustment Policies/Programmes (SAPs) that were implemented in the developing countries by the funding institutions, and designed to alter existing social economic structures with the aim to correct the imbalances in economic development. In Kenya some of the SAPS conditions saw the introduction of cost sharing in education and health sectors as well as trimming of the civil service through the so called "golden-handshake" of 1997 and retrenchment programme of the year 2000. SAPs have also led to some negative impacts as reduction in employment opportunities, reduction in government expenditure, increased household expenditure, malnutrition and increase in poverty especially to the vulnerable groups such as urban poor/sum dwellers, rural workers/peasants, landless/squatters, women and children, handicapped and street families.

An example of a project in Kenya being supported through World Bank multilateral funding is Sondu Miriu Hydro power project in conjunction with technical cooperation of Japan International Co-operation Agency (JICA).

Some other examples of multilateral agencies include: -

- World Food Programme (WFP) - the United Nation's frontline agency in the fight against global hunger. Organizer or overseas food aid programmes globally including those for most of the World's refugees and internally displaced people.
- Food and Agricultural Organization (FAO) - One of the specialized agencies of the United Nations and the leading agency for efforts supporting forestry, fisheries and rural development. FAO has 183 member countries plus one member organization, the European Community. This is the organizer of the World Food Summit.
- World Health Organization (WHO) International Nutrition Division - Global database on National Nutrition policies and programmes. Also conducts nutrition research including WHO multi country study on household food and nutrition agency.
- United Nations Development Programme (UNDP) - connects countries to knowledge, experience and resources to improve social conditions. Divisions located in 166 countries offering technical and other assistance to help countries create their own solutions to development challenges.
- International Fund for Agricultural Development (IFAD) - specialized agency of the UN, established to finance agricultural development projects, primarily for food production, in developing countries.
- European Commission (EC) Food Security Network - focuses on vulnerability, poverty and debt reduction.

Grants and Grants-in-Aid

A grant is a form of assistance usually financed in nature, the benefit of which is non repayable. It is given by one organization to another to encourage it to undertake or continue activities that it would not (or could not) otherwise do without that support. Alternatively, a grant may be used to persuade the organization to refrain certain activities. Grants can be distinguished from other forms of finance available to individuals of organizations by the fact that the grantors decision to support an organization is made without the need for direct commercial gain. Over recent years there has also been a trend to see grants being offered to encourage public private sector cooperation rather than offering public support to encourage companies to undertaken projects they might not otherwise do. Increasingly, central and state government support is provided to encourage local authorities to work with the private sector to release properties that would otherwise remain idle, empty or under utilized. In so doing regeneration in areas of social, economic and other need will be accomplished.

The not for profit sector in particular has had to consider funding how to obtain funding, requiring it to be more business-like in its approach. Charity funders are unlikely to support any scheme that has not been thought through or could not be continued once their initial support ceases. Increasingly, the lines of division between the for-profit and the not-for-profits sectors are becoming blurred: sports, arts, medical care, education are but four examples where requests for help could be directed to government, charitable trusts or commercial sponsors.

A grant-in-aid is also a form of assistance, which is non repayable but pegged on some agreed conditions. If the conditions are flouted then the grant-in-aid becomes repayable. Grants-in-aids are common between the most developed countries and least developed countries. The least developed countries are given financial or technical support but given conditions so that the support is not diverted to nonprioritised areas or other priorities. For example the Norwegian Government offers a grant-in-aid support to Kenya by offering scholarships to Kenyan graduates through the Quota programme. The only condition is that once the graduates are through with studies in Norway, they should come back to work in Kenya for at least three years. If this condition is flouted, then the person repays all the money that was extended to them in the form of scholarships. Grants-in-aids also help the donor country to safeguard their interests in a particular country of funding projects or initiatives that favour their interests. For example the Japan's Agency for International Co-operation (JICA) funds specific projects in Kenya.

Technical Assistance

A number of definitions of Technical Assistance have been proposed thus, "A means of using knowledge to improve the adoption and implementation of some type of educational practice or procedure". A simple approach to technical assistance is to provide information and resources to users. This may involve sharing resources with a caller or referring someone to a trainer in his/her area. In this approach, the user or the technical assistance provider can initiate the contacts, aimed at meeting specific user needs. Disaster education awareness in the context of a comprehensive school health/safety program can fit perfectly in the definition of technical assistance. This variety of definitions reflects the complex nature of Technical Assistance, which is a blend of content - the knowledge or information that is shared - and process - the way it is shared. Different ways of defining Technical Assistance also reflect "the different conditions and purposes technical assistance systems are designed to address". The most effective type of Technical Assistance is more intensive and involves activities that are sustained over a period of time with frequently scheduled meetings between the Technical Assistance provider and user(s) or beneficiaries.

Conclusions and Lessons Learnt

We have discussed in this paper the two main approaches in resource mobilization for re-construction and development in developing countries such as Kenya: indigenous approaches and external support through donors. Among the indigenous approaches used in Kenya are the "harambee" method, local community service, pooling work for self help, merry-go-round, micro-financing and domestic borrowing. Among the approaches from external support for funding include Loans, grants, grant-in-aid, bilateral and multi-lateral funding as well as technical assistance. By using a number of case studies listed in such approaches like merry-go-rounds we see that much progress was achieved through these approaches at both individual, community and even national levels. Each approach had its own negative side that have been highlighted. We therefore conclude that if the shortcomings identified can be fully addressed and rectified a combination of local and international approaches can work well in developing countries.

References

ASSISTANCE-DYN.show Orieko Preston (1999), "Community Development", 147-149.
Daily Newspaper 'The Standard': March 2005 - May 2005.

Daily Nation Newspapers 26/05/2005 (HELB)
Kenya Government Printer (2003), "Anti-Corruption and Economic Crimes Act 2003".
Kenya Government Printer (2003), "Report of the Task Force on Public Collections or Harambees"
Kenya Government Printer, "Sessional Paper No. 10 on African Socialism".
Kenya Government Printer, "The Penal Code, Cap. 63 Laws of Kenya."
Kenya Government Printer "The Public Officers Ethics Act 2003".
UNDP. Org.Np/Publications/drc 96/Key - def. Htm.
www.dti.gov.uk/expenditureplan/expenditure2001/annex-a/table-a1/a1-part35th.htm
www.grant-4-u.com
www.ntnu.no
www2.edc.org/NTP/ta.htm
12.46.245.173/pls/portal30/CATALOG.TYP--ASSISTANCE-DYN.show
216.239.59.104/Serach/q=cache

A POST-DISASTER DILEMMA: TEMPORARY SETTLEMENTS IN DÜZCE CITY, TURKEY

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Abstract

The long written history claims that disaster events have resulted worldwide in dreadful damages during the past thousand years. In 1999, Turkey faced two major earthquakes -7.4 and 7.2 Richter magnitudes- which affected deeply the public routine and the sustainability of the urban growth and development. Within this tragic picture, Düzce city was one of the particular samples that almost collapsed due to the two disasters—especially in terms of housing. In view of this, the city was gradually reconstructed through the execution of 15 temporary settlements and permanent housing complexes. On one hand, temporary constructions met the urgent needs of families affected by disaster (i.e. shelters, sense of secure, safety, privacy and daily life requirements). On other hand, they hindered the maximization of the opportunity given by the disaster itself to be turned into sustainable re-development due to their negative impacts in a long-term. Based on this conflict, the present study aims to review the temporary housing and examine their affects starting from the preliminary design to the uncontrolled growth of urban areas. According to the findings, the main reason was an outcome of access obstacles to permanent housing in both physical and financial terms whereby the need of improving the quality of living environment by self-demanding of the community occurred.

Keywords: temporary housing; post-disaster reconstruction; housing recovery.

Introduction

> "Turkey is a country with a high risk of natural disasters. But one of the criteria of livable settlements is that they should not be confronted with such a risk or that they should take the necessary precautions against it. In Turkey, a destructive earthquake occurs every 1.5 years or less. The statistics of structural damage caused by natural disasters during the last seventy years show that the number of houses wrecked/damaged by natural disasters is estimated to be 600,000; 66 percent of the damage is caused by the earthquakes, 15 percent by floods, 10 percent by landslides, 7 percent by failing rocks, and 2 percent by avalanches and meteorological disasters." (Habitat, 1996)

In 1999, Turkey was faced with two major earthquakes with magnitudes of 7.4 and 7.2 on the Richter scale causing around 19,000 deaths and 50,000 wounded. They also caused losses of approximately 300,000 and 50,000 residential and business units respectively. In this tragic incident, the city of Düzce almost collapsed. The city took a special place due to its position as a seismic centre in the second earthquake of November 12, 1999.

Consequently, it caused large number of housing shortage that needed urgent covering. The major issues were defined as rescuing victims, providing emergency sheltering and afterwards reconstructing the living environment. However a conflicting environment occurred because of the need to provide urgent requirements and the need for long term planning requested for by the properly structured plan

Post-Disaster Reconstruction : Meeting Stakeholder Interests : Proceedings of a conference held at the Scuola di Sanità Militare, Florence, Italy 17-19 May 2006, edited by David Alexander, Colin Henry Davidson, Andrew Fox, Cassidy Johnson, Gonzalo Lizzaralde, ISBN 978-88-8453-611-2 (online), ISBN 978-88-8453-612-9 (print), © Firenze university press, 2007

for the redevelopment opportunity of the City. As a consequence of shortcomings in recovery program, the temporary housing program did not work successfully. This has put the city in the previous vulnerable position with informal settlements and vast slum areas.

The study is exploratory and aims at developing a better understand the implementation of housing recovery through lessons-learnt from previous experiences. It describes the main tasks of reconstruction planning and focuses on temporary sheltering and housing with alternative approaching in providing these.

The research title, "*Disaster Dilemma*", was chosen as a result of its contradictory meaning to the previous experiences which show that most temporary housing settlements stay longer than their expected life.

Research Objectives. The research comprises 2 main objectives; To examine physical features of the selected temporary settlements in Düzce in between their 3 years life line (2000-2003), in order to figure out their negative and positive sides.

Research Questions . The proposal research questions as follows:-

- What are the preliminary and present conditions of settlements?
- What are the changes between initial and existing situation, and Why?
- What are the circumstances behind the captured picture of Düzce city in the selected period?(year 2000 and 2003)

Disaster and Housing

Housing is essential to well-being and development of most societies. It is a complex asset with links to livelihoods, health, education, security and social and family stability (Barakat, 2003). It is also a complete system embracing whole human activities determined by specific requirements and cultural patterns (Ibid, 2003). The World Bank reports (2002) that most vulnerable assets for disaster are housing in housing sense and developing countries have been affected more than industrialized ones. The reason of this vulnerable position is the unfortunate consequence of the process of rapid uncontrolled urbanization in developing countries, which has resulted in the proliferation of vast slums and squatter settlements (Huque, 1983).

According to the conditions occurred on post-disaster period, the major issue is usually defined as re-building the physical environment by emphasizing housing in the recovery programs. For all ages the humanity tends to have a shelter to settle down and continue to improve their standards. Therefore, this basic attitude is generally seen at the afterwards of a catastrophic event; sheltering is a necessity to provide safety conditions, reduce the tensions and maintain community's security with protection from climate conditions and sanitation problems. It is also important for human dignity and to sustain family and community life as far as possible in difficult circumstances (Shelter Project, 2004).

Temporary Housing

> "…Temporary housing is usually provided by wealthy governments, and it is extremely expensive in relation to its intended life-span. The provided units are expected to last for a period of several months to several years, prior to replacement with permanent housing…"
> (UNDRO, 1982)

As Johnson discusses (2002) temporary housing refers to disaster-affected families' lodging between the onset of the disaster and the period when they regain permanent housing. Temporary housing is usually preferred by national authorities when the disaster consequences point large number of housing shortage that permanent construction takes long time. In addition, it is observed as a necessity because of recovering physiological destruction of the community (Ibid, 2002).

At the international platforms, constructing temporary house in disaster affected regions has become a big debate. The main reason is observed as difficulties on controlling its time span and undesired circumstances caused by this exceeded life. With the light of all local and international discussions, it is still considered as the crucial joint part in housing recovery as a key of puzzle and in many disaster occurred regions it has a great tendency to implement in reconstruction program frequently.

Research Study: Düzce City

In 1999, when two massive earthquakes[1] shook Düzce in Turkey, the City is left with huge amount of housing shortage within a ruined public routine. According to consequences of disasters, Düzce had been left with 300.000 residential and 50.000 business units' losses[2] (Tercan, 2001) Due to the volume of housing shortage, the Ministry of Public Works and Settlements had tendered the construction of provisional settlements to 25 private contractors. Approximately 20,000 prefabricated houses were constructed in the effected areas, and around 8000 units were donated by Turkish Military, national private companies and foreign countries including Japan, Israel, Germany, USA, Greece, Russia, Czech Republic and the Cyprus Federation (Ibid, 2002). In addition to the housing donations as units, the Spanish Government provided a loan of 400 million US$ for housing reconstruction and good supply by stipulation on purchasing the products from Spain (The Annual Report of Prime Ministry of Turkish Government, in Ibid, 2001).

Temporary Housing Settlements in Düzce

As mentioned above, for reconstruction response, 15 settlements were constructed in both inner city and the surroundings with all the aids and provisions supplied by Turkish Organizations. The process was conducted by the Directorate of Prefabricated Constructions of GGDA.[3] Municipality of Düzce and Ministry of Public Works cooperated together for provision of infrastructure and site services, even though the neighborhoods were not included in municipal authorization boundary. Besides, the plans and layouts were prepared by the GDDA as seen on Figure 2. On other side, the GDDA also constructed various units in the same neighborhoods by using their wooden prefabrication technology. In addition, different typed constructions were built by international donors and organizations' aids that comprised igloo type, containers, steel-structured units, paper log houses and also constant prerequisites of aid organizations.

[1] The earthquakes, occurred in 1999, had 7.4 and 7.2 magnitude level. And Düzce was the centre territory of second earthquake.

[2] According to assessments, the total material damages are estimated over 10 billion US$ which is about 5% of the GNP of Turkey (Tercan: 2001).

[3] GDDA is General Directorate of Disaster Affair located in Ankara. It has seven departments in order to response mitigation and reconstruction issues for disasters including preparedness, risk analysis and need assessment studies.

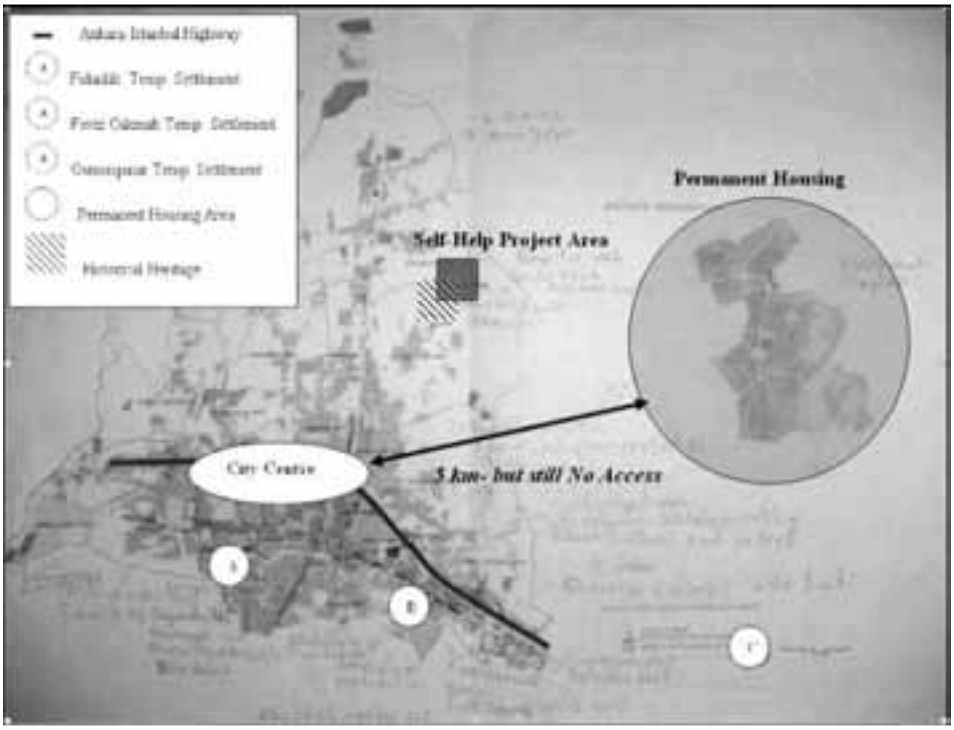

Figure 1. the relation between permanent, temporary housing and city centre in Düzce city, adapted by author (2004).

This diversity has created the different tendencies and attitudes seen on the residents. Due to their time span, the physical changes are observed and they have a character to be a tool to identify the local behaviours and prototyped products. For a researcher it is observed an opportunity to analyze the mismatches and positive sides of the implemented approach, "Temporary Housing". By basing on this opinion, Temporary Housing reviews are done with different design layouts and prototypes of provision houses are given above. The research is important to explore the physical features and design ideas behind the executions, directly related with use of time expectation.

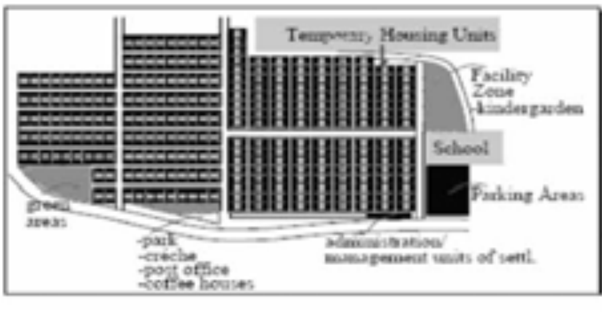

Figure 2. the Layout Map of Fevzi Çakmak Temporary Settlements, data obtained from Municipality of Düzce, drawn by author (2004).

Figure 3. Separated functioning within one room, Source: Baradan (2002).

Quick Review of the Temporary Housing Settlements in Düzce

This section analyses the data obtained in fieldwork briefly explained above. In order to illustrate research analysis, the framework is constituted to perceive the logic that comprises land and location, physical features and environmental aspects.

Land and Location
▪ Adequacy for settling ▪ Accessibility ▪ Ownership definition ▪ Development possibilities
Physical Features
▪ Necessary activities ▪ Road systems ▪ Zone planning within master planning ▪ Relations to the activities ▪ Relation to the neighborhoods ▪ Layout patterns ▪ Spatial organizations ▪ Space dimensions ▪ Cultural codes in space formations ▪ Building technology use ▪ Traditional construction methods ▪ Contemporary construction methods ▪ Labor skills ▪ Experience on related technologies ▪ Material selection ▪ Resistance of materials ▪ Economic life of products ▪ Local materials ▪ Imported materials
Environmental Aspects
▪ Climate ▪ Cultivation/plantation facilities

Table 1. Land and location, physical features and environmental aspects.

Spatial Discussions

In order to figure out the physical changes of the settlements, the open ended interviews were conducted among the residents. According to the results of questionnaires,[4] the most adequate space organization is chosen as Fevzi Çakmak settlements. The main reason of the relatively higher satisfaction level is because of the stage of privacy with multi-roomed character and size of the units.[5] Nevertheless, when the modifications of the units are analyzed, the most-frequently applied scheme manifest a need of covering the functional insufficiency that is demonstrated by the conflict between average family size and imported design conflicts.[6] For instance, the extra parts rank as main bed room, kitchenette, rooms depending on the number of children in a family-, storage and greenery.[7] The changeable character is loaded to the main living room as being flexible in day-night period, according to the number of children. Although extra constructions make the total area smaller, the main rooms are divided into different functions by isolating the kitchen from living place due to ventilation problems and fire risk. Depending on family size, the kitchen created by dividing living space, is used to create an extra space for family member. The site surveys show that the proficiency of the households creates considerable differences between tailored units in sense of quality, creativity on the space organizations. For instance, furnishing elements used as tools to identify spaces with reforming the units by storage, shadowing and gardening constructions.

In all the settlements, greenery re-arrangement in their close neighbourhood is also observed. Mainly, these gardening efforts represent two meanings; Firstly, it

[4] In the extended research, the questionnaires bringing us to the results and conclusions are conducted. Due to the limitations it is not placed in this paper.

[5] The unit area is approximately 30 m², with additional constructions it was increased to 45 m² including the greenery.

[6] The average family size was 4, 97 and it was gained from the GDDA's report. (see the reference).

[7] The most private space is separate bed room was given to the parents or –if exist- grandparents, in spite of the small sized area.

fills the missing part, privacy, in the "given space". Secondly, it revives living environment as aesthetic point of residents view and to enable cultivation attempts for the families. Moreover, most-frequently observed action is to have windbreaks, added for basic requirements. It claims that there is no buffer zone from public to private area. These parts are also used for giving the privacy for each unit between neighbours. The mentioned additional gardens also are constructed to isolate the houses from public areas and to have a place which is adequate for grow and sell the products by cultivating. On the other side, it is an extra effort to create better living environment due to lack of environmental aspects inside the settlements. (See the Figure 5).

When the settlements are analyzed in layout scale, the content comprises necessary activities, road systems, relation between activities and housing units, similarity or discrepancies with regional urban patterns and size of plots. As seen in the figure 4 layouts are tended by grid system.

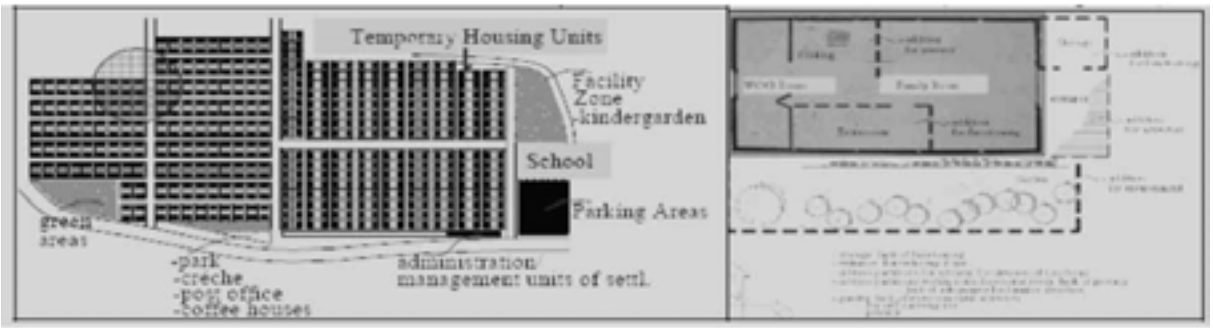

Figure 4. The initial layouts of Fevzi Çakmak Settlement adapted from Arslan, drawn by author (2004) and selected part for identifying the modified patterns (see next figure)
Figure 5. Modified Housing Units by residents, adapted by author (2004).

Figure 6. Additional gardens for cultivation and privacy supply, picture taken by author (2004).
Figures 7 and 8. Additional garden for cultivation and privacy supply, picture taken by author (2004), and source: Johnson (2003) and Author (2004) Construction methods and materials.

The schemes in Figure 6 and 7 stresses that users are identified their living environment. A buffer zone necessity between units can be read on figure 8. In particular, traditional codes in spatial planning are displayed in re-formed conditions by breaking the strong feeling of grid systems. Culturally, land use transition in planning are followed from public to semi private then private in spatial chain. By looking at the two schemes, this effort is explored as users interferes their close surroundings in order to adapt themselves by using the tools as changing the orientation of possible elements and re-identifying their defined spaces. It demonstrates the alien character of housing settlements and necessities of inhabitants to reformulate their interactions within settlement scale. In particular, gardening, re-positioning of the entrances with extra constructions and elements built for terracing and shadowing point out the need of proper planning that should match to the social structure as seen in Figure 9.

Indeed, these modifications prove that improperly prepared designs and circumstances of the failures. Originally, the target of temporary use is to cover the needs in rehabilitation phase but taking the preventions to hinder sense of belonging. In Düzce case it is clear that wrong ownership sense, among community seeing occupation is their rights, is supported by the authorities with provided services and high facilitating level of the settlements. While this idea doesn't reflect the design choice of the units, eventually contradicted actions with the idea occurred too. While re-using possibilities are missed, the solution is suggested as demolishing the settlements with the support of military.[8]

Figure 9. Schematic view of modified settlements in Fevzi Çakmak Settlements, drawn by author (2004).

Figure 10. Fevzi Çakmak Settlements, Source: Johnson (2003).

Figure 11. Modified Housing Units, Source: Johnson (2003).

Figure 12. Constructing house by using container type of temporary units as a core, Source: Johnson (2003).

Figure 13. Schematic Drawing to express modifications and spontaneously built commercial units in Fidanlik settlement, drawn by author (2004).

[8] It is claimed by the authority of the GDDA in Ankara as a result of open-ended interview (2004).

Analyzing the housing by construction methods and material use includes building technology use (traditional and contemporary methods and their reflection), labour skills on construction and their affects on housings' economic life span. For the same purpose, material selection is elaborated with understanding the resistance of materials, their local or imported features, applicability to the region and expandability characteristic. As mentioned, the building technology requirement was set through the construction scheme of General Directorate of Disaster's. The GDDA prepared the tendering documents, including layouts design, material choices, and decision of construction technologies. The proposed system pointed prefabricated concrete panel constructions built on site, even though on site efforts doesn't fit the prefabrication logic because of requesting long time. Since international and national aids are received, there is a variety occurred among housing types. In terms of technology and material selection, from local to highly sophisticated systems are monitored in close neighbourhood. This diversity played important role to create conflict among the community because of significant differences between different types.[9]

Figure 14. Initial design of temporary housing unit in Fevzi Çakmak Settlement adapted from Arslan (2004), drawn by author (2004) and Modified Units by residents: drawn by author.

Figure 15 Modified Unit by residents: adapted from Arslan (2004) drawn by author (2004).

Particular feature of imported products is that they are not considered being resistant against extreme climate conditions in disaster affected region as high humidity or dryness. In Düzce, main problem is that the structural applications aren't adequate for specific climatic features. In particular, Düzce has climate with high humidity caused early rusting of steel framework system compounds. Moreover, the sub compounds comprised by wooden products become unusable because these re-

[9] Figure 10, 11 and 12 express that different schemes create different demand on changing the living environment.

quired protections among the layers (between day-night and among the seasons) were not counted in reconstruction phase against extreme temperature changes.

The typical resident attitude observed is to modify housing to tackle with this problem by using own capabilities. However, In Düzce case it concluded with failures because of quality of the additional constructions. On one hand, components of the failure show self-efforts of the community that create a shield for survival needs as protection, security and privacy. On the other hand, these drudgeries were done unconsciously due to lack of know-how.[10] It is necessary to mention that the extended research done for this paper show that permanent housing reconstruction in Düzce city comprised mass housing and self help projects. In pre-disaster conditions, the main reason observed as physical, economic and environmental vulnerability, increased by man-made efforts. The indicators ranked as inefficiently applied building codes, mismatches on task delivery in related public organizations, ineffective legislations on overall constructions that were guided by political interests-–i.e. settling the city centre in most hazard-risked areas etc. In addition, the fragility was doubled by not ignoring the hazard risk into urban planning and development issues. Although land use zoning and physical plans were considered in master planning within national development programs, actual implementations were conducted by political interest, individual or common rants. According to the findings and tendencies both community and governmental sides, the positive and negative points can be found in SWOT analysis below.

SWOT Analysis

Strengths (in short term):-

- Necessary for comfort conditions (In short term; the basic comfort conditions, including minimum privacy, utility and necessities, have been given)
- Necessary to reduce tension (by given service, facility and infrastructure level, it helped to rehabilitate community's physiological structures, totally collapsed because of two major earthquakes, although temporary constructions delayed in first earthquake)
- Provided as components of new constructions-in short term when expected time span is fulfilled (see-annex-3)
- Had alternative uses in the future (Depending on building technology use, there were alternatives to re-use the hosing units by re-functioning or improving the existing conditions as UNDP-primary school and GDDA's
- housing projects).
- Had resistance against climate (depending on the building technologies, some housing units were relatively higher resistance against climate to meet the requirements of their economic life.
- Maintained by local material additions (The sense of self-sustained system had started to be reflected by community efforts).

Strengths (in longer term with the affects of modifications):-

- Self-assistance among the community members have been developed the neighbourhood conscious. Due to the necessities of population living and being in the same conditions, aiding attitudes were enhanced by itself in terms of strengthening the houses or improving their environmental conditions.
- Local capacity has been increased due to modification of the houses by community. In some cases, self implementation of traditional codes by modified houses made layout patterns more livable.

[10] For instance one type of temporary housing, paper log houses, although the economic life is 6 months, by plastic sheets, additional insulation layers the use of houses were exceeded. However, due to over use it is common to be demolished by itself.

- Self surviving methods attempted because of the cultivation efforts in built gardens and commercialization of the grown products.
- Imported technologies allow the local sector/population to be aware of the new systems and develop their construction skills due to the experiences on maintenance. Alternatively uses for light industrial or commercials, educational/administrative buildings, storage for farming. (It is seen that various assembled units have transferred to the new settled industrial zones)
- Secondary product market created by trading additional constructions within the community, spontaneously achieved the goals of prefabricated systems.

Weaknesses:-

- Except for specific samples, slow delivery occurred on construction process. It started to ruin reconstruction chain following permanent housing settlements.
- General idea was concentrated on their inflexibility and lack of individuality. In terms of technology transfer, imported designs didn't match the exact requirements of population. Most-frequently observed complaints were titled in basic design principles as opening the side of the doors through the neighbour units and missing the individual privacy. The material selection following the same problems were inappropriate in isolation sense.
- The discrepancies between temporary units, varied by funding organizations and their prerequisites, caused conflicts and created unfair atmosphere among the disaster affected families.
- They are frequently too small for a family type in Turkish standards in the region. It was inevitable to take some precautions in order to reflect their lifestyle.
- The quality of the materials was very low. Deterioration of the elements in housing units started earlier than the expected life time. This problem is also a consequence of insufficiencies of the organizations.
- Since the time of use was extended, there has been a conflict between the landowners and residents in sense of ownership and occupation.
- By additional constructions and re-characterizing the physical features, the
- temporary settlements have created a bad image on overall the city. The substandard of built environment is another issue for tackling with overall housing construction.
- Concrete prefabricated and wooden framework systems didn't resist against climate conditions, except containers. On the other hand, strongly supported systems of containers -by adequate-sized insulation materials and isolation layers, and their nonexpendable character-cause to change the attitudes on modifications.
- Immobilization of initial building materials, except self-added products, didn't match the logic behind prefabrication systems.
- Slow delivery of permanent houses and temporary constructions extended the time period to re-sustain the public routine and it caused that provisional houses stay permanent. Therefore, the defected periods caused the infinitive loop.
- From inflexibility to acceptability, the conditions were obtained by force of community's needs-privacy, functional, environmental, cultural, climatic
- In terms of transport, shipping and relocating the units were too costly. Instead of dismantling and displacing, It is understood that reconstruction from scratch is much cheaper.
- Speed was low due to inexperience of contractors, unskilled labors and construction defects.
- Lacking of individually-broken by additional construction and gardening was observed as a significant missing point.

- Infrastructure was constructed for temporary aims. Therefore, in a number of cases it is not possible to re-function the settlements by using existing infrastructure as a consequence of selecting low quality system, which was aimed to reduce the total cost for the government.
- Lack of alternatives contradicted with different typed units in one settlement due to households' allocation done by lottery. Significant distinctions between housing types created the sense of unfairness because of donated units, the GDDA's houses, and private contractors' applications.
- Expensive to maintain if it is desired to keep the housing units within their original manner.
- Inconvenient additions of utilities (i.e. heating systems) created danger as fire risk. Depending on the materials resistance, fire spread in larger areas as Fidanlik Settlement.
- Selection of the beneficiaries was difficult due to lack of pre-studies, creating a profile for needs assessment. Especially after second earthquake in 12th November 1999, temporary housing settlements, where there was no demand after first occurrence, was illegally occupied in overnight due to the fear and availability.

Opportunities:-
- The efforts of community should be canalized by consciously prepared
- modification
- projects--as self help logic.
- Local economy should be enhanced by product trading, high construction demand.
- It has high Speed on construction (Depending on contractors' capability and interrelation between organizations, high speed can be achieved with synchronizing infrastructure and superstructure constructions)
- When the prefabrication logic worked, the materials and building systems can be transferred for covering the needs of homeless. The temporary housing units can be used in slum upgrading facilities for both strategy implementations: contractor based mass housing projects until the construction is completed and material subsidization by reusing the parts. If the transportation problem is solved, there will not be any resource loss.
- Each plot area, except the presence of housing units, was adequate to use the different functions as individual environmental efforts, cultivations and even though to add new removable parts into the existing construction as core systems within temporary aims. The problematic is about quality of materials and concluded with unpatternized approach by missing the identity aspects as Gümüşpınar Case.

Threats:-
- When initial aim, being temporary, doesn't follow the executions, long term impacts always bad on the city and re-development chance can be almost lost. The image of the cities can be ruined as Düzce case, having totally temporary look. Due to the exchanged materials used in temporary settlements and occurrence of new prefabrication market in construction sector, the building types has shifted to totally low-quality structures, spread overall the city. Besides re-curing any kind of mistakes on implementation requires too much effort.
- Land selection wasn't fulfilled properly i.e. forestry, agricultural valued lands, inadequate soil conditioned areas were settled by loosing the potential use or increasing the vulnerability.
- Insufficiencies in administrative bodies created problems such as delays on constructions following to the entire execution processes- i.e. determining the

content of contracts, tendering process, selection of contractors, financing through the budget allocations, mismatches among public, private and assistance organizations.

- Even though the time period is well-determined within accelerated permanent housing constructions, they are very attractive areas to immigrate. It causes to start having same circle ending with vulnerability. The attitude of community made the units deteriorated much shorter than expected life time. Untrained and unskilled family members damaged the units by extra constructions. Due to this reason, it has become impossible in terms of relocating and re-using for probable disaster on rehabilitation phase.
- Foreign assisted housing designs were enhanced in their initial countries.
- Since international labor assembled the units in Düzce city, there was a problem occurred in dismantling phase, due to lack of knowledge. This is another handicap, hindering the re-using possibilities.

Conclusion

Theoretically, when temporary settlements target to fill two gaps, emergency and permanent sheltering (Johnson 2002), initial aims and applications follow each other. For this purpose, a clear-cut division on time spans and forming both temporary and permanent settlements are recommended to be well-defined in terms of budget allocation that comprises technology use, design task and material selection. However, implementation for the earthquake response showed that extra efforts have been spent to make temporary settlements more attractive in Düzce. Instead of stimulating the population to re-settle to permanent housing complexes, land selection, facility and services, activities and building technology decisions have demonstrated as if provisional housing was built to fulfill any permanent housing requirements. Nevertheless, in theories temporary time span, In Düzce, related applications have pointed to opposite direction.

Previously implemented program concluded temporary housing areas with modified settlements called as "premature slums". Basically they are simple outputs to prove the conflicts between demand and supply side. The basic indicators were comprised with missing the coherent needs assessment, overlooking the local capacity, mismatches between requirements and provided elements. Even though the material selection and building technologies within well-designed housing concepts were done properly, the tendency of community were observed to exploit the supplied materials in provisional housing due to the ownership clarification. As a consequence, it doesn't leave a chance to re-use for possible reconstructions or relocate to likely disaster affected regions. On the other side, the actions taken to demolish infrastructures, cleaning out the settlements and converting the functions doubled the cost of investments. Moreover, dismantling and storing the materials required for special warehouses because of the large number of assembled housing units and to protect them from climate conditions. Similarly, it is claimed that these actions are more costly than building new settlements from scratch in long term. As the Municipal authorities of Düzce claimed in 2004, 10% of losses in total produced hosing occurred by shipping or transporting. Besides, high percentages of products have become unusable due to detriment done by residents. In that respect, the importance of physiological consultancy, which creates the ownership senses and reconstruction chain of permanent housing, has become important. Therefore, it is necessary to train the population to create the mentality on the using scheme of housing units in order to utilize the compounds again and to respect other likely disaster victims. Moreover, given privacy conditions and transformed functions by resisting the environmental conditions and availability for re-constructing into the individual owned plots are preferred by a significant number of the community due to fears of another catastrophe risk.

Spatial growth tendencies, inefficiently controlled constructions-in spite of existing earthquake building codes-, climate challenges, planning obstacles, which does not fit social structure and concluded modifications, and housing finance problems cause provisional settlements to be exceeded. In order to avoid undesired consequences, affecting city re-development opportunities, the equilibriums should set delicately to reduce the vulnerability of cities to natural disasters.

References

Baradan, Berna (2003) "Geçici Deprem Konutlarının Yapım Sistemleri Açısından İncelenmesi", Dokuz Eylül Üniversitesi, Izmir, p.13-75.

Barakat, Sultan (2003) "Housing Reconstruction After Conflict and Disaster", Network Paper, Humanitarian Practice Network at ODI, p.1-35.

Bayındırlık ve İskan Bakanlığı (2000) "17 Ağustos 1999 İzmit Körfez Deprem Raporu, T.C. Bayindirlik ve Iskan Bakanligi; 17th August 1999 Earthquake Report of Izmit Gulf, the General Directorate of Disaster Affairs, Demirtaş, Ramazan, Ankara.

GDDA (1999) Handbook, The General Directorate of Disaster Affairs, Education, news and Science Magazine, Ankara, Volume 2 2001[a] Handbook, the General Directorate of Disaster Affairs, Education, news and Science Magazine, Ankara, Volume 1 2001b Handbook, the General Directorate of Disaster Affairs, Education, news and Science Magazine, Ankara, Volume 2.

Gonzalo Lizarralde and Colin Davidson (2001) "Models of Reconstruction Projects", IF Research Group. Université de Montréal. Faculté de L'aménagement.

Huque, K. Asraf (1981) "Disaster Aid, Emergency Shelter and Mitigation Planning", Proceedings of the Seminar Stockholm, p.12-100

Johnson, Cassidy (2002) "What's the Big Deal About Temporary Housing? Planning Considerations for Temporary Accommodation After Disasters: Example of the 1999 Turkish Earthquakes", Conference Papers at the 2002 TIEMS Disaster Management Conference in Waterloo, Canada, Online access at www.grif.umontreal.ca

Lizarralde, Gonzalo (2002) "Organisational Design, Performance and Evaluation of Post Disaster Reconstruction Projects", Mc. Gill University, Montreal, Canada.

Oakley, David (1981) "Transition Housing for Victims of Disasters, Disaster Assistance Manual", Office of Housing, Office of U.S. Foreign Disaster Assistance, Volume 1, Padco, Inc.

Shelter Project (2004) "Transitional Settlement, Displaced Populations", The Martin Centre for Architectural and Urban Studies department of Architecture, University of Cambridge and online access at www.shelterproject.org.

UNDRO (1982) "Shelter after Disaster, Guidelines for Assistance", Office of the United Nations Disaster Relief Organisation, Geneva.

THE DEFINITION OF URBAN HABITAT AS A SAFETY TOOL AGAINST GLOBAL RISK

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Abstract

The objectives of this research are: 1) Implementation of a strategic management of protection against global risk by developing the concept of safety-bearer habitat as the support space, which presents a high risk-security level, meaning that it is not liable to be destroyed, as well as the space endowed with patrimonial values that create and identify individuals' feeling of belonging to a community and the social sentiment of the being and 2) Formation of a poly-nuclear system of special safety centers, able to relocate in the post-disaster stage the affected population, named emergency habitat support system able to generate post-disaster reconstruction. The results of this research is the implementation of a strategic system for global risk protection through the development of the concept of secure habitat, which has to involve the entire society, authorities, legal and physical persons in implementing a multilevel safety system involving: the building - object; vicinity - building assembly; town and territory. The methodology employed is 1) investigation and mapping of the characteristics specific for hazard of the location, the exposed risk elements, their vulnerability and the resulted risk (direct and indirect loss), as well as establishing the accepted risk and 2) the identification of the secure habitat typology with patrimonial identity for urban development and post-disaster reconstruction. The project is proposing the scientific substantiation of some management operations for the reduction of disaster risk of the built space and the space under post-disaster reconstruction with keeping the continuity and specificity of the urban habitat, in order for the feeling of civic affiliation to be preserved.

Keywords: safety; patrimonial habitat; post-disaster reconstruction.

The Constructed Environment and the Sustainable Development Concept

Bucharest – a capital exposed to earthquake. Bucharest – capital of Romania is one of the European towns exposed to earthquakes. With an area of 228 sq. km and a population of 2,021,000 people, a great density in the central area, high buildings built between the 2 world wars, Bucharest had during the earthquake from March 1977 over 1500 dead and damages of over $ 1,000,000. In this context, the efforts of the specialists and central administrative authorities are focused on the implementation of a risk reduction management regarding disasters, by direct methods – consolidation, as well as by indirect methods – of legal type, for developing and urban strategy. Determination of the type of habitat necessary to solve a post-disaster residential crisis is made on the basis of a complex investigation, based on criteria of urban sociology statistics, which will determine: estimation of demographic growth, structure of population by groups of age, family structure by sexes, family structure by occupations, social and religious affiliation, economic context, local and national specificity, traditions of geo conformation – climatic, ethnical, religious. The intervention in the calamity-stricken areas must assure the population a climate of security of life, renewal and stimulation of the economy and increase of the habitat quality and implicitly of the quality of life by restructuring. Reconstruction of the patrimonial reference marks, identification of the identity spatial strategies generating psychosocial security by reference to the "mental map" memory.

Post-Disaster Reconstruction : Meeting Stakeholder Interests : Proceedings of a conference held at the Scuola di Sanità Militare, Florence, Italy 17-19 May 2006, edited by David Alexander, Colin Henry Davidson, Andrew Fox, Cassidy Johnson, Gonzalo Lizzaralde, ISBN 978-88-8453-611-2 (online), ISBN 978-88-8453-612-9 (print), © Firenze university press, 2007

Risk management by the fundamental principal of durable development. Titled suggestively "Our common future", the Bruntland Report described very clearly and for the first time the process of the environment degradation, both on a local -regional level and on a global level, in close connection with the economic development, underlining at the same time the systematic transfer of certain degradations on to the future generations, substantiating the concept of durable development. The definition of durable development is followed, in the Brundtland Report by its explanation through two integrated notions:-

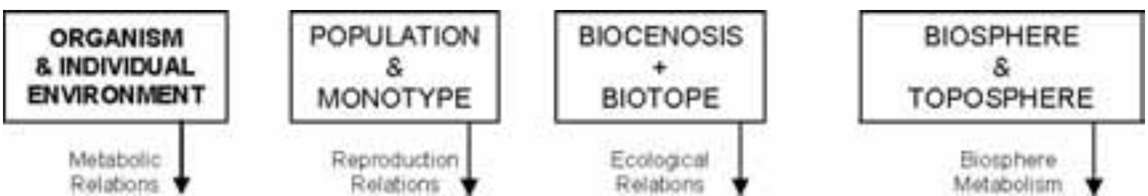
- the concept of need--in particular the essential needs of the least favored who need to have priority;
- the concept of limits, imposed by the current state of technology and social organization over the ability of the environment to respond to our current and future needs.

The *six components of sustainability* are respected in order of:-

- maintain and enhance quality of life
- enhance economic vitality
- ensure social and intergenerational equity
- maintain and enhance environmental quality
- incorporate disaster resilience and mitigation into actions and decisions
- use a consensus-building, participatory process when making decisions.

One of the principles on which the concept of durable development based is the principle of the eco-systemic approach, which derives from the ecologist vision of environment protection. According to its definition, the ecosystem is „ the aggregate of the physical, chemical and biological conditions that the life of an animal or vegetal species depends on". An ecosystem is a living dynamic organism, characterized by a circulation of fluxes in the interior or between the interior and the exterior of the system, to which the system adapts itself through its own forces, changing its characteristics and thus evolving. The ecosystem consists of two major components – the living as an individual, populations, biocenosis (biomass) and the non-living – the environment, the support space of the living. The ecosystem-based approach within the framework of the durable development supposes, on the one hand, that we should understand the environment that we must respect it by understanding its constituting ecosystems and on the other hand, that we should understand other non/natural systems by assimilating them as ecosystems. The constructed existential space, given by the relation between the support environments (defined as habitat), where the individual lives, the collectivity defined as antropocenosis, are forming the architectural ecosystem – urban ecosystem.

Organization of the Ecological System



Individual Ecological System	**Collective Ecological System**	**Ecosystem**	**Ecosphere**

Figure 1. Biological System + Environment = Ecological System (Gociman, 1999a).

Ecosystemic disasters are defined by the introduction of turbulences or strong aggressions in and around the biotope provoking changes, which in turn destroy the ecosystem's equilibrium, forming an entropic ecosystem.

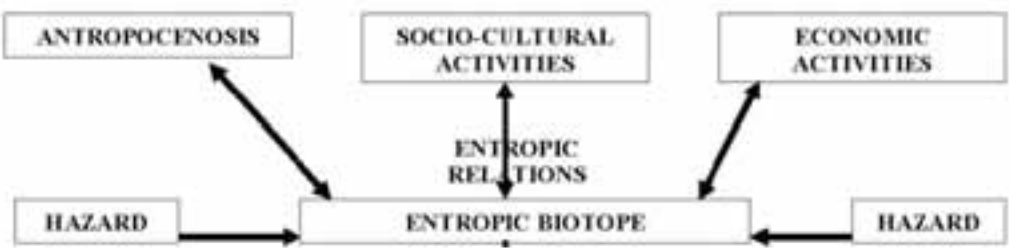


Figure 2. Entropic ecosystem - Specific concepts for risk management (Gociman, 1999b).

The Architectural Ecosystem: a Constructed Existential Space

In his book „Existence, Space & Architecture" C. Norberg-Schulz decodes the hierarchy of the existential space levels as reported to man and to his actions. This structure points out people's specific operating scenes, created through the interaction with the existing architectural space and it also illustrates the cognitive theory of space. The six levels of the existential space decoded by the author can be identified by three environments recognized by the population of a certain place and develops on their own territory: the individual, the proximal and the global environments which are in direct interaction with the architectural space as constructed existential space.

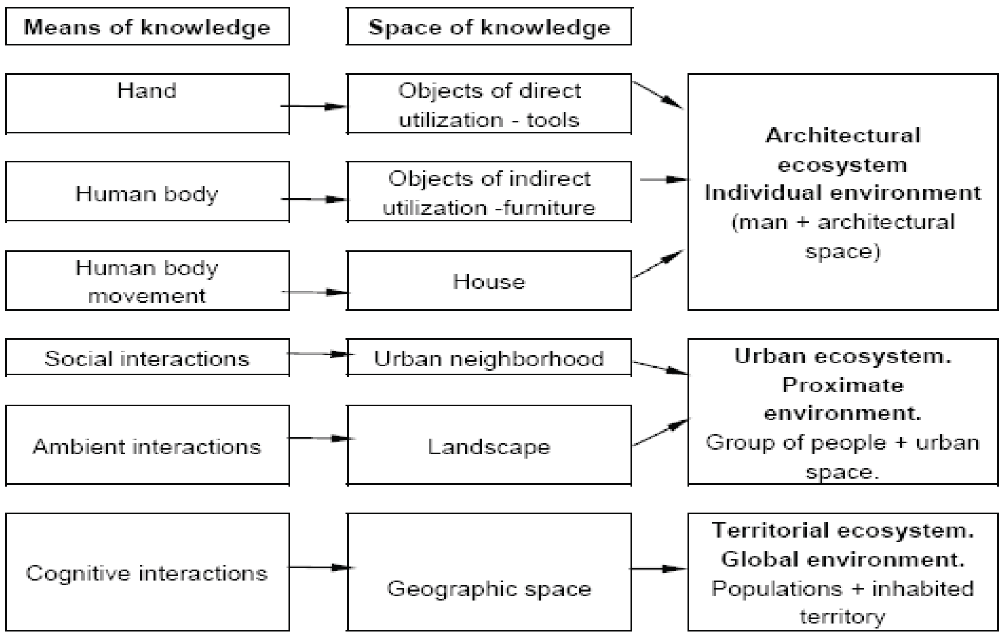


Figure 3. Organization of the architectural – urban ecosystem (Gociman, 2006a).

This perception of the space organization establishes a hierarchy of the relationship of the individual - collectivity (the anthropogenesis) with the environment (the biotope), fact that creates behavioural reference points that are fundamentally necessary to reconstruct in case a disaster occurs.

Habitat – Support Space

The habitat is a special-functional network in which the dwelling as a basic structure coexists with the complementary public structures, commercial, educational, health and leisure facilities. The configuration of the habitat is an expression of the geoclimatic, social-political and religious determinations of each community as a result of its organic development. This characteristic forms a historical as well as a cultural dimension of the community. *The brutal destruction of the habitat as a result of natural or anthropical disasters represents one of the major losses of a collectivity.*

The patrimonial habitat. The patrimonial habitat is finite from a spatial point of view – by accumulation in the territory, but infinite from a temporal point of view, by continuous selection during the evolution of the collectivity, with certain specificity, expressing an energetic balance between tradition and innovation. This mobility and power to adapt itself enable it to assimilate in the contemporary world the true values, describing a mode of functioning specific to the living organism – self-adjustment.

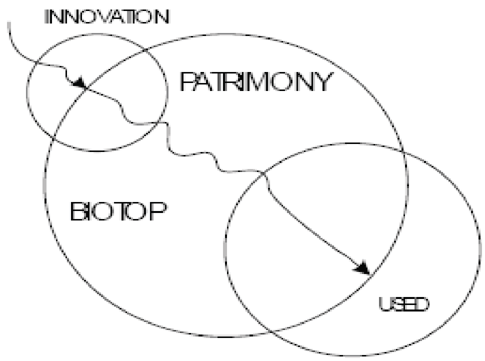


Figure 4. Innovation. and patrimony.

The evolution of the urban ecosystem both on the level of the needs as well as on the level of responses creates the premise of a transgression of essences, able to open and to incorporate any manifest gesture as a fiction of a future tradition. The assimilation, the sedimentation of constructed gesture will create a conservative definition of the space, which will interact with the future act of construction, with the resistance of the “tradition”. The impulse generated by the couple architect-beneficiary and the response of the biotope (natural environment, architectural environment) will form a biunique relationship – one of self-adjustment. Analyzing the result of this interaction, we find at the level of the biotope an accumulative sedimentation, the one keeping with the patrimony, and at the level of the anthropogenesis an essentialization of mentality – conceptualizing the identity *and the tradition*.

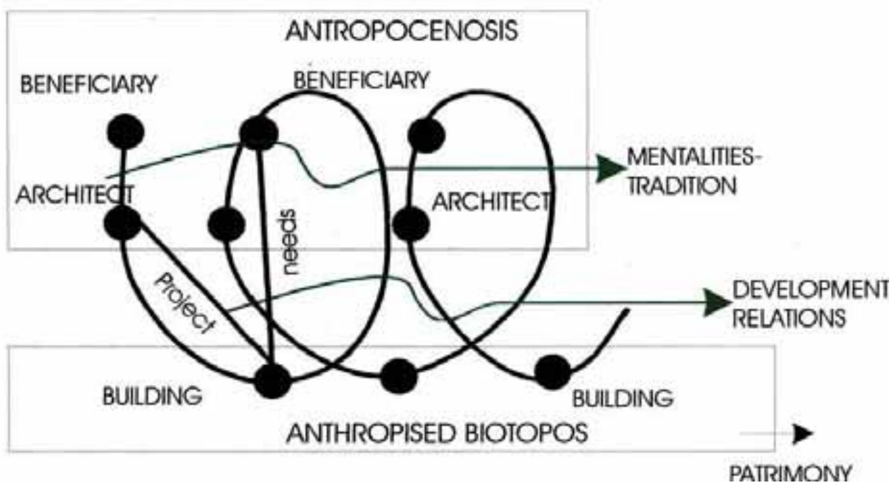


Figure 5. Evolution of the urban patrimonial ecosystem (Gociman, 2006b).

The habitat – reference point. After the destructions caused by World War II, starting from the existing problem of city reconstruction, the architect Kevin Lynch set on to demonstrate that existential and architectural space as imagined by humans are the result of a mental process by which the exterior world is perceived. According to Lynch, this image is the result both of imediate sensations and of the memory of past experience. In his study "Toward an Architectural Design Epistemiology Regard as a Place Creation Activity" - John Muntanola Thornberg maintains that architecture, by creating places that contain life, has a human value. According to Lynch's research on citizens and the perception of constructed environment, he points out that each individual carries with himself an "image map", a mental projection of the reality marked by physical, cultural and psycho-social components, by "places". Localization of space (of every space) is submitted to certain relations with certain "places" – fundamental childhood reference points: home, church, school. Identification of space is connected with its personalization: important routes in a network, as reference marks – points on a route, materials, texture, colour, light – which can be identifiable.

Localization is submitted to associations with certain events: cultural, religious. The identification with a certain characteristic responds to a necessity of repeatability, even to one historic information. Localization is connected to the memory of certain emotions and feelings experienced in a certain space. Identification of a spirit of the place – generator of affinity, familiarity, sadness, joy etc.

Figure 6. The "Patria" Inn, Bucharest – facade and sidewalls (Joja C-tin., 1999a).

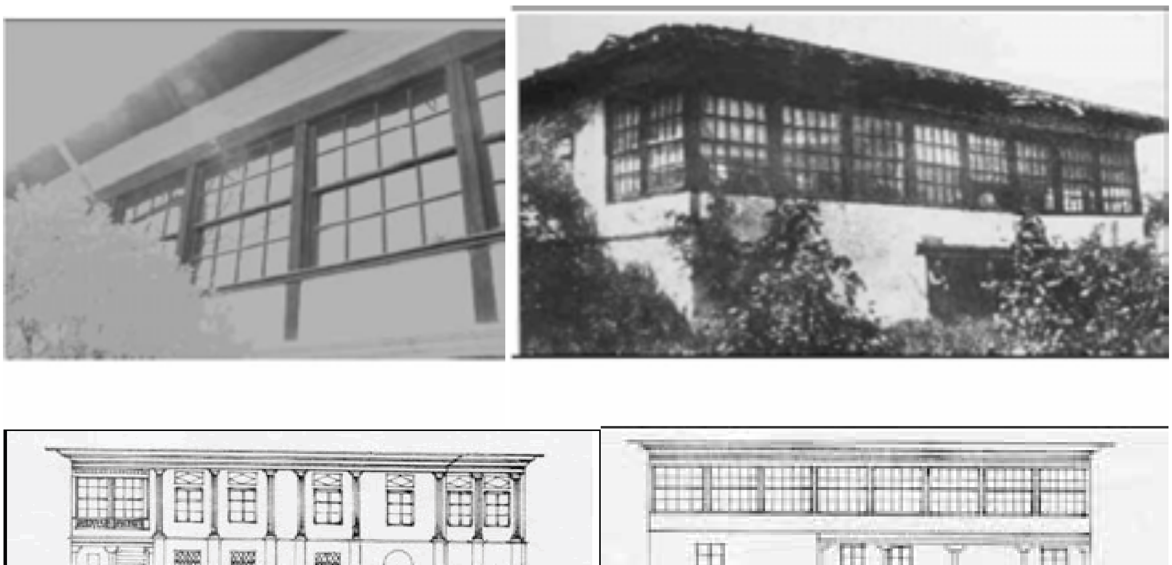


Figure 7. The Melik Residence, Bucharest – facades (Joja C-tin., 1999b).

The visual perception. The constructed space proposes to each receptor a particular representation, cognition of the perceptive images is accomplished only through an analysis of the individual spatial representations, which are tightly connected with the mental representation of the individual with respect to his environment and with the way in which he receives the information as a message coming from the constructed and social space. The mental image of the city, structured into a mental „map" is partially sequential and sectorial, the known areas being interconnected by linear visual flows corresponding to the axes of movement and in which an important role is performed by speed of movement, the clearest parts of the mental map being those connected to the usual ones and to the activities, that is those connected to recognition and functional identification. In the relationship of the individual with the constructed space, the transfer and reflection at the level of the subjective image of the mental „map" is performed through some main perceptive criteria, more precisely through scale, reference points, visual sequences, together with distance, duration and speed of perception. These criteria were identified and pointed out as connecting elements between the mental and the real space, as constitutive components of the architectural space.

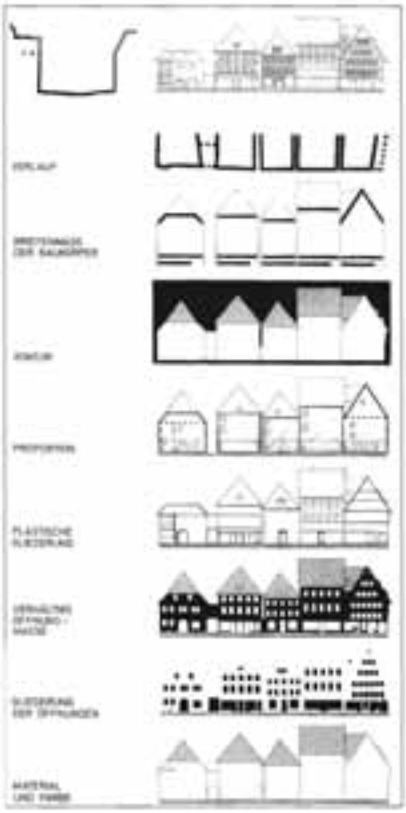


Figure 8. House group analysis in Pferdemarkt, Hameln, Germany.

Marcel Proust described the difficulty of presenting a fixed image of the character of a society or of a passion. In this universe in which the fragments of classical world are atomized different past present and future temporalities are mixed up in an imperceptible way and in an unstable balance, decoding images and explored spaces becomes an object of permanent reading again. "One of the functions of architecture is to reveal the unconscious memory hidden in forms", says Fumihiko Maki.

Possible spatiality. The moment when the habitat gets de-structured pursuant to a calamity, the collectivity loses its „orientation", the affiliation to the space of „mental map" memory requires a re-creation, a reconstruction of the former reference points now disappeared, in order to give behavioral stability to the community.

Figure 9. Linden Inn, Bucharest (Joja C-tin., 1999c).

Figure 10. Visual sequences Frankfurt – The Römerberg Front.

The intermediary – Romanian Space. The indefinite Japanese space, deriving from the Buddhist idea of vague, ambiguous, floating frontiers specific to the Hara logic, the gray space defined by Kurokawa, represents an area of coexistence. The romanian space also pointed out by Constantin Joja as a space of shade, of the porch and large eaves, which dematerialize the house, constitutes a point of tangency of two different worlds. An intermediary space between the indoors and the outdoors, between shade and light, monovalence and plurivalence, place of reverie and meditation, the porch scrutinizes the horizon as a huge eye open to the world, in a total assimilation with its best friend – the nature. Its resemblance to a circle that closes and opens itself, as C.Noica remarked in his "The Romanian Feeling of Being", reminds us of the complementary conciliation of the antagonistic Ying and Yang in the well-known Chinese symbol. Revealing the dual character of existence in nature, Blaga shows that to the extent in which knowledge implies ordination, the known environment is our creation. In this context, getting to know the nature by contemplating it means re-creating it perpetually: people of different ethnical origins model space in a different way, some of them incorporating it as a friend, others rejecting it as a virtual enemy.

Bipolarity/Adaptability. The Romanian stylistic field – appertaining to the Carpathians-Danube geographic area – is a bipolar field situated at the limit of the active and dynamic Occidental world and of the Oriental world of "passive resignation" and acquires an intermediary and conciliating value, that is adaptability. Revealing the sinusoidal character of the Romanian topos, character which is also present in the existing architecture of the antagonistic horizontal-vertical duality on a system level (that is at the level of the village) is also present at the level of the object, that is of the house and of the porch. The conciliation of the antagonistic duality indoors-outdoors, shade-light, horizontal-vertical in the intermediary area, the transparency, the mobility of the Romanian space, the essentializing purity, they all start from the deep apprehension of the measure of things, of the behavior of materials, incorporating a serene cosmogonical vision of being in harmony with the world.

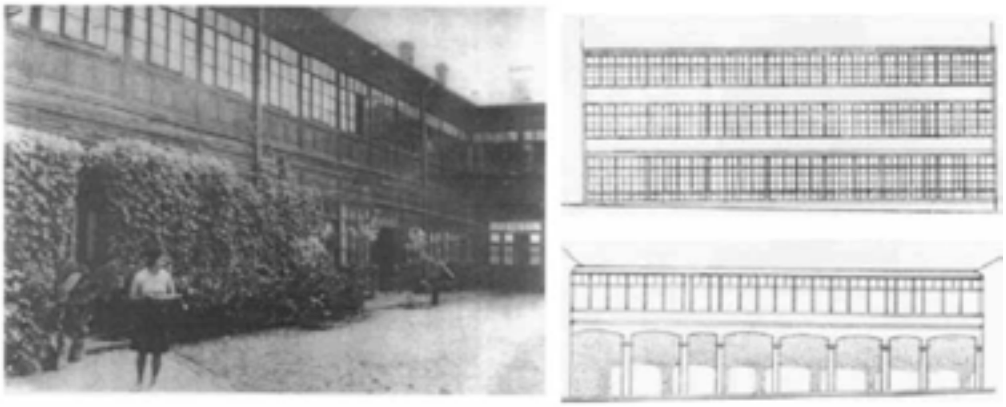


Fig.11. Present situation of the Romanian Architectural tradition
(Joja C-tin., 1999d).

Fig.12. Church from Maramures, Village Museum, Bucharest.

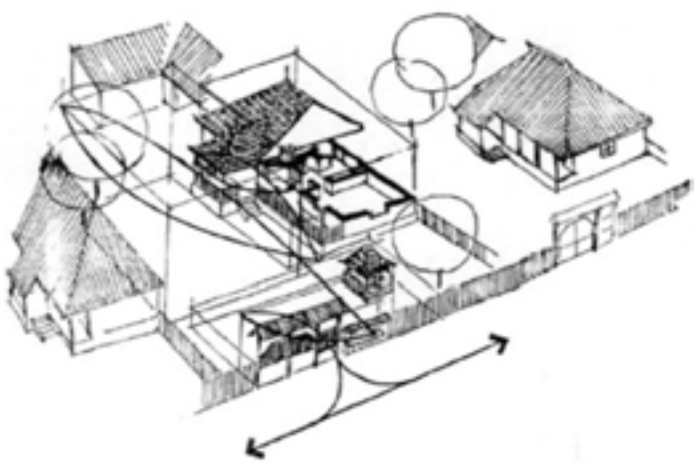


Figure 13. The schematic representation of the Romanian tra-

The feeling of durability over the ephemeral by sacrifice has with the Romanians a remote mythical root. Starting from the ancient Indo-European archetype of the cosmic pillar, according to which at the very basement of the house a soul is laid, the legend of Manole the Craftsman is illustrating, advocating the idea of sacrifice as a condition of durable construction.

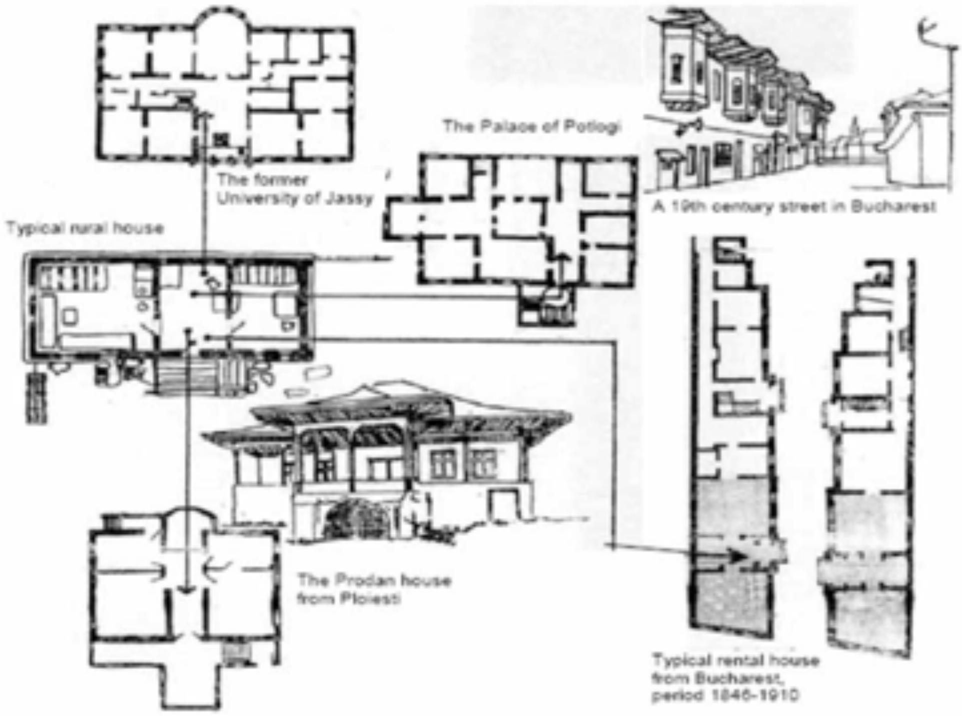


Figure 14. Transfer of traditional Romanian folk house plan into the plan of aristocratic city houses and of palaces. (Caffe M., 1987b).

The safety-bearing habitat.

Safe habitat with patrimonial identity = safety-bearing habitat.

Safe habitat. The development of the safe habitat concept must involve the entire society, authorities, legal entities and individuals for the implementation of a multi-level safety plan involving: the object submitted to the process; the neighborhood – the complex of buildings; the settlement (village, town, city). The safety-bearing building imposes: more efficient technical norms of protection against different hazards, appliance of new technologies and diminution of the object's specific vulnerability. The safety-bearing complex of buildings is based on the different behavior of the individual constructions of the ensemble, the components of which can interact, which requires that the behavior of an heterogeneous building ensemble be calculated in relationship with the entire ensemble's hazard. The safety-bearing place (village, town, city) must become a secure polycentric network; the safety-bearing territory is a secure area of globality.

Multilevel safety system. A safety-system regarding the organization of the city areas towards which the affected population of a zone can be evacuated creates a local safety system and determines the area of evacuation to these centers. Formation of the– green areas network with facilities and possible flexible connections for ensuring the necessary supplies, which can become zones of linear evacuation, emergency transportation lines or lines of fire stoppage in case of fire. The green knots are green areas, parks, squares able to receive the population evacuated from the neighborhood or areas associated to certain public functions, supplementary dimensioned and calculated for risk situations (schools, hospitals), able to accommodate the evacuated persons.

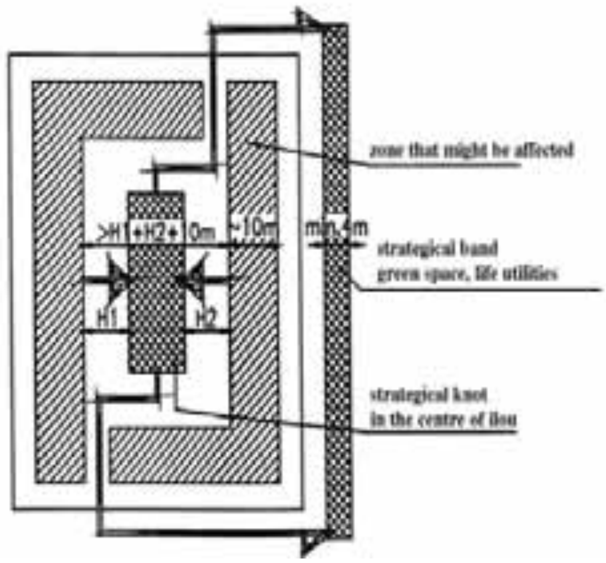


Figure 15. Evacuation chart of a strategic ilou – strategic knot (Gociman, 2006d).

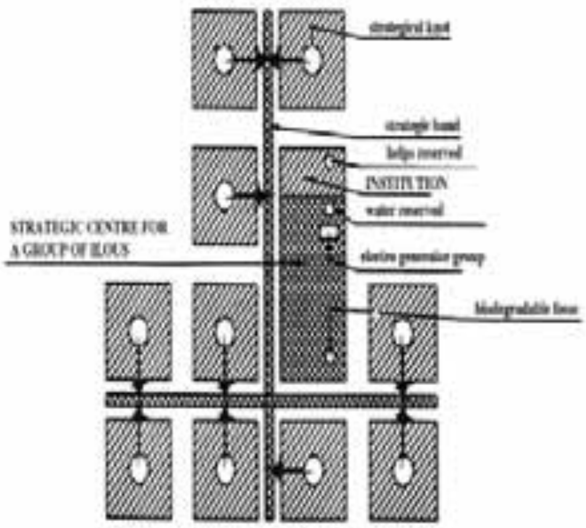


Figure 16. Chart for creating a strategic centre – evacuation of more ilous (Gociman, 2006e).

These strategic knots will be equipped with water reserves or tanks with a double supply system, both from the municipal network and from a well. They can be equipped with electric generators (if possible), with toilets connected to a biodegradable septic tank and will have the possibility to be connected to a communication system. *Reconstruction of the destroyed areas* must be based on a systemic analysis. Criteria of approach such as:-

- priority necessities of the population dislocated both from the dwelling space and from the productive space regarding the reconstruction of the destroyed facilities.
- the development premises created by the need of reconstruction – named premises of urban restructuring, which can be different from the provisions of the projects of urbanism approved initially.
- functional remodelling of certain buildings – architectural monuments and social-functional re-conversion modelling.

These criteria can generate a new general or zonal plan, which will orient differently the development of the area estimated before the occurrence of the disaster. In accordance with the international expertise, there are three different ways to produce the habitat, which also generates a certain classification: the planned habitat, the administered habitat and the sub-integrated habitat. ***The planned habitat*** is the simplest and fastest solution to solve the requirements of a mass crisis and represents a coherent performance of project-execution for residential and service ensembles. The planned habitat is the object of a big investment supported from the budget or by big investors in order to satisfy: a rapid demand of dwellings and services with a concentration of responsibilities and components. It offers the possibility of a correct investment management and of easy administration. It is obvious that the system has disadvantages in terms of homogeneity that imposes monotony; a low degree of flexibility that does not allow the special-functional evolution might generate social-urban pathologies.

At the same time, it requires large-surface empty plots of land, which are not always available but only be urban extension or by eradication of some de-structured areas.

The administered habitat is a moderate solution of intervention in the territory, the initiative appertaining to the investor, the administration specifying only the construction possibilities or interdictions resulting form the urbanism regulations – R.L.O. (rate of land occupation); L.U.C (land utilization coefficient), alignments, height standards. This type of habitat represents a permanent juxtaposition of the individual initiative and the control/guidance of the administration, creating problems in the relationship between private and public both from a managerial and financial point of view and with respect to the property. Historical places and cities are an eloquent example of this organic growth of such habitat.

The subintegrated habitat appears under extraordinary demographic pressures as a product of a construction made by one's own means and built of different materials by people of poor means. This type of habitat is not within the legal boundaries, formally administered and cannot be submitted to any therapy. Eradication of this proliferation is a problem of urban prophylaxis, but first of all it is a social-economic problem. All these three types of habitat coexist, the planned habitat being prevalent in the periods of centralized planned economy (the plots of cheap-apartment blocks of flats of a "social" type, the large dormitory areas of "modern" cities), the administered habitat in the periods of liberal economic orientation and the sub-integrated is recorded most often in developing countries or in the periods of post-disaster relocation.

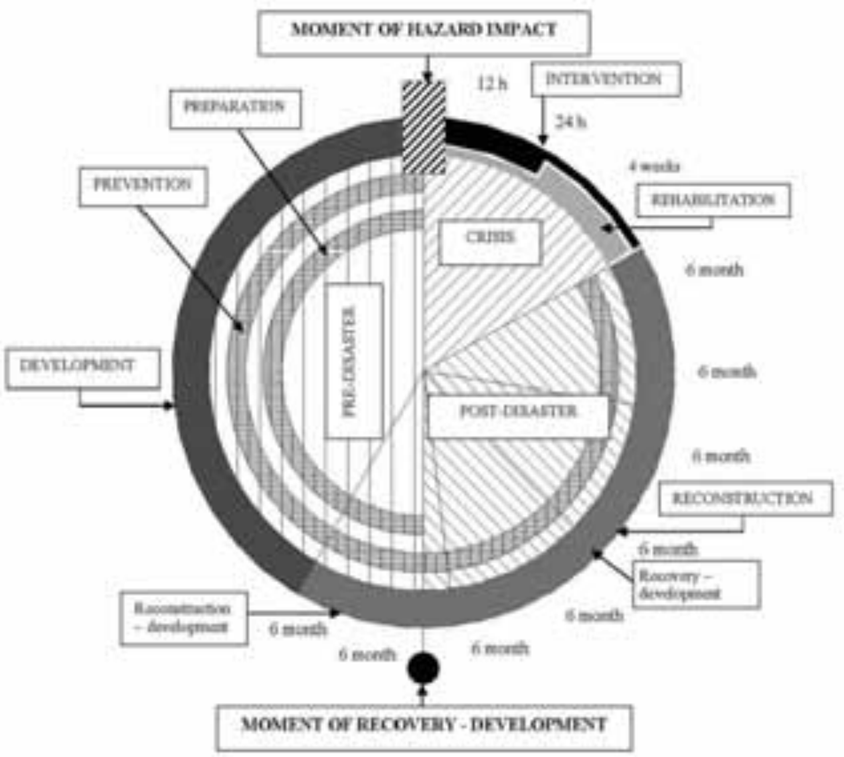


Figure 17. Formulation of a new pattern of global approach (Gociman, 1999c).

By the estimated duration of use, we have two types of habitat: permanent or temporary. *The permanent habitat* is the one described hereinbefore as a modality of permanent residency. *The temporary habitat* consists of residential units preserved in case of disasters or minimum services able to take over for a period of a few months the accommodation of the victims of the calamity and which can be then deactivated or maintained in accordance with the existing demands. The temporary habitat is currently used in "drawer"-type operations of substituting the sub-integrated habitat (the "slum" population is transferred to a temporary lodging campus while the destructured area is rebuilt). Considering the degree of vulnerability of the habitat, we can have a safety-bearing urban habitat or a habitat exposed to risk.

Conclusion

Urban strategies for risk reduction:-

- Definition – formation and implementation of the concept of safe habitat at all the levels of spatial organization: object, neighbourhood, residential area, town/city, territory.
- Identification of the specific components of the patrimonial habitat – reference points, routes, architectural, cultural, religious and affective sequences which
- can be reconstituted and which can create the mental map of the community.
- Zoning of the territory of the settlement by criteria of protection against disasters, into strategic areas, dimensioning the area by considering the risk class and especially the possible number of affected population which is likely to be evacuated towards a given location, named security cluster and independent from an energetic point of view and having medical, food and equipment reserves.
- Formation of a poly-nuclear system of secure zones able to protect and relocate the affected population and to generate emergency habitat – support for post-disaster reconstruction.
- The management of rehabilitation as well as of that of reconstruction must be based on the involvement of all those affected, individuals, collectivities, institutions.

Ascertainment, interpretation and inventing are stages of a non-implicated archaic wisdom that we must now abandon, adopting an attitude of implication. By aggressing, we become aggressed ourselves and the contemplation becomes an obsolete attitude, which changes exactly by implication. Our "cohabitation" with the hazard modifies the reference points of stability, compelling us to a receptive and anticipative permanent dynamic action, represented by the new type of risk managerial approach, a risk which aggresses the architectural ecosystem – a symbolic expression of the existential space empowered towards a permanent reconstruction.

Figure 18. Arrangement proposal for temporary habitat (Gociman, 2006e).

References

Aristotle – "Physics", Book IV.
Blaga, Lucian – "Spatiul mioritic"
Brundtland Report – "Our common future", 1987.
Caffe, Mihail (coordinator) – „Contemporary house – issues and points of view", Technical Publishing House, Bucharest, 1987.

Cockburn, Charles and Barakart Sultan – "Community property throught reconstruction management", Teheran, 1991.
Gociman, Cristina Olga – „The management – architectural ecosystem relationship in the reduction of disaster risk", Ion Mincu University Press, Bucharest, 2000.
Gociman, Cristina Olga – „Habitat investigation – ecosystem approach", Ion Mincu University Press, Bucharest, 2006.
Gociman, Cristina Olga – „Management of disaster risk reduction – architecture and urbanism strategies", Ion Mincu University Press, Bucharest, 2006.
Joja, Constantin – „Glass facades", Simetria Publishing House, 1999.
Joja, Constantin – „The present condition of the Romanian architectural tradition", Technical Publishing House, Bucharest, 1984.
Muntanola Thornberg, John – "Toward an Architecture Design Epistemiology Regard as a Place Creation Activity".
Noica, Constantin – "The Romanian Feeling of Being", Bucharest Lynch, Kevin – "Town image", 1960.
Norberg-Schultz, Charles – "Existence, Space and Architecture".
Spengelin, Friedrich – „Stadtraume in Wendel", Germany, 1998.

TEACHING STUDENT ARCHITECTS ABOUT RECONSTRUCTION: A SYSTEMS APPROACH

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Abstract

Reconstruction after natural disasters requires a broad view of the issues and the possibilities; it cannot be reduced to the single levels of techniques or of social issues, taken in isolation, demanding instead the mobilization of efforts of analysis and synthesis, coupled to organizational and physical design. Architect students potentially possess the ability to take a broad-scope view of an environmental design problem, but habitually focus primarily on technical and esthetic design issues rather than broadly including organizational and process design as the systems approach suggests. At the School of Architecture, University of Montreal, we offer the opportunity for students to broaden their view of their future domain of professional responsibility, by harnessing their skill and enthusiasm to the humanitarian problem of post-natural-disaster reconstruction in developing countries. The scenario within which they work comprises two phases: (i) developing the conditions of a competition (in the form of a performance specification) and (ii) developing a technical and logistical response accompanied by an organizational design. Through the students' work, several principles underlying post-disaster reconstruction have emerged, such as its open-ended time-frame, the need to broaden what "housing" includes, the importance of organizational design and the scope for a systemic view of local involvement.

Keywords: architectural education; design processes; logistics; organizational design; project management.

Introduction

Tackling the complex issues of post-disaster reconstruction requires a combination of knowledge, experience and skills – skills in synthesizing the disparate inputs and in coordinating the heterogeneous participants. In an educational setting, coordination skills are acquired in project management courses; synthesizing skills can only be acquired through experimentation of the sort that architecture students are exposed to in their design studios, learning as they go how to cope with often irreconcilable project requirements.

In a university setting and in parallel with our long-term research into understanding the complex problems of reconstruction after natural disasters in developing countries, we devote efforts to "teaching" about post-disaster reconstruction. However, *teaching* is hardly the best word to use, since our students approach this *problématique* in a cluster of coordinated courses and a studio, forming a systemic program of activities. The studio is the focus of this paper.

Objectives and Methods

Our initiative addresses the need to form as many competent professionals as possible to cope with the surge in catastrophes, to recognize vulnerabilities beforehand and to plan for the right levels of intervention. As we have mentioned, the program of work hinges around a studio, where students learn about and experi-

Post-Disaster Reconstruction : Meeting Stakeholder Interests : Proceedings of a conference held at the Scuola di Sanità Militare, Florence, Italy 17-19 May 2006, edited by David Alexander, Colin Henry Davidson, Andrew Fox, Cassidy Johnson, Gonzalo Lizzaralde, ISBN 978-88-8453-611-2 (online), ISBN 978-88-8453-612-9 (print), © Firenze university press, 2007

ment with the indispensable link between technical and organizational design, and the importance of logistics.

The studio is carefully designed to simulate a hypothetical but plausible situation under the theme of "Reconstruction after natural disasters in developing countries". The scenario supposes that the Canadian International development Agency (CIDA) wishes to integrate Canadian professionals and firms with other organizations working overseas. For this purpose, CIDA (hypothetically) organizes a competition to propose a plan of action for post-disaster housing reconstruction in developing countries.

As a first step (which takes the first five to six weeks), the students - working as teams of about six members – prepare the *competition conditions* (in the form of a functional and performance specification document); to do so, they carry research into local conditions (culture, standard of living, resources, climate, building techniques etc.). In other words, they take a systemic view of the up-front steps of the design process, particularly functional analysis, identification of required conditions and establishment of performance criteria, consistently covering the three areas of technical design, organizational design and logistics. This activity forces the students to understand, as best they can, what are the on-the-spot conditions within which reconstruction takes place, and what are the constraints and resources (technical, social, political and economic) to be worked with.

In the second step (which takes the remaining nine to ten weeks of the semester), the students – working as teams of two – change roles and *respond* to the competition conditions (i.e. the performance specification that they generated in step one) and produce adaptable and locally-appropriate shelter designs, accompanied by organizational and logistics proposals.

Their proposals include housing and housing insertion (within damaged communities or as new peripheral communities), provision for small businesses and certain basic community facilities. Their proposals also anticipate the long-term evolution of the quick-response shelters as the recovery process gets under way, possibly by using the shelters as the cores for more extended and eventually better-quality houses. The organizational design aspect (to which we attach equal importance) considers the roles of, and relationships between the communities, companies and institutions involved - the 'who does what' in the reconstruction process. Students also consider logistics, such as how to transport materials to the site and where they will be stored, taking into account the timeline for the project. Questions they think about may include: how much can a mule or a camel carry?

What happens if a key component is lost en route? What sorts of skills are available in the receiving community? And can they be mobilized to produce disaster-resistant dwellings?

Results

As mentioned above, the students, collectively, first prepare a proposal call in the form of a specification, which includes requirements for technical performance, organization and logistics. Then, working in small groups, they prepare responses, which address issues such as:-

- Technical designs of the housing units, including details of construction components, local manufacturing methods and assembly. The projects usually employ a mix of locally available and imported materials.
- Layouts of the settlements, taking into account the needs for privacy (especially in Islamic cultures), as well as the evolution of the site and the units over time.
- Organizational design, portraying the relationships between the organizations involved in financing, manufacturing, design and logistics for the project.
- Analysis of internal and external risks in the project.

Project 1: Post-Disaster Housing for Iran (Year 2004)

In this project, IKEA which now manufactures building components and a large Québec construction company form a partnership to build minimum cost housing units to respond to the Bam, Iran, earthquake. The settlement and unit designs take specially into account work activities within the home, the needs for privacy, and rooftop sleeping arrangements which are common to the Bam culture.

These studies (figs 1 and 2) provided the basis for a simple technical design based on dry-laid interlocking masonry units.

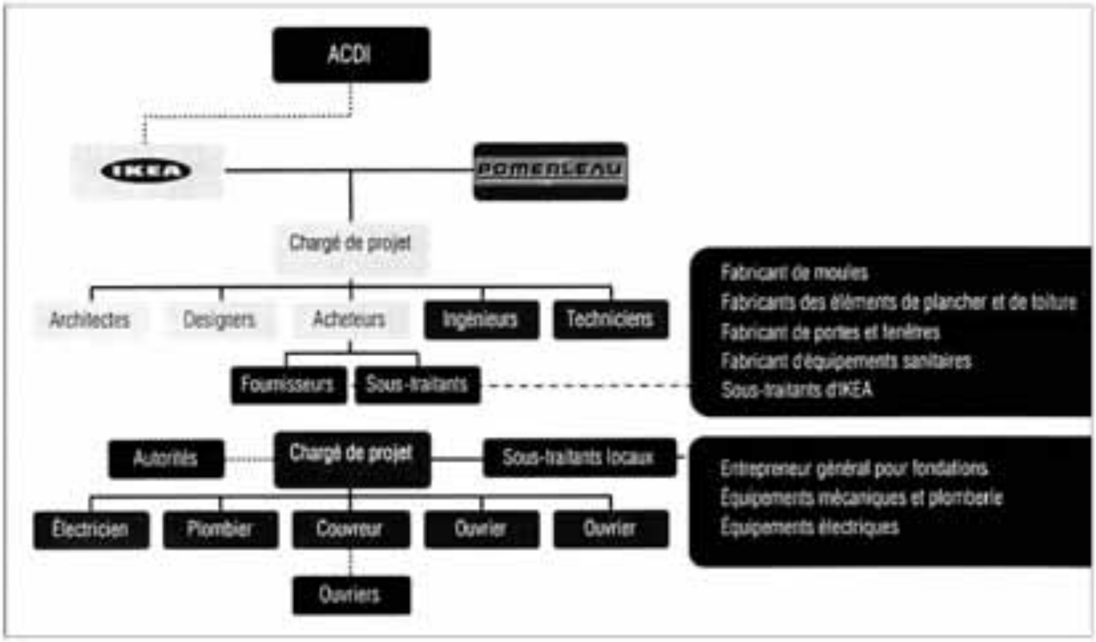

Figure 1. Project 1: organizational design.

Figure 2. Project 1: study of domestic activities and the culturally appropriate use of spaces.

Figure 3. Project 1: technical design: elevations of a cluster of houses.

Project 2: Post-Disaster Housing for Central America (Year 2003)

Figure 4. Project 2: left: logistics, right: plan of the basic housing unit.

This project is proposed by a design company that acts as a central organization liaising with funding agencies, manufacturers and local volunteers to build post-disaster housing projects in Central America. Simple and lightweight construction components can be transported by hand if necessary, and walls can be in-filled with a multitude of locally available materials.

Figure 5. Project 2. View of the units and the proposed clusters after completion by the users.

Figure 6. Project 2: some of the pieces in the catalogue of construction components.

Project 3: Post-Disaster Housing for Central America (Year 2002)

A prefabricated sanitary core offering a basic kitchen and bathroom facility is supplied along with an easily assembled framed structure complete with roof and floor. The structure is designed for earthquake and hurricane resistance. The walls may be finished with locally available materials.

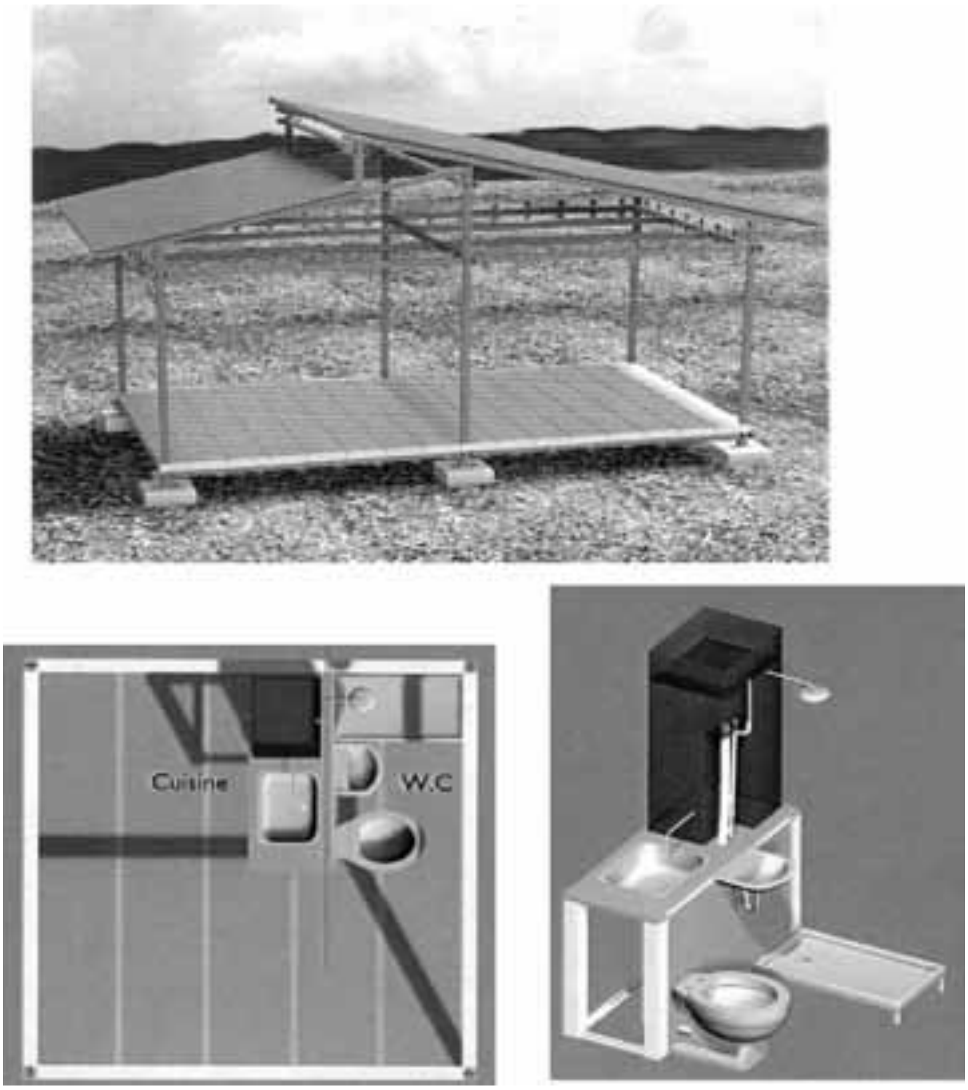

Figure 7. Project 3: top: view of the unit before being completed by the users;
bottom left: house plan, bottom right: water service core.

Discussion

Our experience with working with students on post-disaster reconstruction has been positive at a number of levels, for the students, evaluated against the criteria of student success (measured, for example, in grade-point averages and obvious student interest), and for us (because of the lessons we have been able to draw from these five years of studio experiments).

In effect, the students – through their studio projects – show that they have come to grips with understanding the requirements for reconstruction projects and, more importantly, have learnt how to tackle this kind of task. They learn about international competitions and the scope for using the performance approach, and then they produce systemic proposals, including, as we have mentioned, technical and organizational designs plus logistics plan.

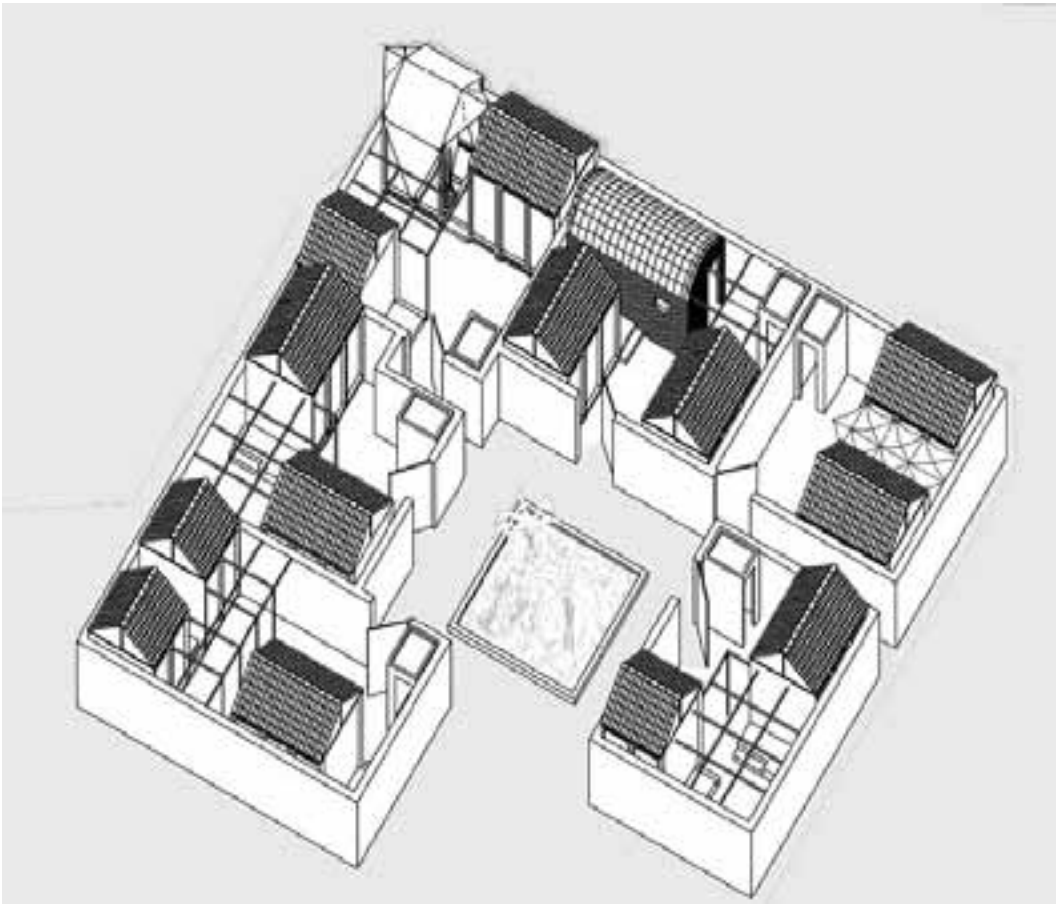

Figure 8. Post-disaster reconstruction in Bam, Iran; view of a cluster of units after completion by the residents.

Quite apart from the benefit for the students, this series of studio projects enables us to propose and tentatively validate various hypotheses, such as:-

- Post-disaster housing reconstruction challenges the traditional definition of a 'project' the 'official' reconstruction project may have a limited time-frame, but the community re-development does not have a clear end; the units initially provided will probably be completed over a long period of time by the occupants. This aspect is often underestimated by NGOs, which necessarily work within a limited time frame and cannot take a long-term strategic view of the reconstruction/development process.
- Housing solutions require a complex understanding of relationships at the 'urban' scale. In this regard, the house itself is not enough if it does not fit into a solution at the scale of the settlement, both in terms of neigborhood design and the provision of facilities for micro-businesses. This is crucial for the feasibility of re-establishing local economic activities (and income generators).

- Community participation is not really the key to performance in reconstruction. Many other aspects such as logistics, organizational design,
- communication, etc. seem to be more influential in the overall performance of the reconstruction/development process.
- The feasibility of technical solutions depends on appropriate organizational design, involving merging both local and external resources in a coordinated way.
- A better coordination between local organizations and local manufacturers is required for obtaining innovative and appropriate solutions for post-disaster reconstruction.
- In some of the students' projects, their work validates these hypotheses; in other cases, their work serves at least to propose the pertinence of proposing them.

Acknowledgements

We thank our many students for joining with us in this studio work and for participating actively in the socio-cultural research and technical applications that it required; we apologize to those whose work we have not illustrated in this paper.

References

Johnson, Cassidy, Gonzalo Lizarralde et Colin Davidson. (2004)."Architecture et modernité : l'architecture invisible" *Trames*, No 15, pp.53-66.

Johnson, Cassidy, Gonzalo Lizarralde et Colin Davidson. "A Systems View of Temporary Housing Projects in Post-Disaster Reconstruction", *Construction Management and Economics*, (accepted).

Johnson, Cassidy, Gonzalo Lizarralde et Colin H. Davidson. (2005). "Reconstruction in Developing Countries – a Case for Meta-Procurement":, *CIB W92 Symposium*, February 2005, Las Vegas.

Johnson, Cassidy, Gonzalo Lizarralde et Colin Davidson. (2004). "Learning Oriented Evaluation of Reconstruction Projects" *Proceedings of the Second International Conference on Post-Disaster reconstruction: Planning for Reconstruction, April 2004*, Coventry, Coventry University, Coventry Centre for Disaster Management, pp. 8-2 to 8-14.

POST-DISASTER RECONSTRUCTIONS IN RURAL AND URBAN AREAS OF TURKEY

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Turkey

Abstract

Disaster assessment refers to the survey and information collection activities carried out to determine the effects of a disaster on the affected population, and their resulting needs. The assessment process is usually conducted at two distinct stages of a disaster: Immediately after a disaster, a *preliminary assessment* is conducted to obtain an early but full assessment of the geographical extent of damage, and the number, categories, location, and circumstances of the disaster-affected population. This assessment provides a general picture of where people are, what condition they are in, what they are doing, what their needs and resources are, and what services are still available to them. It usually takes the form of an initial reconnaissance that can guide search-and-rescue and relief operations. Preliminary thematic maps that locate affected or damaged sites and infrastructure can then be produced from the results of this assessment As needs change day by day in the immediate aftermath of a disaster (i.e., first, for rescue equipment, excavators and medical equipment, then food, medicine, clothing, and shelter), a series of rapid assessments may be needed. Their results provide valuable baseline data and a basis for monitoring the post-disaster situation to determine whether it is improving or deteriorating over time. At a later stage, a more *detailed assessment* is done to collect more specific information about the nature, location, and extent of losses and damages, and the resulting needs of the affected populations. The more specific information collected from this assessment are useful for planning and implementing reconstruction programs. For the recovery and reconstruction phase of a disaster, various types of detailed disaster assessment are most relevant: damage assessment; needs assessment; technical evaluation of structural damage; inventory of affected assets; sample survey. In the light of these; effects of disasters will be analyzed on urban and rural settlements in Turkey and other countries.

Keywords: *post-disaster reconstructions, housing, disaster assessment, disaster vulnerability, local knowledge and capacity, disaster, risk, risk management, cultural heritage*

Introduction

To provide sustainability of interventions undertaken as part of post disaster reconstruction is one of the serious challenges confronting the developing countries. There are sufficient examples to show that in many cases, reconstruction serves to reinforce and sometimes-even increase the vulnerability of rural and urban areas. This is well exemplified in Turkey by the case of reconstruction following 1999 Marmara earthquake in 1999, with the light of these challenges, the paper will focus on the methodology, post disaster reconstruction and risk management, which are readdressed from a holistic and dynamic perspective. The term 'risk' is redefined in an integrated manner with respect to exposure to one or more hazards as well as other factors determining vulnerability in developing countries. The term 'vulnerability' is assessed not only as product of hazard exposure but in a progressive manner resulting from social, economic and underdevelopment processes, before, during

Post-Disaster Reconstruction : Meeting Stakeholder Interests : Proceedings of a conference held at the Scuola di Sanità Militare, Florence, Italy 17-19 May 2006, edited by David Alexander, Colin Henry Davidson, Andrew Fox, Cassidy Johnson, Gonzalo Lizzaralde, ISBN 978-88-8453-611-2 (online), ISBN 978-88-8453-612-9 (print), © Firenze university press, 2007

and after disaster situations. The paper will further attempt to redefine disasters as a continuum where actions taken during various phases have an impact on each other, thereby emphasizing the need for establishing various backward and forward linkages while deciding various actions and interventions at various stages. The paper will conclude by elaborating on the proactive tools, techniques, strategies and actions for risk assessment and control at various stages with respect to a disaster situation and thus address various types of risks in an integrated and dynamic manner.

Developing countries like Turkey are faced to various natural risks leading to disasters, which cause immense loss of life and property. The Marmara Earthquake of 1999 is enough to substantiate this argument. Such an immense disasters require effective planning and programming for post disaster reconstruction, needs not only providing of burrows, but also rehabilitating Physiologic, social and economic infrastructures which are badly mutilated as a consequence of these disasters. Ensuring sustainability of interventions undertaken as part of post disaster reconstruction is certainly one of the crucial challenges while undertaking post disaster reconstruction. This is enough examples to show that in many cases, reconstruction serves to reinforce and sometimes-even increase the vulnerability of settlements. This is well exemplified in Turkey by the case of reconstruction following Marmara earthquake in 1999, where 'city-like' steel stake layout for apartments and import of 'modern' technology for construction of urban housing has failed to reduce peoples' vulnerability to future earthquakes. On the contrary, these have increased physical as well social and economic vulnerability of the local communities (Jigyasu, 2002).

Reducing Disaster Damage from the Physical and Psychological Viewpoints

The principal causes for increasing disaster damages, both in pre and post disaster situation are in actually related to the existing psychological, social, economic and political context and existing policy approaches for post disasters reconstruction. in many examples are result of existing development processes, on rural and urban settlements, whose implications are in the form of social and economic poverty, market economy and undeveloped education system. Some main issues and challenges are clear in the context of rural and urban areas of Turkey and developing countries for reducing their disaster damage through building local knowledge and capacities. These are: Loss of material and land resources (from rural communities), Loss of Traditional Skills, Acquiring a Different Cultures of external interventions, Increasing Social and Economic poverty and inequity, Weakening of Municipalities and city administrations. (Jigyasu, 2002).

Redefinition of Disaster Damage
Relationships between Vulnerability and Economic and Social Capacity

Vulnerability is happen a set of negative conditions within a people, which may be derived from several factors. This may be grow out of inherent weaknesses of these rural and urban settlements or derived from external threats. In contrary, knowledge and capacity of local administrations are result of positive conditions in a society. It represents the internal strengths of these societies and their external opportunities. However these negative and positive conditions do not cause and capacity as mutually exclusive. In fact disaster damnifications are both the cause and effect of losing knowledge and capacities of local administrations and of conditions of poverty. (Anderson-Woodrow, 1989) Which does not explore the relationships between vulnerabilities and capacities as mutually effective conditions, rather looks at them independently.

Disaster damnification is complex in the following respects: It can encompass various aspects such as physical, social, attitudinal, economic and psychological. -It may hold true with respect to one risk or multiple risks. It may hold true for the whole society or specific sections of it. While to explore the inter-linkages between damnification and capacities of aggrieved societies, a significant aspect is their dynamic nature. This implies that damnification does not unchangeable the same over a given time process, especially after a natural risks such as earthquake and hurricane. On one hand, certain aspects of injury before the risks form the context or setting for the disaster. On the other hand, reactive actions (as relief and rehabilitation process) may help in eradicating or reducing certain kinds of damnification, changing certain damnifications to different kinds and reinforcing or compounding or strengthening or even increasing others. The damage conditions can also change with time on their own through certain inherent community coping mechanisms or other practices. Vulnerability to natural disasters can therefore be understood as 'products' and 'processes', existing before as well as after a disaster. Certain aspects of disaster vulnerability precede a disaster, and thus create a setting for the disaster, thereby contributing to its nature and severity. These can get reinforced and changed after a disaster as a result of various response decisions, as well as the overall social, economic, political and institutional context. In spite of good Intentions, certain aspects of damnification are carried forward since the underlying causes remain. Also knowledge and capacity of local administrations that have potential for disaster mitigation are accumulative, continuously updating or changing (in positive or negative direction) in response to various situations, which are taken as part of learning processes through local initiatives. The internal world views or perceptions dictate these learning processes and communication mechanisms, which develop over time, leading to creation, reception and accumulation of new knowledge. Considering the dynamic nature of damnifications and knowledge and capacities local administrations, Societies are always in transition and as such, their damnifications and capacities increase or decrease accordingly. Besides, there may be some hidden capacities and vulnerabilities, which may not be linked to one risks or another but nevertheless characterize the strength and weakness of these societies in general. Moreover, in many situations, damnifications and capacities pertaining to various risks may compliment each other. When seen in a time continuum, disaster vulnerabilities and capacities in the context of rural communities in India and Nepal can be described as the processes, which are the 'products' of Inherent social, cultural and economic transformation processes within communities. Normal (under) development process, Immediate and long-term disaster response, including those of emergency relief models by various NGOs. These three factors affect the vulnerability and capacity of rural and urban societies, and also affect each other.

Damnifications: Social, Cultural and Economic Transformation Processes Within Societies

The rural and urban areas and societies in Turkey have traditionally been coherent entities with distinct social hierarchy but well-defined roles and relationships. However these societies are transforming in many respects, one of which relates to inherent structural changes in traditional patterns and relationships within societies, which determine their mutual support systems. These contribute to lessening their damnification, although one must admit that some of these patterns and relationships are exploitative in some respects and lead to increasing damnification of certain groups. Moreover, the inherent transformation processes of these societies also extend to changing perceptions and thinking processes, which strive for anything which is 'modern', whether it is the way of life or the built form. These structural changes are mainly due to the predominant forces of globalization and changing political and economic context, because of which the traditional systems and social and resource relationships that have defined these communities for generations are breaking up. Social vulnerability in the context of South Asian rural communities is very much linked to widening social and economic segregation, which gets further reinforced with local political power structure. This has weakened the collective coping and response mechanisms of the communities. As a result, social and economic inequity has further increased, resulting in increasing vulnerability of certain marginalized sections. Looking from an inter-generational perspective, the present generations of these communities can rightly be described as one of the "Lost" generations, since they are neither able to use their traditional systems, nor able to adjust and take the benefits of 'modernization'.

Damnifications of Normal Development Processes

Damnification of Turkey urban and rural societies is certainly a direct or indirect result of the dominant paradigm of development. Such a paradigm is by and large made up of the some resulting practices. In some form or other development has implied modernization the transformation of "traditional" society (characterized by dependence on particular social forms and cultures, as well as on the whims and dictates of nature) towards "modern" society (characterized by control over nature, by individual free choice, and by independence as freedom from given social and natural reality. Also such a paradigm assumes that 'Development can be created and engineered'. It is something, which is brought, to and for some, by others who presumably are more developed. Moreover, it is assumed that development is linear and predictable. Put another way, there is a direct line between cause and effect, between input and output. Such predominant notions of externally driven 'modern' development are having negative implications on rural communities. Firstly, the agencies in charge of development perceive 'modernization' as panacea for development of 'backward' urban and rural societies, without actually comprehension of the local frames of reference – their worldviews, needs and priorities. The result of this is cultural incompatibility and non-sustainability of interventions. As a result, rural development approaches in Turkey have failed to some extent to meet their basic needs and enhance their capabilities. The consequence of such a development process on rural communities is that they are increasingly loosing access to local resources, especially land. The question of choice and access to resources is fundamental in any discussion on rural poverty. Increasing rural poverty in the region is also driving rural people to urban areas, leaving behind their skills and knowledge, to search for opportunities. However, most of them end up getting marginalized in urban areas also. Vulnerability as Product of immediate and long-term disaster response It is also a product of external human interventions and myths or perceptions of decision makers, undertaken as post-disaster decisions or actions, both immediate relief and long term rehabilitation, that in fact are originally intended to reduce vulnerability against such natural events. This is either because of wrong official policies for undertaking relief and rehabilitation or in many instances, a result of emergency, relief and rehabilitation models by NGOs. Many of these policies and models are dictated by the dominant paradigm of development, which is explained in the previous section. The negative consequences of these in the long run are evident in the Marmara's case. Also in these areas, provision of reconstructed houses is thought of as an end product for development of villagers and urban dwellers. Besides wrong policies, the ineffectiveness may be due to the overall social, economic and political context, within which disaster management takes place. In fact, existing context shapes disaster management, which in turn also shapes the context. In fact wrong policy approaches can reinforce and in some cases, even increase existing resource dependencies, social inequity and at the same time, overlook local knowledge and capacities. Moreover, social participation in disaster management depends largely on the local power structure, which ironically, is reinforced by existing social segregation. Theoretical discussion on this issue will be done later. Another significant issue pertaining to disaster management practiced in Turkey subcontinent is that it has become a highly specialized discipline and various professionals and decision makers perceive various approaches for mitigation and rehabilitation within their own disciplinary field. For example, policy makers perceive relocation as a safe option based on the technical criteria of seismic safety, without considering the relationships to land, culture and livelihoods. Similarly, housing reconstruction is seen as a physical end product, without paying heed to the process of urban and rural housing and its link to social structure, way of life and local economy. Similar issues emerge on the questions of transferring technology, which can make the structures highly resistant to earthquakes, but throw open questions on their affordability, cultural compatibility and sustainability in the context of rural communities in the region.

Redefining 'Risks' and 'Disasters'

The above discussion throws light on the perspectives to the fundamental question; what is a disaster. (Quarantelli, 1998) Conventionally, we tend to categorize various phases in relation to disaster (as pre, emergency and post disaster) for the sake of management. However one needs to question whether disaster is a 'reality' or a 'construct' as it has been make out to be through these categorizations. (Jigyasu, 2004) The complexity and dynamism of vulnerabilities and capacities, makes 'disaster' a very loose and vague denomination, which does not have a starting or an ending point as these points can only be measured by developing objective indicators. Therefore, disaster situations need to be looked in a continuum, as actions taken during various phases have an impact on each other. This means that we need to establish backward and forward linkages while deciding various actions and interventions at various stages. vulnerability and development This also implies that disaster can only be measured for the phenomenological discussion of the nature and the increase and decrease in vulnerabilities and capacities before and in response to specific natural hazards. Therefore, discussion of phases as pre-disaster or post disaster will not be appropriate.

Rather, the shifts in magnitude, scale and severity of vulnerabilities and capacities need to be looked at various stages with reference to the particular hazard event, that catalyses these processes into disaster situation. These stages are: In the normal situation (without impact of natural hazard). In the emergency situation (when the natural hazard has struck, extending to a few days or months after the event) in the transition phase from relief to recovery (extending to a few months to a year after the event) in the rehabilitation phase (over the years, when the rehabilitation process takes place). After the rehabilitation phase in the long run (Cannon-Davis-Wisner, 1997) (to assess the impact of post natural risks interventions). This model essentially describes how vulnerability situations develop by elaborating on the causal relationships. However, the model is linear in its conception and conceives disaster as an end-product. In the above discussion, development is a fundamental context within which all the above situations are intervened and take shape on the ground. Such a development is either externally driven or driven by the local communities. Therefore, in the disaster management cycle, development is not a phase in itself, rather it interacts and affects separately, each of the above situations and in turn, each of them are affected among themselves, ultimately shaping the developmental context itself.

To Realise Risks

However disasters are very much a part of the overall risk framework. The term 'Risk' is understood as the product of Risks and Vulnerability. In conventional terms, the risk of a site or a property is understood in relation to one hazard such as earthquake, floods etc. and vulnerability is understood as exposure of that site or property to that particular hazard in focus at one particular time. Moreover vulnerability is understood mainly in physical terms. Contrary to conventional means, the integrated method of understanding risks to a site or property may stem from exposure to one or more hazards and other determinants. This implies that we need to facilitate a holistic understanding of risks from various hazard sources (fires, earthquakes etc.) as well as to understand vulnerability processes, and at the same time, to incorporate specific actions / strategies for specific kinds of hazards. This also implies that we need to link physical vulnerability of both movable and immovable aspects of a site or property to that resulting from social, economic and under development processes. For example, the risks to the physical fabric are not only linked to the structural weakness but area also inherently linked to the social, political and economic context in which they are located. Besides, the local meanings and perceptions are also worth taking into account, while understanding risks and disasters.

Post Disaster Reconstructions and Integrated Risk Management

'Risk management' is a well-developed subject with well-defined components and universally accepted terms and definitions. It includes various proactive tools, techniques, strategies and actions for risk assessment and control at various stages with respect to a disaster situation. Therefore we need to organize the subject of risk preparedness, primarily under the universally accepted phases of risk management (e.g. risk identification and analysis, risk evaluation, monitoring, prevention/mitigation, disaster preparedness, emergency response, long term recovery etc.) and then address the various types of risks. The risk management framework is a prerequisite for a disaster management framework. This implies that various activities undertaken during preparedness, response and recovery phase of disaster must be subject to risk identification, analysis, assessment and control.

Various activities, tools and techniques for risk management in post disaster situation need to be part of the integrated risk management, so that their interrelationship with activities undertaken in pre-disaster and emergency situation can be explicitly articulated, besides the implications of the actions in the long-term perspective.

Integrated Risk Assessment

Risk Assessment undertaken, as part of integrated risk management will involve integrated vulnerability analysis on one hand and integrated hazard mapping on the other. Integrated vulnerability analysis involves taking into consideration social, political, economic and attitudinal aspects of vulnerability along with physical aspects for their impact on each other. Moreover vulnerability is not only considered as a product in the form of exposure to one or more risks at a particular time but also as a process over time.

Damage and Needs for Reconstruction

Disaster assessment refers to the survey and information collection activities carried out to determine the effects of a disaster on the affected population, and their resulting needs. The assessment process is usually conducted at two distinct stages of a disaster: Immediately after a disaster, a preliminary assessment (sometimes called rapid assessment or situation assessment) is conducted to obtain an early but full assessment of the geographical extent of damage, and the number, categories, location, and circumstances of the disaster-affected population. This assessment provides a general picture of where people are, what condition they are in, what they are doing, what their needs and resources are, and what services are still available to them. It usually takes the form of an initial reconnaissance that can guide search-and-rescue and relief operations. Preliminary thematic maps that locate affected or damaged sites and infrastructure can then be produced from the results of this assessment As needs change day by day in the immediate aftermath of a disaster first, for rescue equipment, excavators and medical equipment, then food, medicine, clothing, and shelter), a series of rapid assessments may be needed. Their results provide valuable baseline data and a basis for monitoring the post-disaster situation to determine whether it is improving or deteriorating over time. At a later stage, a more detailed assessment is done to collect more specific information about the nature, location, and extent of losses and damages, and the resulting needs of the affected populations. The more specific information collected from this assessment are useful for planning and implementing reconstruction programs.

Damage Assessment

Collects the following types of information which are most valuable for the purpose of reconstruction planning. Damage to housing and buildings, damage to livelihood (e.g., shops of small traders, salt pans, industrial units), damage to agriculture and animal husbandry (crops, fruit trees, livestock), damage to services (educational, health, recreational facilities) and government buildings, damage to infrastructure and utilities (water supply, sewerage, roads, bridges, electricity, telecommunications, etc.).

In each of the above, specialists in each sector determine the damage. Structural or civil engineers, for example, examine the damage to housing, commercial and public buildings, physical infrastructure and utilities. Agronomists and agricultural specialists determine losses to crops and forests, among others, and economists determine damages to the local economy. Their implementation extends much further. Special plans developed by local governments also deserve such attention.

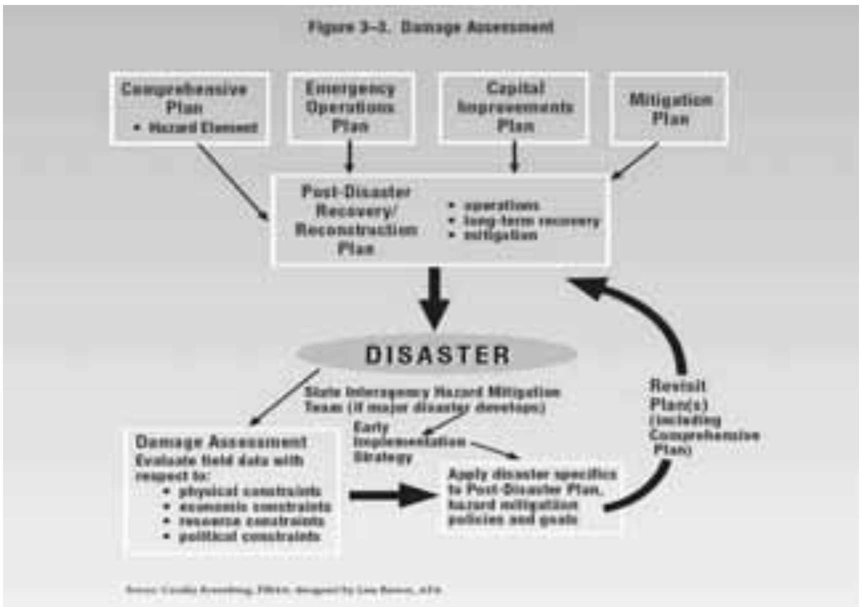

Figure 1. Source: Cecelia Rosenberg, FEMA; designed by Lisa Barton, APA.

Neighbourhood plans, for instance, allow an ideal opportunity to sharpen the focus of post-disaster planning. Neighbourhoods in hazard-prone areas, especially if they are developed with a high level of citizen participation, can serve well to raise citizen awareness of the need for preparedness and mitigation and of possibilities for more sustainable methods of rebuilding (such as improved energy efficiency in more disaster-resistant structures) in the aftermath of a disaster. Could better storm water detention systems that resulted in the construction of swales or that took better advantage of natural runoff patterns ease a neighbourhood flooding problem? Might fire-resistant landscaping requirements for a subdivision or homeowners association help avert disaster? What access patterns could be changed to benefit residents and improve public safety? Under what conditions treasured but vulnerable historic buildings and homes should be demolished? Linking the post-disaster element with the development of neighbourhood plans presents an opportunity to nail down details of post-disaster reconstruction and mitigation that might otherwise escape notice in the larger scheme of things. (PAS Report, 2005).

While damage assessment is usually the work of sector specialists, it is essential that the disaster-affected families participate in damage assessment surveys involving their housing units, as discussed below.

Needs Assessment

Determines the level and types of assistance required by the affected population, their priorities, and their preferred strategies to meet these priorities. Common needs include: housing needs, livelihood needs, personal needs (of the injured, handicapped, orphaned, those suffering from disaster caused trauma), and needs for services (water supply and sanitation, electricity, schools, health centers. The information collected from this assessment help in identifying and prioritizing needs that lead to appropriate types of assistance and inputs for reconstruction in the medium and long term.

Given these problems, it is axiomatic that reconstruction would be more effective and less onerous if it were well planned. Planning needs to be holistic, in that it is not merely a question of replacing damaged building stock and infrastructure, but also one of reconstructing communities, ensuring equity, access to resources and equality of opportunity for the most disadvantaged members of those communities, and reducing community vulnerability to hazards. (Lewis, 1999).

Methodology of Disaster Assessment
Technical Evaluation of Structural Damage

The objective of this assessment is to determine the precise nature and extent of damage to all buildings in disaster affected areas, using pre-defined categories in which to classify structural damage. Different categories represent different degrees of damage. Judgments concerning damage categories are made on the basis of direct onsite visual evaluation of building exteriors.

Harmful and Needs for Reconstruction

Taking, into account damage to the foundation, load bearing walls, ceilings, or roofs of the structure. This is usually conducted through a street-by-street house by-house survey in the disaster-affected area. It is essential that the surveyor/assessor consult with each affected family during this assessment to develop a reasonable consensus on the method and basis for classifying the affected housing unit under a given damage category. (Quarantelli, 1998) It is also important for the surveyor/ assessor to evaluate every structure within the area, even if the structure is not affected. This ensures that isolated undamaged homes are identified and recorded, and also helps pinpoint the specific cause of damage to those that are affected. The information obtained from this assessment provides the basis for the level of housing assistance allocated to affected families. The latter should be informed of the damage assessment results as soon as possible, providing clear interpretation of the assessment findings and its financial assistance implications.

Inventory of Affected Assets

This involves a detailed survey of all losses that resulted from the disaster, taking into account loss of assets and income. Important inventory categories include such assets as shops, workshops or worksheets, stalls, tools/ equipment, livestock. When compiling these inventories, the owners/household heads may be required to countersign them to minimize the possibility of subsequent claims or disputes regarding claims. It's on the basis of this assessment that special financial provisions are given to the affected people (Anderson-Woodrow, 1989).

This involves more detailed surveys relying on interviews of a sample of the affected population and on collecting statistical information on the affected population. Generally, sample surveys are used for needs assessment, on the basis of which appropriate types of assistance and interventions are determined. There are several different types of sampling Techniques that can be used for conducting needs assessment: simple random sampling. Every member of the target population is equally likely to be selected, and the selection of a particular member of the target population has no effect on the other selection; systematic random sampling. Every fifth or tenth member on a numbered list is chosen; stratified random sampling. The population is divided into categories; members from each category are then selected by simple or systematic random sampling; then combined to give an overall sample; and, cluster sampling. The sample is restricted to a limited number of geographical areas ("clusters"); for each of the clusters chosen, a sample is selected by simple or random sampling. Sub samples are then combined to get an overall sample.

Tools for Post Disaster Reconstruction

Checklists or Worksheets are the most common and perhaps the easiest tool used in disaster assessment. A checklist or worksheet is simply an abbreviated list that provides the assessor with a comprehensive, yet flexible guide to the types of information needed to be collected. (Cannon-Davis-Wisner, 1997) It is usually a form structured and formatted in such a way that surveyors can easily remember key points and ask certain questions to fill it out. It is essential that the format of the checklist is standardized and is as simple as possible to facilitate the process of analysis and collation. Likewise there should be common understanding of the terminology used and consistency in spelling names, e.g., of the affected villages or towns to avoid confusion and ensure that the information collected can be presented in a way that is most helpful to the users. Formatted checklists are normally used for damage assessments. Questionnaires are most commonly used in needs assessments. A questionnaire is simply a list of questions used for interviewing the total affected population targeted for the assessment survey, or a sample of this population. The individual being interviewed can answer the questions orally or in writing. Questionnaires are useful for obtaining detailed information about the needs of the affected families and other vital statistical information about their post-disaster condition. Its tabulated results can facilitate a good analysis of the impact of a disaster at the individual and family level. Questionnaires are a more useful method for obtaining specific, detailed information for planning purposes, but are not a good tool for rapid assessments in the immediate aftermath of the disaster.

Conclusions

Following implications and conclusions can be drawn from the discussion that has been initiated in this paper: It implies establishing / strengthening the management systems of both tangible and intangible, 'historical' and 'living' dimensions of our cultural sites and properties and establishing systems which address risks to the site and property in an integrated manner through preparedness before, during and after disaster situations. After all, integrated risk management of living cultural heritage is about addressing the knowledge and skills accumulated in the past, surviving in some form in the present with a potential for reducing disaster vulnerability and increasing capacity for the future. It is about managing the change in order to link past, present and future, It implies proactive (and not merely reactive) approach, which imply not only reacting to the risks from disaster but addressing the underlying causes which create the disaster itself in pre as well as post disaster situation. Integrated Framework for Risk Management implies addressing larger forces (and not merely hazards), which put cultural heritage at risk. Risk preparedness initiatives for cultural heritage can be strengthened by integrating the concerns / needs for living heritage in the existing disaster management systems at national and state level. This requires re-addressing existing development policies and their impact on the risks to cultural heritage. Risks are a shared reality – spanning individual, village, block, district, state, nation and even region – and have to be responded with a multi-prong approach. ¨In the complex Indian reality, it also implies involving diverse group of stakeholders and integrating their concern in the overall policy initiatives. Considering the complexity of cultural heritage both in its scope and nature as well as the present reality, there can be no single policy initiative to address risks to cultural heritage. Rather, there have to multiple initiatives at various administrative levels through involvement of multiple stakeholders (public as well as private). This requires a dialogue and subsequent collaboration and coordination.

References

Anderson, M. and Woodrow, P. (1989). Rising from the Ashes: Development Strategies in times of Disaster. Paris: UNESCO.

Blaikie, P. Cannon, T. Davis, I. And Wisner, B. (1997). At Risk: Natural Hazards, People's Vulnerability and Disasters. New York: Routledge.

Jigyasu, Rohit (2002). 'From Marathwada to Gujarat – Emerging challenges in Post-earthquake rehabilitation for sustainable eco-development in South Asia', proceedings from I-Rec conference *'Improving post-disaster reconstruction in developing countries'*, University of Montreal, Montreal, Canada from May 23rd to 25th, 2002.

Jigyasu, Rohit (2002). 'Reducing Disaster Vulnerability through Local Knowledge and Capacity – The Case of Earthquake-prone Rural Communities in India and Nepal', Dr.ing thesis, Norwegian University of Science and Technology, Trondheim.

Jigyasu, Rohit (2004). "Disaster – A 'Reality' or 'Construct'? Perspectives from the 'East'" to be published in Perry, R. Quarantelli, E. (ed.), 2005. *"What is a Disaster? Perspectives on the Question"*, Second Edition, Xlibris.

Kaplan, A. (1999). The Development of Capacity. Geneva: NGLS Development Dossier.

Quarantelli, E.L. (ed.) (1998). What is a disaster? Perspectives on the Question, London: Routledge.

Rapoport, Amos (1984). *`Culture and the Urban Order'*. In Agnew, John, et. Al. 1984, The city in Cultural Context, Allen & Unwin Inc. Winchester, Mass. PP. 50-51.

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SEISMIC-PROOF HOUSING: RECONSTRUCTION IN RURAL AREAS

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Abstract

A robust solution for typical problems of developing countries is proposed here. It consists of a complete and coherent set of technical and organisational measures combined with provisions of technology transfer. The design system for individual housing is adapted to the socio-cultural acceptance, which ensures earthquake safety by a lightweight steel-framed body supported on an innovative base-isolation system. Earthquake-resistant design of low rise buildings; seismic isolated structures; structural rehabilitation, strengthening & retrofit of existing buildings and sustainable construction materials are of particular interest.

Keywords: affordable; developing-countries; indigenous materials; public awareness.

Introduction

Recent earthquakes have caused unacceptably high death tolls, mainly in rural areas of developing countries. Comartin et al. (2004) are convinced that reducing such an unacceptably high loss of life from earthquakes is the most important challenge facing the global earthquake engineering community. The philosophy of earthquake design (for structures other than essential facilities) has been well established and proposed as follows (Falk and Soltis 1988):-

- To prevent non-structural damage in frequent minor ground shaking;
- To prevent structural damage and minimize non-structural damage in occasional moderate ground shaking;
- To avoid collapse or serious damage in rare major ground shaking.

This philosophy is in complete accord with the concept of comprehensive design. Similar approach is incorporated in Eurocode-8 and IS-2800 (Iranian standard). However, current design methodologies fall short of realizing the objectives of this general philosophy (Bertero and Bresler, 1977). Implementation of this philosophy presents serious problems particularly in quantifying the different types of damage (structural and non-structural) and what constitutes frequent minor, occasional moderate, and rare major earthquakes. Following general goals in seismic-resistant design and construction, the objective of this study is to close the gap between the results of existing research activities in the field of Earthquake Engineering and the practice in developing countries. The idea for systematic design of structures enables individual housing layout and functionality following local culture. This is a very ambitious project to investigate how affordable earthquake-proof housing for millions of families can be really done.

Post-Disaster Reconstruction : Meeting Stakeholder Interests : Proceedings of a conference held at the Scuola di Sanità Militare, Florence, Italy 17-19 May 2006, edited by David Alexander, Colin Henry Davidson, Andrew Fox, Cassidy Johnson, Gonzalo Lizzaralde, ISBN 978-88-8453-611-2 (online), ISBN 978-88-8453-612-9 (print), © Firenze university press, 2007

A Robust Technical Solution

The project idea aims at two main burdens of developing countries: shortage of adequate housing and lack of jobs (The World Bank Group, 2005). It also targets one or two storey housing particularly attractive for villages and little towns. This can potentially slow the rush to the mega-capitals avoiding rural exodus. The great vision can only come true on condition that a solution of technical excellence is found for the *complete* sequence of problems causing poverty and disaster. The solution consists of a complete and coherent set of technical and organisational measures combined with provisions of technology transfer to realise affordable housing.

Structural form.

- A systematic design of individual structures for earthquake-proof housing is worked out, for which the principle is based on individual lightweight steel-framed structures (fig. 1). Such structural forms (made of wood) have survived up to 400 years of wear & tear and many of them withstood strong earthquakes (fig. 2, Dikmen 2005). In seismic hazardous areas, steel is more appropriate for structural elements, due to its capacity for plastic deformation.
- By its deliberate architectural style all components ensuring earthquake safety remain permanently visible from outside. This precaution prevents any omission of essential components on site. Visible-steel-frame is a decisive feature for earthquake-proof-success, which must not be undermined.
- The proposed style of housing demonstrates its exposed load-bearing steel-elements, as architectural components. Every house of this style permanently illustrates to be earthquake-proof. This is a visible guarantee for earthquake safety, easy to check for the inhabitants themselves. Isn't it in their natural interest?
- Undamaged building elements of the Bam earthquake (26-12-2003) prove that fine-meshed steel structures with incorporated steel bracings cope with earthquake loads, whereas wide meshed structures without bracing collapse as shown in the middle area of figure 3 (www.bhrc.ac.ir).

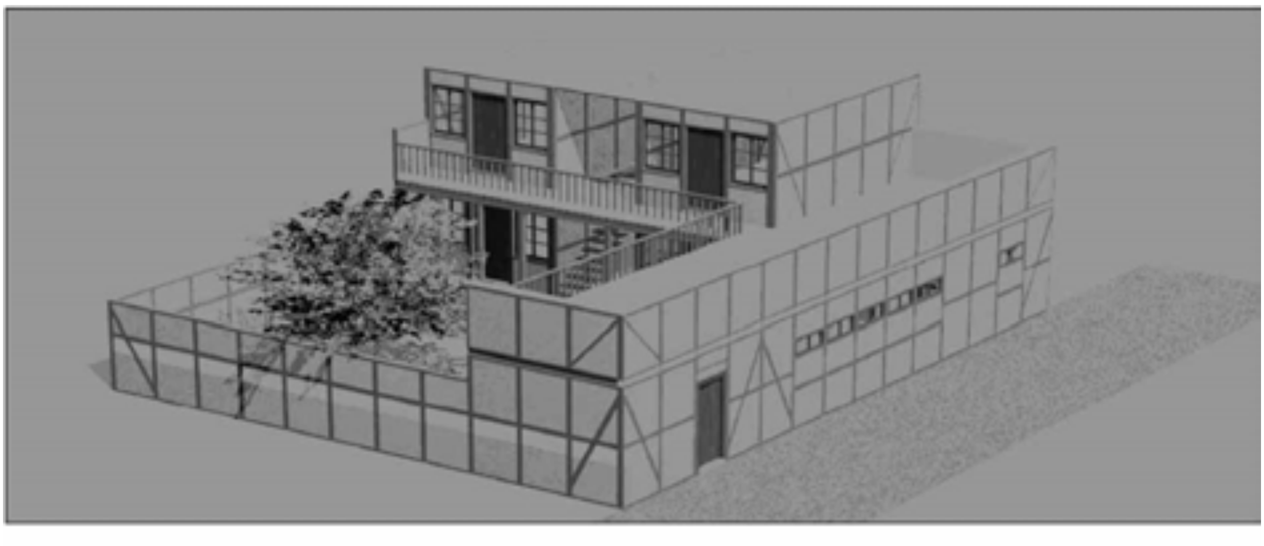

Figure 1. Individual housing, systematically earthquake-proof by visible steel framing.

Figure 2. A building in Yuva Village, Cankiri Province, Turkey (Dikmen 2005), which withstood an earthquake of magnitude 5.9 on Richter Scale 06-06-2000.

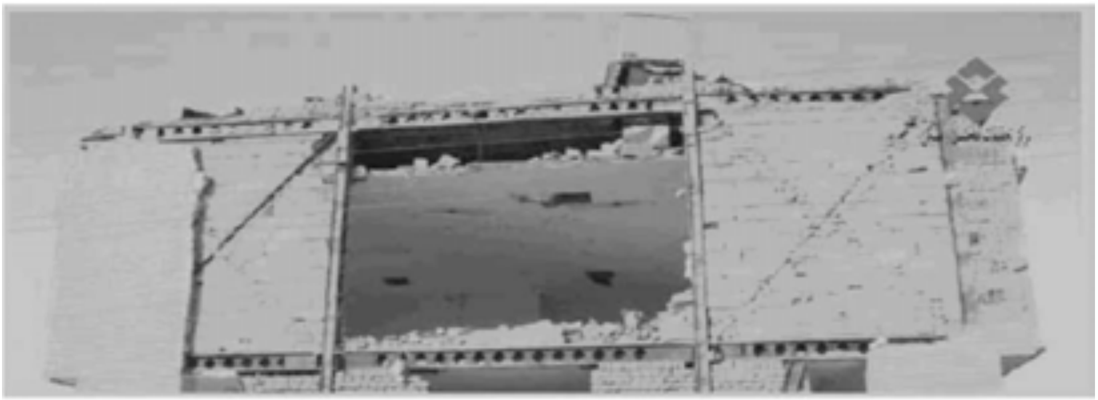

Figure 3. Fine-meshed steel structures in Bam 26-12-2003 (BHRC).

- Consequently, the proposed structural form, embedded in the architectural style, exclusively uses fine-meshed structures with bracings where appropriate. If such kind of structure is used for walls as well as all floors and the roof, a self-supporting body similar to the coachwork of cars is achieved. Self-supporting bodies are fit for earthquake loads and shocks out of any direction (Fig. 4).

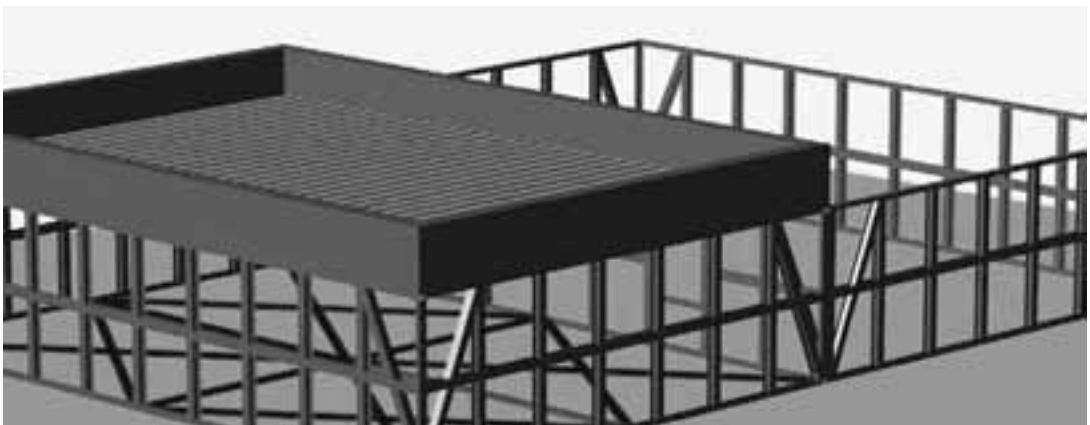

Figure 4. Self-supporting steel body structure, ensuring earthquake safety.

Base Isolation Technique.

- In addition to this safety concept by a body of fine-meshed steel-framed structure, an innovative base isolation (fig. 5) is proposed here; in which friction clutch reduces horizontal shock transfer (Kelly, J.M. 2002). This way, the immense impact of most dangerous horizontal earthquake shock waves can be reduced sharply. (Structural engineers normally fix a building to the foundations by absolutely rigid anchor bolt connections and the idea of course is very unconventional.)

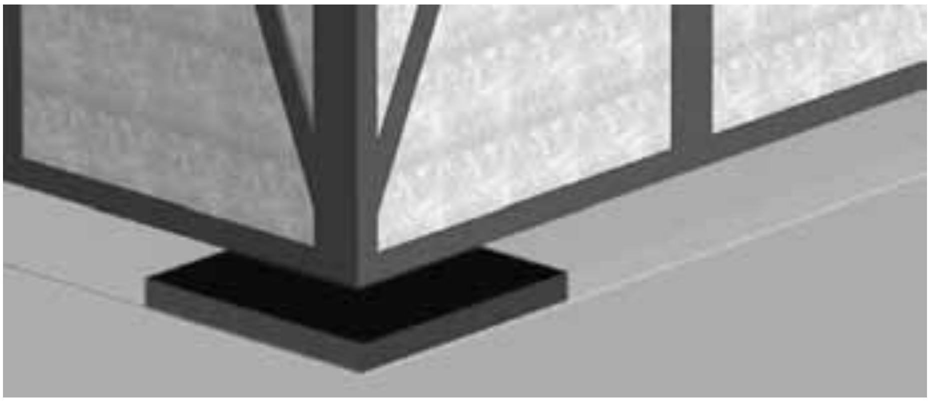

Figure 5. Innovative base isolation system, reducing shock transfer.

- To prevent shortcut and fire after earthquakes we propose to interconnect all piping and electricity (life-lines of the building) by an interface box with flexible connections giving room for displacements, self-closing in case of rupture.

Industrially Prefabricated Components for Earthquake-Safety.

- Housing built today shows that structures intended for earthquake safety are
- ruined by unskilled labourers, who are manufacturing components on site. To bypass this problem the fabrication process of the lightweight steel-framed structure must not be done on site by unskilled persons. Connections on site must be exclusively bolted/riveted. No freestyle welding on site is allowed.
- The steel-framed structures ensuring earthquake-safety must be fully, precisely prefabricated in factories on CNC-machines directly controlled by high-performance CAD-systems. Only best practice of advanced production technology using high-performance CAD systems and CNC-machines, as used in leading steel construction enterprises can ensure the indispensable quality of the safety-relevant steel components.

Planning Process.

- Comparing the level of knowledge and application vs. risk in various countries, it can be concluded that the high vulnerability of developing countries are not mainly due to the lack of knowledge and technical capabilities, but it is rather due to the lack of strong policy implementation, knowledge application, cooperation, limited economic capabilities and awareness. In other word as long as the present situation exists, the risk is growing (Ghafory-Ashtiany 2001).
- The proposed methodology will resolve the issue by making the planning process absolutely robust and producing error-free structural systems as designed. This approach particularly improves planning processes in developing countries and can decisively help to address the limited capacity and the quality issues of their building industry within the context of global competitiveness.

- Industrial fabrication has to be restricted to the lightweight steel-framed structure only. This will systematically leave a reasonable share of work to local workmen in towns and villages to fill the areas in-between the steel-framed structure enclosing bricks or adobe. Creating community involvement will lead to eventual success of the project. Modest qualification requirements of this share of work are adequate to local skills. Defects here no longer have fatal consequences, because structural earthquake-resistance is guaranteed by the steel-frame alone.

Further Comments.

- The project is integrated into ongoing lectures of a joint BSc programme in Civil Engineering between Bergische Universität Wuppertal, Germany and Isfahan University of Technology, Iran for widespread snowball effect.
- To make the dream of earthquake-proof housing come true, our team actively pushes the project forward by organising local infrastructure at Isfahan/Iran.
- It is advisable to make earthquake-proof housing economically competitive to non-earthquake-proof housing by a governmental program and/or public private partnership to finance the lightweight steel-framed structures.

Outreach Toward Beneficiaries of the Research

Civil Engineers in developing countries are among beneficiaries of the outcomes of this research, because this will lead to a profound innovation of their respective industry and will make them fit for global competition. This is their chance to make a successful transitional move to global markets and to make the local building industry strong enough for the challenges of the near future. For instance, by official estimates about 800,000 new residential houses need to be built each year in Iran.

Technology insertion into industry as well as technology transfer to developing countries is also of particular interest. Enterprises interested in joint-ventures with the construction companies in developing countries are among the target audiences of this research project.

How to reach each group with a range of tailor-made research outputs is being established and identified. A dissemination plan has been integrated into the life cycle of the research project, rather than just at the project-end. A variety of media and appropriate language is being used to help communicate research results in several countries to make research outputs accessible, attractive and simple to use. For example, TV-video clips will be designed for educating the general public about earthquake-proof houses by easy to understand illustrations.

Concluding Remarks

This investigation has immediate relevance to overcoming all-around obstacles in mass construction of earthquake-proof houses in developing countries by successful transfer of key technology features and due attention to localisation/adaptation. The essentials of our human-centred research are as follows:

Vision. To take the last mile for the millions in need of earthquake-resistant housing in developing countries by translating scientific advances into action;

Mission. To simultaneously generate housing and employment as well as to encourage migration towards rural areas, instead of promoting mega-cities;

Strategy. Transfer of key technology features with due attention to localisation/adaptation (such as locally available materials/workmanship);

Technical objective. Pin-pointing the practical barriers of mass construction of new safe houses as well as retrofit of existing buildings. This will help overcoming all-around obstacles by deploying a realistic robust solution for typical problems;

Technical approach. To distinguish between structural members directly relevant to safety (that must be pre-fabricated under strict industrial supervision) from other components (that can be constructed on-site to generate local labour opportunities);

Team. 8 Professors and 12 students of both Bergische Universität Wuppertal, Germany and Isfahan University of Technology, Iran are actively involved, plus local NGOs and industries in both countries. Both knowledge creation and technology transfer for a sustainable structural development are of particular interest here;

Typical Actions. Launching an "Earthquake-Resistant Building" learning centre (fig. 6) intended for the general public by the end of this year, in Isfahan/Iran. Building of the centre, itself, is a show-room to promote the idea and to raise public awareness.

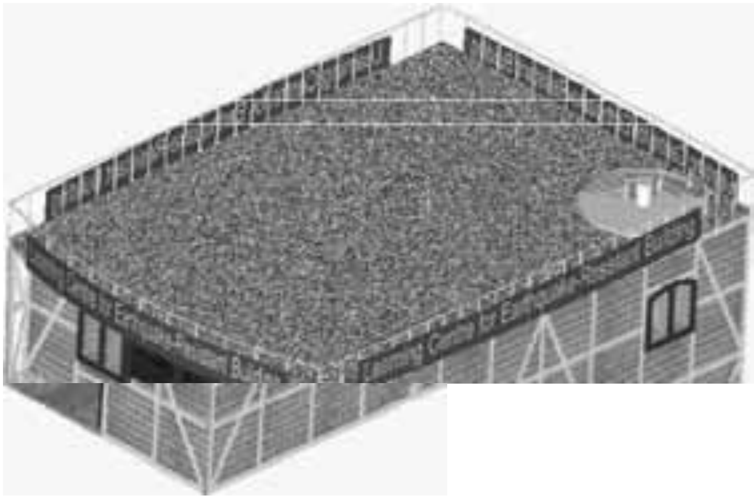

Figure 6. Earthquake-Resistant Building learning centre in Isfahan, Iran.

This is indeed an extremely ambitious project to really solve the problem of housing in developing countries in spite of all typical obstacles. Plausibility is checked by all the stakeholders and the best local experts available. It is fascinating that so many stakeholders and influential persons and institutions offer their help, so that this great vision can come true.

Acknowledgements

The authors are grateful to Alexander von Humboldt Foundation (www.avh.de) for awarding a Georg Forster Fellowship to the first author to carry out this investigation. They are also extremely grateful to German Academic Exchange Services DAAD (www.daad.de) for providing grants for summer-schools, the running of joint BSc programme of BUW/IUT, provisions of exchange of scientists and PhD studentships. Thanks are also due to Mr M. Samsamshariat for his contributions in the revisions.

References

Bertero, V.V. and Bresler, B. (1977). "Design and Engineering Decisions: Failure Criteria (Limit States)," *Proceedings of 6th World Conference on Earthquake Engineering*, New Delhi, India, January.

Building and Housing Research Centre (BHRC), http://www.bhrc.ac.ir/.

Comartin C., Brzev S., Naeim F., Greene M., Blondet M., Cherry S., D'Ayala D., Farsi M., Jain S.K., Pantelic J., Samant L., Sassu M. (2004). "A Challenge to Earthquake Engineering Professionals", *Earthquake Spectra*, Vol. 20. No. 4, November, pp.1049-1056.

Dikmen, N. (2005). "A Provision Model and Design Guidelines for Permanent Post-Disaster Housing in Rural Areas of Turkey Based on an Analysis of Reconstruction Projects in Çankiri", *PhD Thesis*, Middle East Technical Univ.

Eslimy-Isfahany, S.H.R. (1990). "Seismic Vulnerability and Structural Strengthening of Gravity-Load-Designed Masonry Buildings for Earthquake Hazard (in Persian)", *Soroush*, 18th of August, Vol. 523, pp.10-13.

Eslimy-Isfahany, S.H.R., and Pegels, G. (2005). "Affordable Earthquake-Resistant Housing for Developing Countries", *UNESCO's Worldwide Engineering Award*, Berlin, Germany, final report.

Falk, R.H. and Soltis, L.A. (1988). "Seismic Behaviour of Low-Rise Wood-Framed Buildings", *The Shock And Vibration Digest*, Vol. 20. No. 12, December pp.1-7.

Ghafory-Ashtiany, M. (2001). "Case Study of Iran's Earthquake Risk Reduction Experience", *Global Blueprints for Change*, First Edition - August.

Grünthal, G. (1998). "European Macroseismic Scale", Luxembourg.

Kelly, J.M. (2002). "Seismic Isolation Systems for Developing Countries, *Earthquake Spectra*, Vol. 18, Issue 3, pp. 385-406.

Samsamshariat, M., Eslimy-Isfahany, S.H.R., and Pegels, G. *(work in progress)*; Advances in Seismic Hazard Assessment/ Observation in Iran.

SOHA Eengineers (1998). "Home Builder's Guide to Seismic Resistant Construction", *Federal Emergency Management Agency*.

The World Bank Group (2005). "Country Brief, Middle East & North Africa Region (MENA)-Iran".

Part 3

Modern and Traditional Methods of Reconstruction

Any post-disaster reconstruction programme needs to blend modern and traditional methods in such a way that vulnerability is reduced and resilience is enhanced.

L'ARMADILLO®: A NEW LOW-COST READY-TO-BUILD HOUSE SYSTEM

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Abstract

L'Armadillo® is a new system conceived by BrianzaPlastica (a firm specialised in insulation panels based in Italy) to find new applications for its existing product Elycop® (curved sandwich panel). L`Armadillo has been designed by Atelier 2 (Gallotti and Imperadori – Milano), in collaboration with a team of experts/consultants. L'Armadillo® is based on an innovative building concept, with multiple flexibility, and easy to transport and assembly/disassembly on site. It can be used for different purposes: housing, hospitals, churches, schools, restaurants, etc. for both permanent and temporary accommodations. The result is a shell-formed architecture where a light steel bearing structure supports the insulated polyurethane sandwich-panel shell. Lightweight façades are shaded by two textile extensions and on the roof by a ventilation layer. A prototype as been built in order to optimise the system and to test all the structural calculations with a particular attention to lateral stability and shell-stability system collaboration under wind and earthquake loads. L'Armadillo® basic unit measures 6,60m x 8,00m (3,30 m is the radius of sandwich panel). The volume optimises the thermal behaviours and maximises energy efficiency. The building can be equipped with thermal or photovoltaic cells. L'Armadillo® thanks to its high performance, quality of space, flexibility, cost competitiveness and adaptability to extreme conditions is a clear alternative to 3d tunnel elements or caravans and Its.

Keywords: building innovation; sustainability; flexibility; demountable; technology transfer.

Introduction: Structure Envelope (STREN) Technologies for Post-Disaster Reconstruction

> Marco Polo describes a bridge, stone by stone.
> "But which is the stone that supports the bridge?" Kublai Khan asks.
> "The bridge is not supported by one stone or another," Marco answers,
> "but by the line of the arch that they form."
> Kublai Khan remains silent, reflecting. Then he adds:
> "Why do you speak to me of the stones? It is only the arch that matters
> to me." Polo answers: "Without stones there is no arch."
> (Italo Calvino, Invisible Cities)

Simple constructive principles and systems normally require complex process of analysis that leads to the synthesis of their final form and technology. Industrializsed systems of construction, based on sandwich panels or stratified layers supported by a frame structure, seem to offer several advantages in a quick reconstruction situation. The field of application of the stratified layer construction de-

Post-Disaster Reconstruction : Meeting Stakeholder Interests : Proceedings of a conference held at the Scuola di Sanità Militare, Florence, Italy 17-19 May 2006, edited by David Alexander, Colin Henry Davidson, Andrew Fox, Cassidy Johnson, Gonzalo Lizzaralde, ISBN 978-88-8453-611-2 (online), ISBN 978-88-8453-612-9 (print), © Firenze university press, 2007

rives directly from vernacular buildings; hybrid systems at low cost and low processing are possible and suitable in many emergency or post disaster situations, where a quick response to large amounts of houses is often requested. The durability/quality of the solution is also very important considering that the temporary solution tends in most cases to become the permanent one. As a consequence temporary accommodations have to fulfil to higher performances than simple tends, caravans or containers.

The lightweight stratified layer building system is a Structure-Envelope system where the lightweight steel structure, supports the outside envelope. The latter is made of sandwich steel and polyurethane panels (the inner envelope could be realized later on its own secondary structure). In the vacuums between the 2 main envelopes, further insulation could be added for winter and summer time. This would provide the necessary delay time of heat transfer from the outside to the inside in warm climate. Services can be applied both to the structure and/or to the sandwich panels. Close to the Tropics and to the Equator the hyper-insulation is less influent because the envelope must mainly face overheating, which means necessity of shadowing the building and introducing natural ventilation.

A practical, technical and functional result can be obtained through esthetical expression by using materials (such as simple wood panels or thin undulated metal sheets or sandwich panels) used in a different way, from their normal purpose, with simple rules of stratified assembling and resistance. This shows that the value of architecture is not contained just in the costs of the materials but also in the investment in intelligence, using very simple materials in a clever way.

Jean Prouvè was the master in this area during the Modern Movement. His ability to interact with the industry opened a new era to the paradigm of the mechanic assembly of buildings. This allows the application of the paradigm of mechanical assembly and connections to very ordinary buildings, with medium/low budgets, using a light structural skeleton and internal and external light weight envelopes. The use of steel sandwich panels with polyurethane (normally applied in industrial buildings or roofs) is an example of how existing technology can be used to make low cost homes, resistant to strong winds or hurricane, naturally ventilated and shaded, used in both normal conditions, thanks to the velocity of construction, for temporary/emergency accommodations.

The "Armadillo" is based on a simple concept but it is the result of integrated design among architects, engineers, and the building industry. This helped to achieve different goals: the use of products already available on the market, the weight optimisation and the logistic, transport optimisation, simplicity and speed of assembly, and last but not least important, pleasant architecture.

The design approach has similarities to the one used in the car industry, where options can be added to the basic version. As a matter of fact Self Supporting Corrugated Steel Shells have also been used by the military for many decades but Armadillo is a different thing for many reasons. Armadillo is a "mecano kit" and this allows to be transported in rather small parts, on the contrary self-supporting shells needed big spaces to be transported, therefore only with military trucks and never stored in a container like the Armadillo is. That's why there isn't need for making the arches self supporting but using them only as envelope and use the steel "skeleton" structure as bearing frame. This solution allows also to reduce as much as possible the foundations to few points instead of be obliged to design a foundation platform (therefore using a lot of water which can be a problem in some regions) like military shells needed.

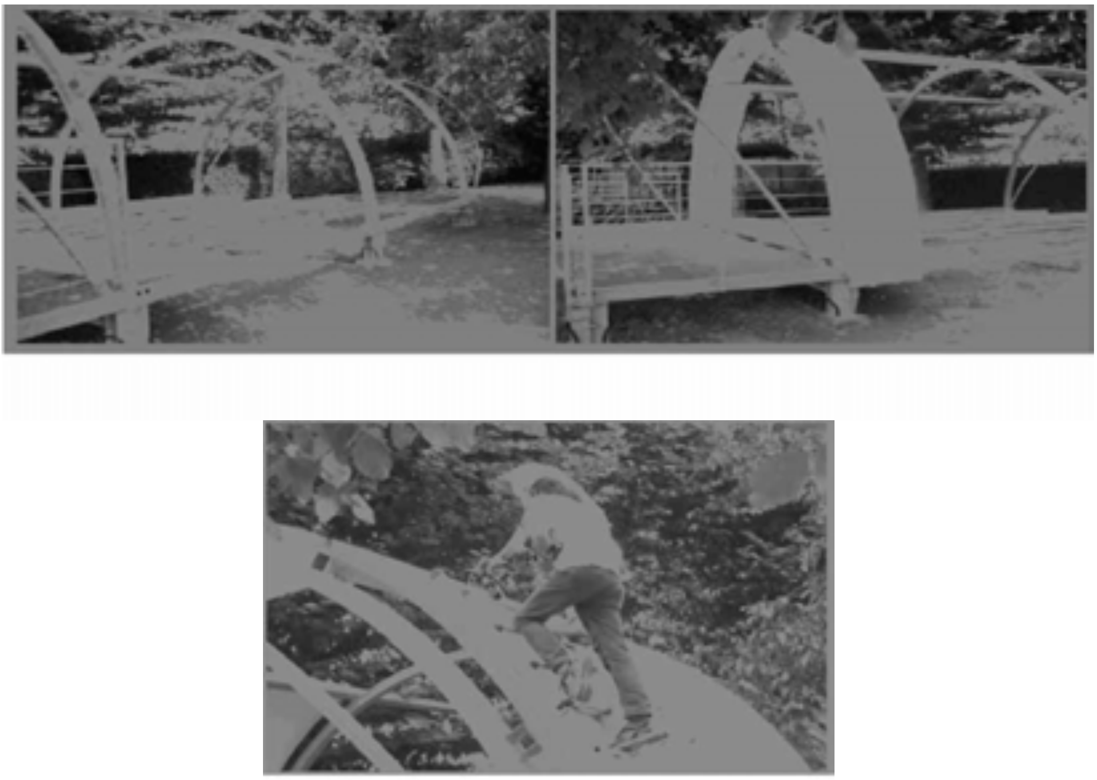
Figure 1. Prototype of L'Armadillo in Carate Brianza (MI) integrating photovoltaic cells on the top.

Technology: "L'Armadillo", Ready-Made Industrialized Home

The building system is made of a lightweight dry assembled kit. The foundations are in concrete on single elements or platform/raft, depending on wind loads. Due to the lightweight of the module the wind load becomes the critical factor to the foundation design. The principal bearing structure is made of galvanized steel profiles, shaped in a semi circular frame (linked at the base with a main beam to hold the secondary beams and the floor), which holds 2 secondary square tubes. The structural elements are connected with simple bolted connections. The curved Elycop sandwich panels are fixed to the secondary structure with steel screws. The sandwich steel panels are fixed to the ground floor secondary beams with steel screws. The façades panels are fixed to the sandwich floors and to the sandwich shell. The floor is totally above ground where only 3 steel supports for each main frame descend to concrete foundations and are fixed to them with simple bolted connections.

Façades are completed with 2 tends that protect the building from sun irradiation, which is much more intense on the vertical surfaces than on the curved shell, except from the top third where is necessary to fix also a further metal sheet to ventilate the upper part of the sandwich arc.

The main steel structure is made of three hinges arches that support square steel sections that act as purlins. The main arcs are connected with a floor beam that distributes the weight to three fitted stabilisers. Over the master beams there are secondary beams supporting the sandwich panels floor, suspended above ground and therefore ventilated, made of 80 mm-thick sandwich panels in pre-painted steel and filled with polyurethane hardened foam. The outer covering consists of end window walls made of aluminium pre-painted windows and doors inserted in the 80 mm-thick sandwich panels. Elycop panels are modular. Normally they are used for industrial roofs and their commercial dimension is 40 mm. For the "Armadillo" a new evolution of Elycop's use has increased the panel thickness to 80 mm in order to give better thermal and static performances. This product improvement has been introduced to guarantee the same performances to be achieved by both the vertical façades and horizontal bearing floor (which are also made by 80 mm sandwich panels). To increase the thickness to 80 mm accurate studies in the fluidity of polyurethane foam and time of expansion have been undertaken. This allowed to adapt the same machines used to produce the 40 mm panel without the requirement of expensive technology. This has given very good results in terms of economy of the solution and the distribution of polyurethane in the curved sandwich has been successful and without air voids.



Figures 2-4. The construction of the prototype. The 3 hinges main arches are in ordinary steel profiles HEA 120 mm and they carry the secondary box beam section profiles. The sandwich panel of 80 mm act as bearing floor.

The outer shell consists of three modules (a middle unit and two side units) which are shaped to fit at the joints after they have been heated and made water tight; the conjunction of the curved panels is located at 60°.

The internal space can be partitioned with gypsum board dividers or wooden panels. The under-flooring is made with plywood planking, which allows for gluing top flooring.

In general aesthetic and functional characteristics of Armadillo make it available for a wide range of uses. It can be used as a single unit or assembled with other units in both of the main axis of expansion to create larger, living spaces, emergency hospitals, first aid, temporary houses, schools, emergency food storage areas or restaurants etc.

The living unit, realized as a prototype and tested, is a small curved shell measuring 6.60 x 8.00 m, which can be divided into sub-units of 6.60 x 4.00 m, or enlarged into units measuring 6.60 x 12.00 or 16.00 m, by adding one or two spans to the basic module. Since the interior of the shell is completely empty, and can therefore be fitted according to the client's needs, many different configurations, both for residential uses and other functions, are possible. Also different modules can be joint together along the transversal axis to obtain open spaces for different purposes. "Armadillo" is surprisingly spacious inside, and so any arrangement is possible. The interiors clearly show the difference between this and other industrialised homes (especially containers or caravans), and also demonstrate its adaptability to different requirements.

It can be assembled like a "meccano" construction system, in just a few days, on a simple load bearing foundation. Elycop panels are fastened over the light, durable metallic frame, also to increase the whole structure's level of rigidity.
The system can be supplied in separate kits, depending on the project requirements. They can also be autonomously devised by the client who has the option of buying only the building frame and order separately the other components. Reliable insulation and the correct position of openings results in high savings on fuel for heating/cooling needs and also on electricity. "Armadillo" can also easily be equipped with photovoltaic systems or solar panels, and therefore be totally independent of fossil fuels. The majority of the building components are made from recyclable, environmentally friendly materials.

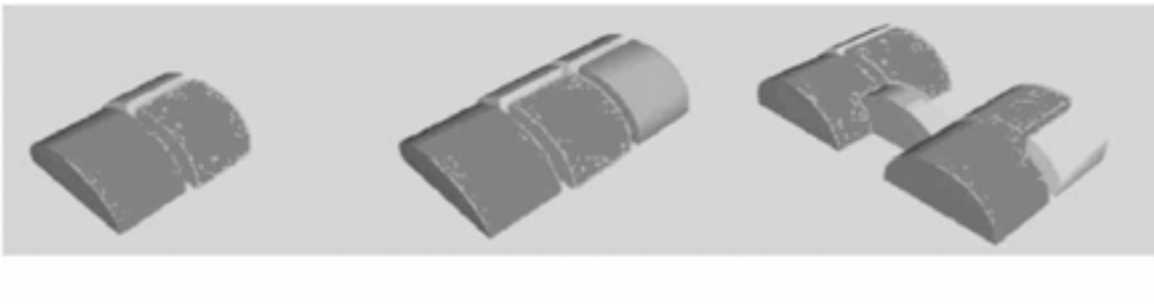


Figure 5. The multiple flexibility of L'Armadillo.

Prototype and Site Tests

A prototype has been realized and tested in 2005 in Carate Brianza (MI). Dimensions are 6,60 m x 8,00 m (more than 50 sqm), which is the surface corresponding to the base unit. Interiors have been conceived as kitchen/living room, bed room, bath room and a terrace, 2 sun shadings screens have been integrated with the front and rear facades.

The 3 hinges main frames (spaced 4,00 m) are in ordinary steel profiles HEA 120 mm. The arches carry the secondary box beam section profiles. The main arches are linked with a base beam ILS 200 mm, connected to foundation with 3 short steel legs, bolted in concrete. Secondary floor-beams ILS 140 sits on the main beams and carry the sandwich panel of 80 mm as bearing floor.

The Thermal resistance of the 80 mm polyurethane panel has shown to be performing very well in winter-cold conditions and in summer-hot condition the system can rely on natural ventilation and the presence of a further ventilation layer on the shell improves the overall condition.

The curved panel overlapping guarantees water and wind tightness and all the connections with vertical façades or floors are carefully protected for the same reason (in some case also with additional polyurethane foam). In the prototype, the internal space has been partitioned with gypsum boards panels. The finished floor is a rubber layer glued on a wood layer, which is fixed with screws to the floor bearing sandwich panel.

The structural system has been calculated first with Straus automatic finite elements program both for stress and strains and the prototype has been tested to verify the structural calculations. The design and testing on site have been undertaken following the Italian Building regulations.[1]

[1] Names and references of Italian legislations and norms applied: Legge 05/11/1971 n.1086 "Norme per la disciplina delle opere in conglomerato cementizio armato, normale e precompresso e a struttura metallica"; D.M. 11 Marzo 1988: "Norme tecniche riguardanti le indagini sui terreni e sulle rocce,

Horizontal load tests have been carried out on the prototype by applying hydraulic jacks to the main frames and to the secondary structure in order to verify the theoretical model and also to prove that the presence of sandwich shell allowed to avoid bracing the structure in the direction of the load. The introduced stiffness without additional bracings maximises the usable space and reduces costs. Different scheme tests have been carried out by adding curved panels to the bearing structure in order to prove the enhancement of stiffness thanks to the collaboration of the sandwich shell. The 2 hydraulic jacks applied were driven by an oleodynamic system controllable and measurable with pressure manometer.

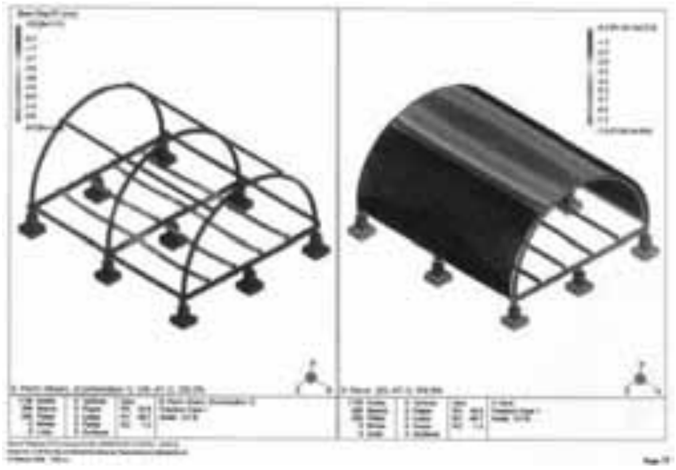


Figure 6. The structural system has been calculated with
Straus automatic finite elements program both for stress and strains.

Structural deformations have been evaluated with a tolerance of 0,5 mm and the results show a substantial elastic behaviour with some plastic corrections very probably due to a small plastic assessment of the connectors and joints (bolted or screwed).

la stabilità dei pendii naturali e delle scarpate, i criteri generali e le prescrizioni per la progettazione, l'esecuzione e il collaudo delle opere di sostegno delle terre e delle opere di fondazione"; D.M. 9 Gennaio 1996: "Norme tecniche per il calcolo, l'esecuzione ed il collaudo delle strutture in cemento armato normale, armato e precompresso e per le strutture metalliche"; D.M. 16 Gennaio 1996 "Norme tecniche relative ai criteri generali per la verifica di sicurezza delle costruzioni, dei carichi e sovraccarichi"; CNR – UNI 10011 "Costruzioni di profilati in acciaio formati a caldo. Istruzioni per l'impiego"; CNR – UNI 10022 "Costruzioni di profilati in acciaio formati a freddo. Istruzioni per l'impiego"; EUROCODES1/2/3.

Figures 7-9. Horizontal load tests have been carried on the prototype by applying hydraulic jacks to the main frames and to the secondary structure.

Static analysis on the simple automatic model has given very good results compared with the real behaviour of the prototype. After analysing a partial model and testing the prototype on site, under horizontal loads to verify the increasing rigidity of the system due to shell panels, a full complex model automatic has been completed. This model has been finally checked under single or combined load actions (permanent loads, variable loads, snow, lateral winds, frontal winds, earthquake). All stress and strain outputs have been inside the limits of safety and functionality, previewed for this typology and for the applied materials.

Conclusions

This building system, ready-made and quick to assemble, shell-shaped called "L'Armadillo", for its reminiscence to the funny animal of the forests, is a house composed by finished industrial product, the result of a commitment to specialisation, research and product innovation between the company policy of a pool of designers and the industrial client BrianzaPlastica. The result is a modular unit designed and built with quality products, present on the market and often used for non-residential purposes.

Its modular nature allows for a wide range of project solutions, and the basic unit can be enhanced with a vast selection of complements and accessories, included in the project, that make various applications possible in relation to the different living needs.

"Armadillo" is designed to be shipped in a container, mounted and dismantled, if necessary, through simple, quick procedures. Its streamlined conformation optimises the heat loss and win ratios between the internal volume and the outer surfaces. Application of solar and photovoltaic panels can transform the unit and make it independent from other energy sources in case of need.

This extremely durable living unit was even designed for use in areas where seismic activity and high winds are prevalent, according to Italian regulations, and therefore can be used in areas with extreme climate conditions. The use in other specific areas will request to verify the specific wind loads in order to verify the bearing and bracing structure (which is the shell itself) for the area selected to the application, as well as the dimension of foundations or concrete platform.

The particular curved shape, which gives also a clear expression of contemporary aesthetic, could in some cases be in contrast with the typology of constructions in the region where Armadillo will be applied. As a matter of fact contrast or dialectic ap-

proach in architecture can also be a value if it is well studied and possible variation on the final skin (added by simple screws on the final ribs of sandwich panels outside skin) could optimise its insertion by empathy or total contrast with the natural or artificial surrounding. More than this, Armadillo's flexibility (both in longitudinal and transversal axis) allow to create common spaces to be used during disaster period but also to reuse units which can be houses during disaster period and, if a reconstruction is done in the time, afterwards can be turned in public spaces (schools, little libraries, bars, common rooms, kinder gardens, etc.).
Design:
Architectural and Technological Designers: Atelier 2 (Gallotti and Imperadori), Milan
General Co-ordination: Studio IDEAG (A. and R. Francieri), Milan
Structural Design: Gian Piero Imperadori, Darfo
Art Supervision: Dubosc et Landowski, Paris
Other components applied to the System :

- Inner envelope: Vanoncini-Knauf
- Eventual roof windows: Velux
- Resilient floor: Mondo
- Interior design of the prototype: GM Design Revolution

Figures 10-13 The modular nature of L'Armadillo allows for a wide range of project solutions. Basic unit can be enhanced with a vast selection of complements and accessories, which make various applications possible in relation to the different needs and conditions.

References

Addlesson, L., Rice, C. (1995). *Performance of Materials in Buildings,* Butterworth-Heinemann Ltd, Oxford.

Zambelli, E., Imperadori, M.; Vanoncini, P.A. (1998). *Costruzione stratificata a secco*, Maggioli editore, Rimini.

Imperadori, M. (1998). *Stratified layer building systems*, Proceedings of CIB World Building Congress, Gävle.

Imperadori, M. (1999). *Le procedure Struttura / Rivestimento per l'edilizia sostenibile*, Maggioli editore, Rimini.

Imperadori, M. (1998). "Stratified Layer Building Systems", *Proceedings dell'International Symposium CIB Construction and the Environment*, Gävle.
Imperadori, Marco (2004). "Centro di primo soccorso industrializzato per Emergency", in *Progettare per la sanità n°79*, Milano, gennaio/febbraio, pagg. 48-51.
Bologna R., Terpolilli C., (2005). *Emergenza del Progetto – Progetto dell'Emergenza. Architettura contemporaneità*, Federico Motta Editore, Milano

REVERSIBILITY FOR SUSTAINABILITY IN EMERGENCY INTERVENTIONS

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Abstract

The general objective is finding the ways to define a design for an emergency housing form, temporary and reversible, able to create positive trends of comebacks and recycle, in the range of the opportunities proposed by the marketplace. This aim needs:-

- Collect and analyse of the referred experiences, due to their features (target of use, features of production, matters, building technologies), to the range of temporariness, and search for the main features of temporary architecture, from the formal, technical and logistic points of view.
- The extrapolation and systematisation of the features referred to temporary and reversible intervention, through the definition of a demand framework; processing the hypothesis about a process scale model for emergency temporary intervention; processing the hypothesis about a process scale model for intervention project.
- The definition of the instruments supporting designing decisions.

Keywords: temporary shelter; sustainable; process.

Introduction

This paper is the result of the activities developed within the PHD[1] thesis in Architecture Technologies, at the Faculty of Architecture of Reggio Calabria, as well as other studies conducted within the TEMENOS[2] research group. The general objective of the research is the analysis of the concept of "reversibility" in the building sector, and its applicability to the contemporary constructive activity in terms of project quality and environmental sustainability. Such objective is pursuable by a management that is aware about the resources in the building sector, bringing back to the concept that all the resources are productive factors, both the new ones, and the others coming from cycles in use. In particular, this research is finalized to point the criteria about the planning of a "transitory" building system, characterized by its reversibility in every process phase, both at the product level, both at the project one. The specific objective of this work is the elaboration of a system of tools to manage the" temporary" intervention, in which with the term "management" is intended as the definition of Guide Lines for planning a transitory and reversing housing form; among several typologies of use of the housing forms, there is the emergency shelter for the short and medium period (3 months - 1 year). A system of Guide Lines created to manage the features referred to the process matters (locking and rationalization of the resources, means of transporting and production, contextualization, etc.) and also the specific features connected to the project of the architectural object (formal choices and techniques).

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Post-Disaster Reconstruction : Meeting Stakeholder Interests : Proceedings of a conference held at the Scuola di Sanità Militare, Florence, Italy 17-19 May 2006, edited by David Alexander, Colin Henry Davidson, Andrew Fox, Cassidy Johnson, Gonzalo Lizzaralde, ISBN 978-88-8453-611-2 (online), ISBN 978-88-8453-612-9 (print), © Firenze university press, 2007

Temporariness in the Building Sector: Provisional or Reversible?

The changes in the building sector require a revision of the factors defining the productive process of the built object, and the first priorities to reach the final achievement. The variable factors are becoming the guide to the choice for the project solutions introducing the concept of temporariness, known not as "time for doing", but as "time for using"; in fact, the "transitory" adjective, as that "temporary", is able to be used in both situations, in which the physical consistence of the architectural object, or its conditions of use, is the one being limited in time (variability of the destination of use and utility). In the first case, the architectural research has made its own the managerial aspect of the "maintenance", by the introduction and development of a tool as the "plan of maintenance", and the analysis about the performance of the materials. In the second case, the problem has been dealt through provisional structures, whose realization, just like all the connected activities before and after the construction, is characterized by the attribute of precariousness (stands, awnings, containers, etc.). Such approach, in some cases, has produced situations of dissatisfaction about the level of fruition and the comfort of the spaces (systems for housing use) and unbalances as regards environmental and productive thematic, due to the choice of materials and techniques, used to face the ephemeral character of the architectural object, which has ended up having preference for economic convenience and quickness features, loosing a rational and more environmentally conscious use of the resources. This negative mean of the ephemeral character of some buildings is a relatively recent acquisition of the western culture; we can find some impressive examples travelling in space and time: they all have in common the same concern for the dismantling phase of the architectural object, and so they show the common need to ``Go Back``. A need linked to the concept of time, with the original definition of the term Reversibility: *"(...) etymologically with reversibility, shows the capability to go back to the starting point. But this definition is not sufficient (...) for a correct scientific meaning of the term, (...) adding that it has to be specified that to have a full awareness of the phenomenon the knowledge about how to go back is needed"*,[3] and that moves the attention from the object to the corresponding process. The definition of a reversible process for the realization of every kind of architecture, and in particular, for the residential buildings, that shifts from the concept of adaptability of the systems (where the mentioned systems have to be intended as the organism with all its components, and the lower systems including components and implants), needs a revision of the structural requirements and conventional rules, according to the logic introduced by the *transitoriness*. This new way in reading the structural requirements, has to avoid the risk of a simplification of the matters about architectural project, that otherwise would compromise the habitability of the settlements planned. An exemplification about this kind of risk is provided, in its extreme consequences, by the emergency housing modules which, referring to the excessive simplification of the functional needs, and the corresponding levels of performance, shown their inadequacy in the medium-long term period.

Hypothesis Planning

Planning in terms of reversibility and, in particular, in the emergency shelter sector, is taking act of the reduced duration time of the architectural object, when the time limit doesn't coincide with the deterioration of its parts, but with the lack of applications, and so of its destination use. The actual situation in the field of the tempo-

[3] Alfarano, G. (2002). "Il progetto in trasformazione: l'orizzonte temporale e la reversibilità del costruire", in Bologna, R., "La reversibilità del costruire. L'abitazione transitoria in una prospettiva sostenibile", Maggioli editore, Rimini.

rary architecture sees a use of “closed systems”, undiversified as regards the typology of the request, that usually needs complex and expensive interventions of re-adaptability, prejudicing its re-use. The analysis of the temporary system markets has made obvious some visible problems, as:-

- Invariability of the structural requirements;
- Reduced performance in terms of environmental quality;
- Elevated management costs for the process, (matters in supplying, need of storage areas, paralysis of the productive factors for a long term);
- Reduced levels of structural requirement maintenance;
- User dissatisfactions.

The suitable answer for the above - said queries has to necessarily be an answer in which the system has to be the result of the correct function of the process accomplishment. For this reason a project hypothesis for a transitory and reversible housing module, is transversal to the research path, because it was elaborated in order to respond to the implemented structural requirements and, at the same time, not concluded in itself, since, it is just to say implemented, through the application of elaborated management tools (CoDec, CoAd).

In consideration of this, the project of the architectural object consists of two systems, an “invariant” one, since it constitutes the structural and fundamental system of the housing module, provided depending on the scheme of the assembling kit, and an “variant” one, since it includes all the component parts of completion and implementation of object’s performance. The project choice of distinguishing a part, let’s say structural, from an envelopment that gives answers to the needs requested in precedence, also giving the possibility to take advantage from the intrinsic characteristics of reversibility in the available production, without the necessity to carry out complex phenomenon of re-conversion in the actual production. The structural system, in fact, is the first equipment of the architectural object, and it is composed of iron structural elements (the choice of this material responds both to structural and economical demands), that is already available in the productive sector, punched and ready to be assembled in the building location by a “dry assembly technique”. The "variable system", instead, is established by the production of covering systems, with simple and compound panels completing the housing system equipment. The distribution space and the structural project of the invariant system is based on a modular measurement of 1, 20m, in accordance with the dimensions of the generally available components in the marketplace. Moreover, the capability to assemble the above mentioned component, without distinction, as regards vertical and horizontal, makes it possible to use panels measuring 1m. The features connected to dimension, module typology and its referring systems, to the orographic area, as well as the system installation plants, are all necessary factors composing the definition of the mentioned housing system. But, because of the complexity of the variable factors and their own variability, depending on the kind of emergency and regarding users and available resources, they also require the elaboration of a managing and checking tool, including the entire building process through different levels of differentiated information.

COGEST–CODEC–COAD Codes’ Application Sphere

The reading and the analysis of the relative data connected to an extremely complex situation, nailed by the hypothesis of the process model, require the definition of tools referred to information management (codes), calibrated according to the objectives of every phase of the process (fig.1). The information about the construction of the process model is characterized by differentiated analysis levels, functional to the defined objectives:-

- The individualization of the characteristics data and their transmission to the “actors” of the process;

- The knowledge about the peculiar characteristics of the context;
- The rational management of input and output flows;
- The correspondence between the performance of the individualized solutions and the requirements expressed by users.

The verification of the tools proposed for the management of a transitory and reversible intervention in case of emergency,[4] consists of the application of an elaborated documentation taken from a current research, performed through the simulation of an event, including the different typologies of the emergency. For this purpose, it is necessary to build a reference "scenery", representing the virtual context of the proper actions of intervention. The construction of such scenery needs a collection of some categories of information, able to point in an univocal way the features of the matter, to inform the project.

Indications for the Project: Retrieval and Classification of the Information

The preliminary realization phase of the process compares the matters referred to the planning of the activities, by the elaboration of the main information. The retrieved and organized data constitutes the "Scenery" of the context (retrieval and classification of the information), or the gathering of the useful data to elaborate an economic, social and physical picture of the interested area referred to the settlement, through the application of characteristic features in the pointed informative areas, through the application of the Management Code:-

- Typology of transitoriness:[5] individualization of the typology of transitoriness, and description of the characteristics of the event.
- Matters (of intervention): definition of the time interval of the intervention.
- Organization of the connections (transports).
- Organization of the urban plan.
- Productive sector.

The information obtained in this way is the base of the "Scenery" of intervention (translation of the information), or of the elaboration of the project model for a transitory and reversing emergency housing system, through the extrapolation of the:-

- Further necessary requirements/ the summary of requirements for the intervention.

Guide to the decisions of project. 1st contextualization: elaboration of the information. The following phase uses the information extracted in the preceding one to reach concerning decisions about the project, in fact, through the application of the Code of Decision it is possible to reach to the individualization:-

- of the application field as it regards the characteristics of use and the context of reference. It provides indications related to the number and to the constitution of nucleuses of user (singles, families, elderly, bearers of handicap, etc.).
- of the characteristics regarding the location of the settlement, related to the
- typology of the "ground attack system"; to the dimension and typology of the housing modules; to the organization for the planning settlements.

[4] Interval of individuated time for the definition of the intervention sphere (medium – long period) answers to the need to cover an evident gap in the sector of the shelter interventions for post – disaster, nearly always, created as an immediate answer for emergencies in which the housing standards offer some compatibilities with a performance limited in time (72 hours – 3 months).

[5] The methodological tool at the base of the present proposal is the result of the phd Thesis in Technology of Architecture: Grasso, M. R. (2005). "The reversibility as a tool for the management of the resources for the transitory architectural project: a proposal of implementation of drafts dealing with the project for the valuation of the intervention reversibility level", University of Reggio Calabria.

Adaptability of the project. 2nd contextualization (elaboration of the information). This phase of the process is the more inherent the formal and technological definition of the architectural object and it has the purpose to guide the project towards choices of plans, that are able to assure a suitable level of performance in comparison to the environmental context (climate), in which the housing system is inserted. It is also the phase in which the requirement of reversibility expounds its function of rationalization of the productive factors, because it provides the "discriminant" for the choice of the components of implementation for the project.

The Intervention Managing Code

The analysis of the experiences done in the latest years about the management of the transitory interventions, particularly referred to the matters about emergency in national and international contexts, shown the determinant features but also the limits of the more widespread approaches, as well as it gave the functional data to create a reference frame.

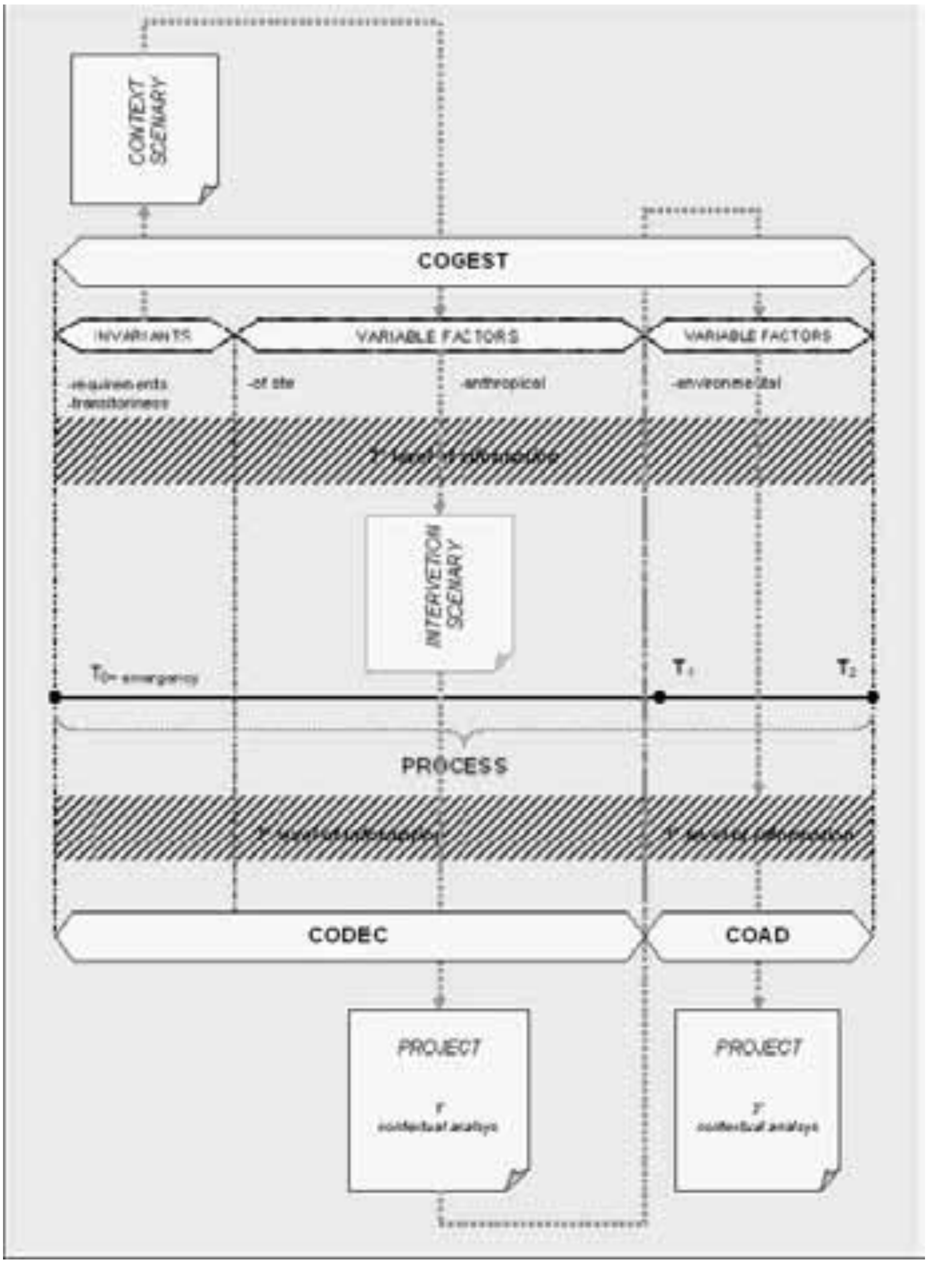

Figure 1. Organization and application sphere of codes.

It seems quite clear – thanks to the number of appointed national, supranational and independent bodies and organizations, and the analysis about the corresponding organizational structures[6] – that great strides have been done in the field of Civil Protection, although these efforts concern first of all the first-emergency time (0 > 72 hours) and the matters about the right knowledge of territorial features, the typological and dimensional classification of the risk, the arrangement of shelter solutions that – created in order to face emergency more than temporariness – show their limits just when the emergency time persists.[7] Very little has done – above all in Italy – in order to design a temporary housing system able not only to face emergency along the medium-long period, but also conceived in the frame of the reversible and sustainable approach to the building field.[8] Above all, one of the invariants during the interventions is the use of ad hoc housing forms, created for the emergency and represented by basically-closed systems, referring both to the integration by production, both to context – the environmental one (road network, orography, climatic zone, etc.). These forms, substantially uninterested in the contextual features we said, show minimal housing standards that suffer further reductions because of their lack of compatibility between system/lodging and system/place as regards to the following analysis elements:-

- Invariants, Exigency
- Kind of temporariness
- Contextual "Place" variables
- Process and/or Project directions
- Contextual "Anthropic" variables
- Climatic variables

The managing instrument for a reversible intervention shows itself as an answer to a complex matter just like the intervention management to offer lodging is, and it could represent:-

- a model to plan all the activities needed to carry out the intervention;
- a study instrument, able to verify the planned processes and create new procedures to improve or re-plan them, investing all the processes somehow involved with offers;
- not a standard, pre-packed solution, but an "adaptive" one, coming by a dynamic process, open to the external inputs.

All the information we mean to organize with the Managing Code are referred to Process in its complexity, from resources' management (material, human, economi-

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[6] In 1980, Date of the earthquake in Irpinia, nearly nothing existed of the present organization that help, today, to manage the different associations present in the territory (armed forces, humanitarian organizations, health, local authorities and voluntaries) and is able to predispose the recovery and the prime recovery of the damaged in a time of 12 hours, comparing to the 30 days necessary in 1980.

[7] The experience of the earthquake at Belice, at Umbria and Marche and the flood of Sarno, demonstrates how the installation projected to last about a few months have continued to be used for housing purposes even years after the calamitous event, starting an onerous process of obsolescence and dissatisfaction of the user.

[8] In this fied, the Provincial Administration of Florence, in collaboration with the University, has activated a serious of activities aimed at the knowledge of the territory, also the formation of the staff, in particular in the area of the project, spread over the territory and applied to the development of a system founded on the concept of reversibility regarding constructions. Other information can be found, in M. Migliorini, The reversibility regarding constructions: new prospective of the role of the civil protection, in Bologna, R., "La reversibilità del costruire. L'abitazione transitoria in una prospettiva sostenibile", Maggioli editore, Rimini.

cal),[9] to their allocation and organization. The more this instrument gives full information, the more administrators have an operating strategy at their disposal to schedule a transitory intervention, able to manage their choices in both general, typological and organizational level.[10] This instrument shows itself as a guideline in which the data involved in the informative system make a first selection about: the settlement features, the functional and technological compatible typology regarding some 1st level parameters or, better, the demand typology, the pre-existing tissue and the actual status, the climatic context and, more, the valued slot.

The Project Decision Code

From the planning of the post-disaster emergency intervention, and all the linked activities – shown in the Managing Code – we reach the step referred to the definition of the functional and planning features at building level, fullycontextualised as regards event's peculiarities generating the demand of intervention. Indeed, the Managing Code - here named as CoGest - stands for a data managing instrument, giving a clear classification of the available data as regards intervention's meaning factors or, better, the actual status and the identified resources, but also as a first level guideline to design the temporary and reversible building. As regards the CoGest, the CoDec stands for an evolution about the data analysis, because it's able to manage decisions at the system design level, where the system is the emergency building. The process in its complex base itself on the design hypothesis of a building spatially and technologically defined at 70% - a level coinciding with the definition of "demand" with its own typological and topological characters.[11] The right individuation of the right choices for this level needs a system coordinating the available data, managing planning decisions at the level of the functional organization of the spaces and translation in a technological congruent system. This instrument works through classifying parameters in three inter-connected macro areas, in which designer's choice is supported by data consequential analysis: Typology, Physical Context, Anthropic Context; in other words, it gives the right key to translate the information collected in the first phase (CoGest) in the organization of a decisional process.

The Project Adaptivity Code

From the definition of emergency settlement and temporary housing form's formal features, we reach the step referred to the individuation of cover's best configuration as to context's climatic status. Functional to this activity, is the use of the virtual store, the interface between design and production.

First Step/Starting data (invariables). This code's application field is the housing system, pointed with the previous analytic phases or, better, a system defined in its technological and spatial level as regards some "first level" parameters, which settle

[9] The number of the answers regarding post-disaster emergency depend, like any "project", on the preciseness of the hypothesis from the start. The phase of the programming therefore requires an careful analysis of the dates of the problem, that in the case of an intervention post-disaster includes many factors: from the structural requirements exactly from the building typology requested (temporary module) to a context socio-productive connected, until the peculiarity of the climate.

[10] The instrument addresses a particular category of user, that we can define, first level category, like done in precedence to individualize the type of information provided, represented by the manager of the intervention or "customer". In the specific case, emergency, the customer is represented by the Civil Protection and by the Association provided to manage the emergency and the economic resources allocated, like defined by the roles (legge 225/1992."Istituzione del Servizio Nazionale di Protezione Civile", art.6).

[11] The percentage of 70% is referred to the definition of the manufactured object about the characteristics of the structural system and the covering base.

the matters about use destination and global running. This model's aim, so, is to support the final phase in designing the whole system, thanks to its adaptability to the context, which is continuously changeable as to demand's localization, regarding the environmental comfort features connected to climatic variations.

Second Step / Variables. In this step we need to connect context's climatic features with the right intervention strategies, to be re-translated in project information (see tab.1).

I.S.	**Implementation strategy:** ***variant system***		
Climate	**Strategy**		**Planning directions**
COLD	Insulation	**S.I.1**	– Thermal insulation of the entire outside division
	Thermal gain	**S.I.2**	– The windows are localized on the surfaces exposed to the east and west
TEMPERATE	Insulation	**S.I.3**	– Insulation of the outside walls exposed to north
	Thermal gain	**S.I.4**	– The windows are localized on the surfaces exposed to south
HOT- DRY	Cooling	**S.I.5**	– Increasing of the thermal inertia of the outside walls
	Management of the solar incident radiation	**S.I.6**	– Reduced size of the windows
		S.I.7	– Use of shields
HOT- HUMID	Ventilation	**S.I.8**	– The position of windows have to facilitate the establishment of streams of air
	Management of the solar incident radiation	**S.I.9**	– Use of shields
	Management of rain water	**S.I.10**	– Draining system of rain water
		S.I.11	– Defence system

Table 1. Strategies of implementation performance of the covering

Third Step/Field delimitation – Adaptivity code's field. The instrument application gives project information about two different operational fields, coming from object's contextualisation (the temporary and reversible housing system) as regards to intervention area's climatic features. Both the first field, and the one considered aiming to the experimental verification of the instrument itself, is referred to cover's answer in order to keep environmental comfort; the second one provides "auxiliary" information referred to compatible plant design's integration with the selected environmental features.[12]

Fourth Step/Translation. In order to satisfy the pointed adaptivity strategies, it's necessary to specify an application field, that could be translated in the definition of the performing features owned by the technological system, referring to building object's decomposition:-

- CV \ External Vertical Closure
  CVia --> Internal Isolation\panel system's insulating features
  CVib --> External Isolation\covering system with insulating features
  CVic --> External Isolation\ ventilated wall syste

[12] The elaborated indications are about the individualization of intervention strategies, not exhaustible by the indication of a corresponding product, but that enter in the most complex problems of the project, because involve problems like: the level of precipitation, exposure of the area, etc.. For this reason the typology of implementation related to the plants don't build materiel for the Virtual Store.

CVsa --> Protection against atmospheric agents \ mat covering system
CVsb --> Protection against sun radiation \ screening system
- CVsb1 --> (Firm Screens)
- CVsb2 --> (Mobile Screens)

- CS \ Upper Closure
  CSia--> Internal Isolation \ panel system's insulating features
  CSib --> External Isolation \ covering system with insulating features
  CSsa --> Protection against atmospheric agents \ pitched roof covering system
  CSsb --> Protection against sun radiation \ screening covering system
  CSsb --> Protection against sun radiation \ ventilated covering system
- CI \ Lower Closure
  CIia --> Internal Isolation \ panel system's insulating features
  CIib --> External Isolation \ ground-fixed lifted system
- I \ Plant design's Integration
  Iia --> Sun plant
  Iib --> Photovoltaic plant
  Iic --> Rain catching plant

Operation of the Tool (Fig. 2)

Typology of implementation of the environmental performances according to the climatic context:-

- the system is based on one "invariant structure" expounds the structural function and also the "varying structure", that constitutes the active covering of the building with the function of mediation with the external environment. This last one is defined and individualized in the beginning of the individualization of the climatic context and of the strategies related to the corresponding implementation.

Individualization of the covering partitions involved in the implementation:-

- for an individualization of a climatic scenery which corresponds to the individualization of the covering partitions, that participate in the improvement of the environmental performances of the confined space.

I*ndividualization of the products for the house building corresponding to the strategies of implementation individualized:-*

- the present phase occurs with the support of a informatics tool, defined a
- Virtual Store. The tool is constituted by two date-bases:
- user / are constituted by file cards containing characteristics of the proposal and the corresponding codes for the strategies of implementation applications.
- production / is constituted by file cards containing the characteristics of the production and labelled with a corresponding code to the typology of implementation which they correspond to.

Selection of the offer (resources for the house building). The choice of the system or the ideal component to acquit to the typology of implementation depends on some voices contained in the file cards:-

- index of reversibility / the informatics tool sends to the file cards of implementation, which to parity of code of implementation, introduces the value of a higher reversibility. Such a value is esteemed through the compilation of some parameters which correspond to a judgment of value.
- availability / number of available units in a period of determined time.
- cost / unitary price.

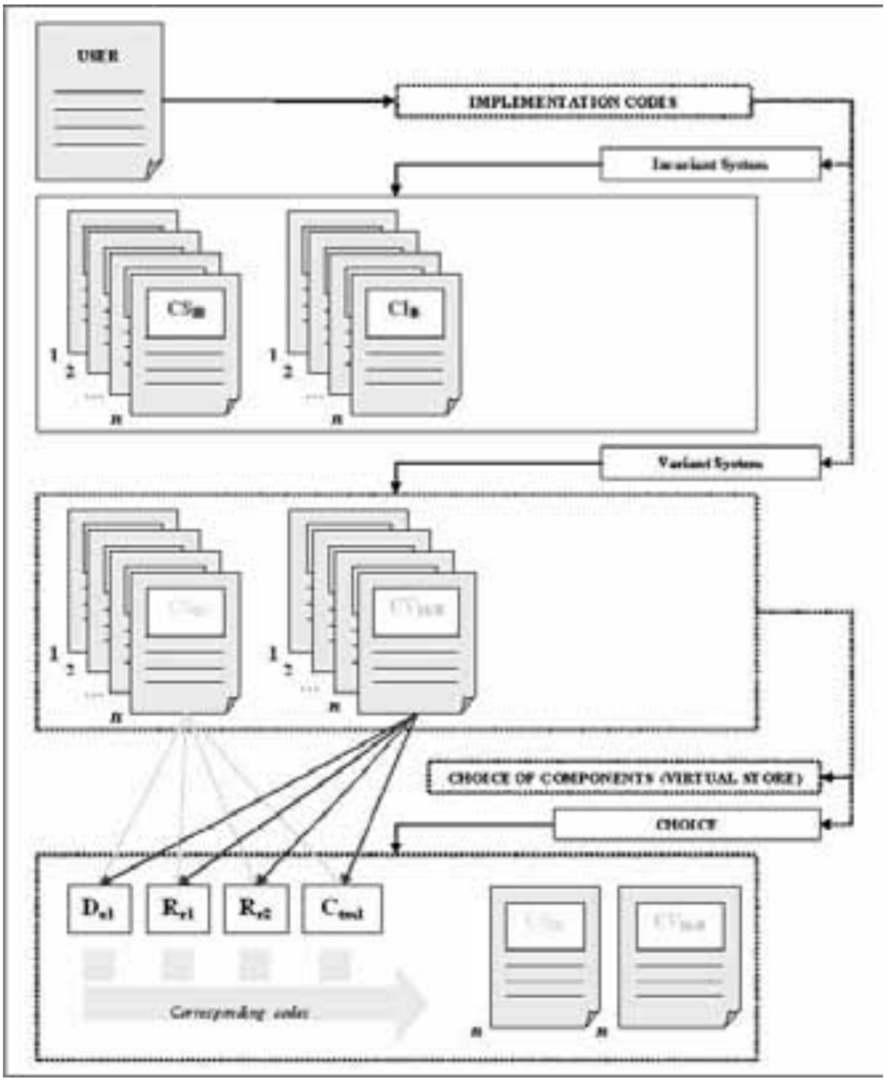

Figure 2. Functional scheme of adaptability.

References

Alfarano, G. (2002). "Il progetto in trasformazione: l'orizzonte temporale e la reversibilità del costruire", in Bologna, R., "La reversibilità del costruire. L'abitazione transitoria in una prospettiva sostenibile", Maggioli editore, Rimini.

Bologna, R. (2002). "La reversibilità del costruire. L'abitazione transitoria in una prospettiva sostenibile", Maggioli editore, Rimini.

Claudi de Saint Michiel, C. (2003). "Strategie integrate per la produzione di strutture temporanee per le emergenze insediative", Clean edizioni.

Falasca, C.C. (2000). "Architetture ad assetto variabile. Modelli evolutivi per l'habitat provvisorio", Alinea editrice, Firenze.

Gangemi, V. (2004). "Riciclare in Architettura, scenari innovativi della cultura del progetto", Clean edizioni, Napoli.

Latina, C. (1988). "Sistemi abitativi per insediamenti provvisori", BE-MA editrice, Milano.

Migliorini, M. (2002). "La reversibilità del costruire: nuove prospettive del ruolo della Protezione Civile", in Bologna, R., "La reversibilità del costruire. L'abitazione transitoria in una prospettiva sostenibile", Maggioli editore, Rimini, pp. 43-45.

BIOSAN LATRINE FOR REFUGEE CAMPS

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Abstract

Provision for energy needs, safe water supply and sustenance of environmental quality are among the topmost challenges facing the present human society. Water and sanitation inadequacies also hinder economic and social development, constitute a major impediment to poverty alleviation, and inevitably lead to environmental degradation. Conditions are worse for conflict/disaster hit areas where a large human population is suddenly gathered, such as in refugee camps. Various technologies for sanitation, which may be suitable for post-disaster or post-conflict phases, have been developed. This study analyses the technological, environmental and economical suitability of the BIOSAN technology, in the post-disaster reconstruction. The BIOSAN technology is a hybrid of the ventilated improved pit-latrine (VIP) and sewerage technologies, and integrates the advantages of the two technologies while minimizing their shortcomings and enhancing the human quality of life. This study follows a BIOSAN technology model designed and constructed at the Kakamega Provincial General Hospital, in Western Kenya. The technology is very appropriate for institutional sanitation and is therefore, considered suitable for refugee camps in the intermediate emergency phase of a disaster or conflict event. Apart from providing an environmentally friendly sanitation, the technology also aims to harvest methane to be used as source of energy.

Keywords: BIOSAN latrine; energy; environment; and refugee camps.

Introduction

Overview of development in the field of sanitation. Water supply and sanitation systems in the world's developing countries are not very well developed. The conditions seem to be deteriorating because of high poverty levels, low economic development and high growth rate of human population. In certain major cities in Africa, for example, it is estimated that as many as two thirds of the population are without adequate sanitation (Water Solidarity Network, 1994). The world health organization figures for 1998 showed that only 67 percent of the combined urban population of the developing countries had adequate facilities for excreta disposal.

Presently half of the human community has no access to any type of sanitation (WHO and UNICEF, 2000). The rest of the humanity relies on conventional approaches to sanitation, which fall into one of two categories: water borne systems and pit latrines. Both 'flush and discharge' and 'drop and store' technologies were built on the premises that the waste is suitable for disposal and have little economic value. Consequently, the environment is polluted, resources are lost, and a wide array of health and environmental problems result. It is no doubt some of the emerging and unexplained illness could have a link with the deteriorating environment.

Sewerage system is suitable for communities with more than 75 litres of water per capita per day. It requires piped water system, high design standards, high investment, maintenance and operation costs. The conventional latrine technologies include: basic improved traditional latrine, Ventilated Improved Pit Latrine (VIP), double Vault Compost Latrine, bored hole latrine, and the pour-Flash Latrine with leaching pit. The characteristics and requirements of the pit-latrine system are that: do not require water for operation, low investment, operation and maintenance costs. The

Post-Disaster Reconstruction : Meeting Stakeholder Interests : Proceedings of a conference held at the Scuola di Sanità Militare, Florence, Italy 17-19 May 2006, edited by David Alexander, Colin Henry Davidson, Andrew Fox, Cassidy Johnson, Gonzalo Lizzaralde, ISBN 978-88-8453-611-2 (online), ISBN 978-88-8453-612-9 (print), © Firenze university press, 2007

latrine should be located such that not to pollute groundwater and downstream of the residential areas with respect to wind direction.

In attempt to overcome the disadvantages of the conventional sewerage and latrine systems other technologies have been developed and tried in different parts of the world. In Nigeria, for example the shallow sewerage system was found appropriate except in areas with shallow piezometric water levels to avoid risk of faecal contamination of groundwater (Adelegan and Ojo, 1999). In South Africa (Austin and Van Vuuren 1999, Holden and Austin 1999) the urine diversion technology has been tried and is still under evaluation, though positive results have already been realized. The source separation of urine and faeces has been found successful in some developed countries (Schonning 2002). However, by using the Quantitative Microbial Risk Assessment (QMRA), Schonning (2002) found out that the risk of viral injection is very high which requires careful handling of the waste. In Ethiopia, ECOSAN (ecological Sanitation) toilet technology that enables the recycling of human waste mixed with household wastewater and organic waste has been successful (Terrefe and Edstrom 1999).

Problems in Refugee Camps

An emergency, which is a description of the crisis that arises when a community has great difficulty in coping with a disaster, may be classified – in a case of a refugee emergency – into five phases: immediate, stabilization, recovery, settlement and resolution phases. The last three phases may take more than two years and are characterized with camp-needs such as construction of more durable shelters and support facilities, installation of piped water supply, improved sanitation, health education campaigns, agricultural support, schooling, vocational training and income generating activities.

Disasters and conflicts have resulted into sudden mass movement of people from volatile areas and concentrated in refugee camps. The numbers of people uprooted by wars has increased dramatically in the last two decades of 1985 – 2005. For instance nearly 300,000 Somalis have sought refugee and about 4.5 million Sudanese were uprooted, of which 475,000 have lived as refugees in the neighboring countries (US Committee for Refugees, 2003).

Most refugee camps are supposed to have 10,000 people. However, camps have hundreds of thousands, as it was with Rwandan camps in Congo in mid 1990's when one of which grew to 600,000 (Cameron, 2002). Refugee camps are supposed to be temporary but unresolved conflicts often make it difficult for refugees to go back home, and camps remain for decades. For instance, the Kakuma camp in Kenya was established in 1992 and is still having refugees due to unresolved conflicts in refugees' home countries.

Conditions in most refugee camps across the world have been found not suitable for humanitarian conditions. The situation is worse in developing countries where, incidentally, most of the refugee camps are located. Donor nations provide fewer contributions, forcing the agencies to just maintain basic services such as health care, shelter and food and implement critical budget cuts on other programs. In Tanzania, which has over 500,000 refugees, programs to improve ailing water systems, construction of new latrines, maintain health services, road repairs have been curtailed.

Most refugee camps are in poor nations of Africa and Asia - and they economically burden local societies, economies, and ecosystems, leading to problems. Sometimes refugees are given food that require considerable cooking, prompting energy related problems such as deforestation. Most of the refugee settlement locations do not have the a significant water supply.

While refugee human needs must take precedence over environmental concerns in times of crisis, the link between human welfare and the environment is becoming more apparent. The environmental resources affected by the presence of refugees include forests, land, water and biodiversity through deforestation, soil erosion, loss of wildlife, depletion of biological diversity, contamination of surface and ground water, poor sanitation, poor waste disposal, over-extraction of ground water and over-cultivation of farmlands.

Refugees use most of the wood from forest as fuel. Survey of Western Tanzania found that refugees used an average of 2.8kilograms of wood per person per day, where local communities used just 1.7kilograms per person per day (UNDP 2005). Soil erosion is commonly observed in and around refugee camps due to destruction of vegetation cover and unsuitable cultivation techniques. For instance soil erosion is a serious problem in and around refugee camps in Karago in Tanzania and Goma and Bukavo camps in DRC. The main threat to freshwater is direct pollution of watercourses by wastewater and waste thrown into the river, laundry washed directly in the flowing river, pollution by infiltration from latrines. Environmentally safe disposal of human, medical and solid wastes is a significant problem in most refugee camps. In Kibumba camp in the Goma region of the DRC, excavation of pit-latrines was difficult due to underlying volcanic rock.

Because the use of woodfuel impacts both the society (gathering wood exposes women and children to violence and requires much time that could better used for education or wage earning) and environment – alternative fuel is necessary. Commonly used camp kerosene is very dangerous causing carbon monoxide poisoning and is easily sold through black markets.

This paper presents a technology, BIOSAN latrine, which is suitable for institutional sanitation. The technology is proposed for refugee camps that have sanitation problems and lack of water and energy supply.

BIOSAN Technology

BIOSAN latrine is in principle the center part of a sanitary biogas unit for safe human faeces disposal, degrading the excreta anaerobically, thus producing biogas and digested substrate that may be utilized as fertilizer. BIOSAN Latrines are designed as integral fixed-dome biogas plants where up to 6 latrines can be installed around a dome.

Biolatrine sanitation (BIOSAN) technology is an integration of the conventional sewerage system and pit-latrine, with an objective of maximizing the advantages and minimizing disadvantages of the two systems, while deriving the economic and financial benefits from the technology. BIOSAN consists of a pit-latrine, digester, gas chambers and delivery systems, as represented in figure 1. The underground part of the pit-latrine is joined directly to the digester, which is divided into two compartments by the baffle wall. The underground pit-latrine, the digester, the gas chambers, and the gas delivery systems are constructed such that they are watertight and gastight.

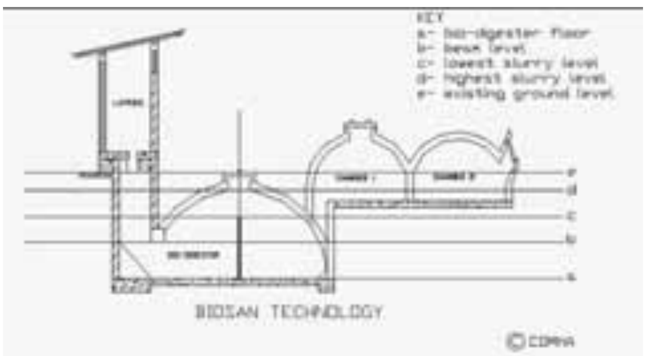

Figure 1. Cross-section view of the BIOSAN latrine.

The human waste (excreta), which is the major input in the system, is introduced into the system through the pit-latrine. The waste moves by gravity into the first compartment and then overflows over the baffle wall into the second compartment. The digester is emptied after filling up. The system starts generating biogas when the slurry level creates a seal in the pit-latrine.

The performance of Biogas technology whose objectives are; the cost-effective provision of sanitation and production of energy) depends on the following factors: microbes, plant design, construction materials, climate, chemical and microbial characteristics of inputs. Several factors influencing the design of the system and gas generation include; temperature, pH, loading rate, retention time and toxicity.

The optimum pH value for generation of biogas is between 6 and 7. However, it has been found that the pH reduces in the initial stages of digestion but starts rising towards the end to about 7.2 and 8.2, when biogas production level is stabilized. The methanogenic bacteria operate in an optimum temperature of 35 degrees C. Satisfactory gas production takes place in the mesophilic range, between 25° to 30° C. Loading rate is the amount of raw materials fed per unit volume of digester capacity per day. If the plant is overfed, acids will accumulate and methane production will be inhibited. If the plant is underfed, the gas production will also be low. Retention time (detention time) is the average period that a given quantity of inputs remains in the digester to be acted upon by the methanogens. The retention time is calculated by dividing the total volume of the digester by the volume of daily inputs. The retention time is also dependent on the temperature: the higher the temperature, the lower the retention times. Mineral ions, heavy metals and the detergents are some of the toxic materials that inhibit the normal growth of pathogens in the digester. Small quantity of minerals and heavy metals, such as sodium, potassium, calcium, magnesium, ammonium and sulphur, copper, nickel, chromium, zinc, lead in small quantities are essential for the growth of bacteria but their higher concentration is toxic.

Advantages of using BIOSAN latrine are numerous: they are run without water – not as flush toilets, thus substantially reducing water demand and related cost. The urine provides sufficient fluid. The latrine can be operated without major maintenance demand for 10-20 years. The chances of contaminating groundwater or surface water are very minimal. Biogas is a low-cost substitute for the fuelwood commonly used in the rural areas and refugee camps. The technology is cheaper compared to the conventional pit-latrine and sewerage system, in the long term and short-term respectively. BIOSAN latrine may only be appropriate solution if at least 25 people are connected to its use making the technology very appropriate for places with high populations such as refugee camps and public and learning institutions. Once a year, a tank lorry has to pump out the settled and partially stabilized sludge for further treatment, such as composting, before being used as fertilizer.

Chemical and Physical Processes and Energy Potential

Respiration and photosynthesis are two major processes that sustain life on the planet earth. When green parts of the plant are exposed to light under suitable conditions of temperature and supply of water, use carbon dioxide from the atmosphere and release oxygen to it. This gaseous exchange is opposite to that which occurs during respiration. In photosynthesis the carbohydrates are synthesized from carbon dioxide and water by the chloroplast of living plants cells in the presence of light, oxygen being the product of reaction.

$$6CO_2 + 6H_2O \rightarrow C_6H_{12}O_6 + 6O_2 \quad (1)$$

As result of this process radiant energy of sunlight is stored up as chemical energy in the molecules of carbohydrates (Biomass, such as wood, crops, and organic waste). Biomass is fuel that liberates heat when it reacts with oxygen. Biomass fuel might be burned to liberate energy in a power plant or they may be fermented to yield higher-grade fuels such as methane.

The feed material for BIOSAN latrine is human excreta (faeces and urine). The production and constituents of excreta per capita per day varies with the climate, type of food and age. In Africa and Europe faeces production is between 130 – 500 g (wet weight) per capita per day, while in Europe is about 100 – 200 g per capita per day. Most adults produce between 1 – 3litres of urine per day.

Human waste materials, which consist mainly of carbohydrates, lipids, proteins and inorganic materials is released in the pit latrine and then moves into the first chamber of the digester. Digestion process takes place in the digester. The process consists of hydrolysis, acidification and then methanization. In the hydrolysis stage, the large molecular complex substances are solubilized into simpler one with the help of extra cellular enzyme released by the bacteria. Example, the cellulose consisting of polymerized glucose is broken down to dimetric, and then to monometric sugar molecules (glucose) by cellulytic bacteria. In the acidification stage, the monomer from stage one is fermented under anaerobic conditions into various acids. The principal acids produced in this process are acetic, propionic acid, butyric acid and ethanol. Methanogic bacteria, in the methanization stage, process the principal acids to produce methane. The reaction is expressed by the chemical equations:

CH3COOH --> CH4 + CO2 (2) Acetic acid methane carbon dioxide
2CH3CH2OH + CO2 --> CH4 + 2CH3COOH (3) Ethanol Carbondioxide Methane Acetic acid
CO2 + 4H2 --> CH4 + 2H2O (4) Carbondioxide Hydrogen Methane Water

An average of 1 kg of wet faeces (12% dry matter content, DMC) produces about 0.054 m of biogas, while 1 litre of urine produces about 0.009 m of biogas. Biogas, which is a mixture of constituent gases shown in table 1, is produced by methanogenic bacteria while acting upon biodegradable materials in anaerobic conditions.

Therefore, based on the 35,846kJ/m energy potential of methane, the potential production of energy per person per day is 750 kJ and 600kJ in Africa and Europe respectively.

Substance	Symbol	Per cent
Methane	CH4	50 - 70
Carbon-dioxide	CO2	30 – 40
Hydrogen	H2	5 – 10
Nitrogen	N2	1-2
Water vapor	H2O	0.3
Hydrogen sulphide	H2S	Traces

Table 1: Gas constituents of biogas

BIOSAN Project in Western Kenya

Project background. BIOSAN project at Kakamega Provincial General Hospital (KPGH), in Western Province, Kenya, is the first model in the country. Figure 2 shows the geographical location of the project (blue spot). The project was funded by

Barclays Bank of Kenya, Kakamega branch, in collaboration with Western University College of Science and Technology (WUCST). The Centre for Disaster Management and Humanitarian Assistance (CDMHA) implemented the technology transfer. The model is to be used for monitoring the performance of the technology in the local climatic conditions.

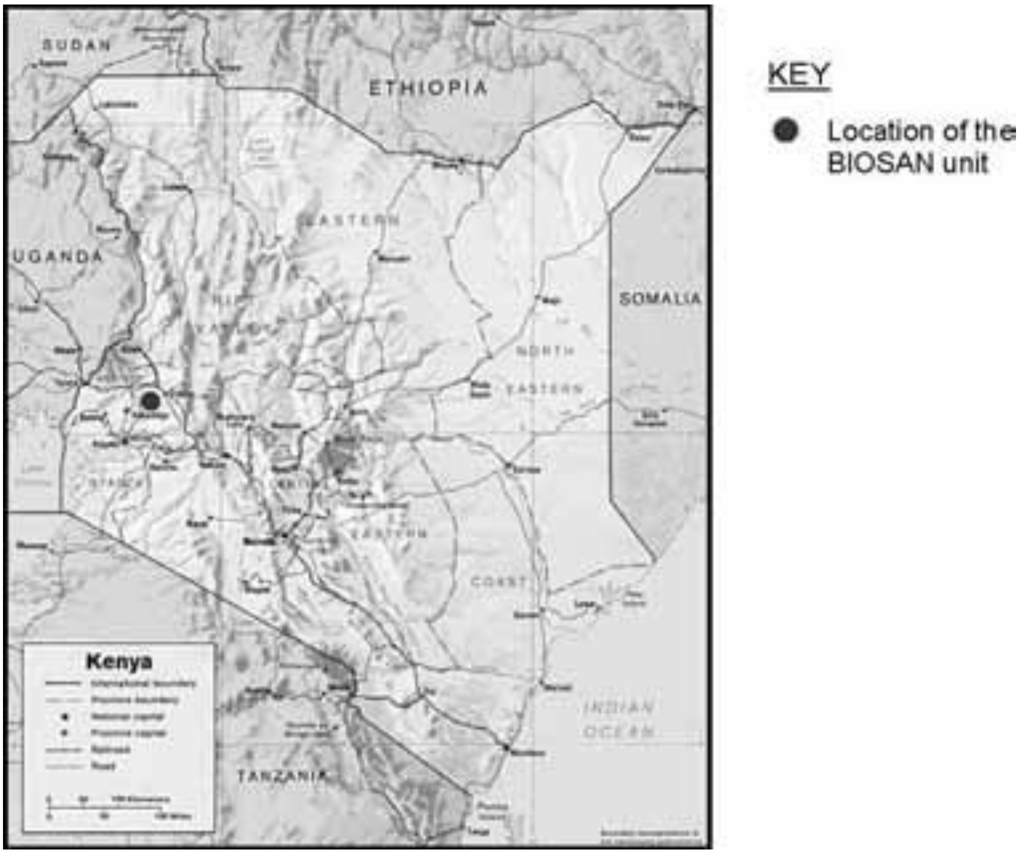

Figure 2. Geographical location of BIOSAN latrine technology in Kenya.

Design and Construction of the Project

The unit, whose design economic life is 20 years, was designed to serve a human population of 150 persons per day. Loading rate and retention time were also considered in the design of the project. Considering the local climatic conditions a retention period of 45 days seemed desirable. Therefore the minimum volume of bio-digester of 12cu. m was to be provided based on the expected 2 litres or 1 kg of faeces per capita per day. With the 30 cu. m bio-digester for the plant the loading rate of the unit is 5Kg/cu. m. Three number cubicles and VIP type of pit-latrine was provided to serve the patients, hospital staff and the general public. Figure 3 shows the BIOSAN latrine project at the Kakamega Provincial General Hospital, Kenya.

Locally available materials such as stones, sand, soil, bricks, and timber contributed significantly to the low project cost. Imported and/or factory manufactured materials were the most expensive of all the construction materials: cement being the most costly material with the 17% of the total construction cost. Services, labour and transport also made the project cost high. Figure 4 shows the total investment cost for individual items for the BIOSAN plant at KPGH. A total of Kshs 205,500.00 was invested in the project.

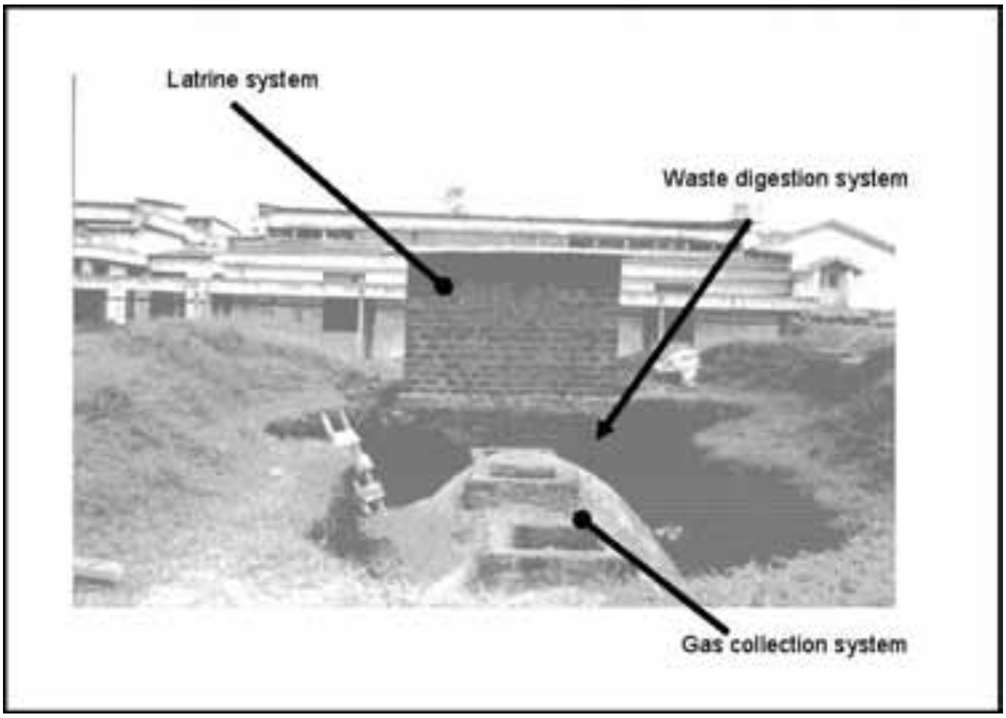

Figure 3. BIOSAN Latrine unit at Kakamega Provincial General Hospital in Kenya.

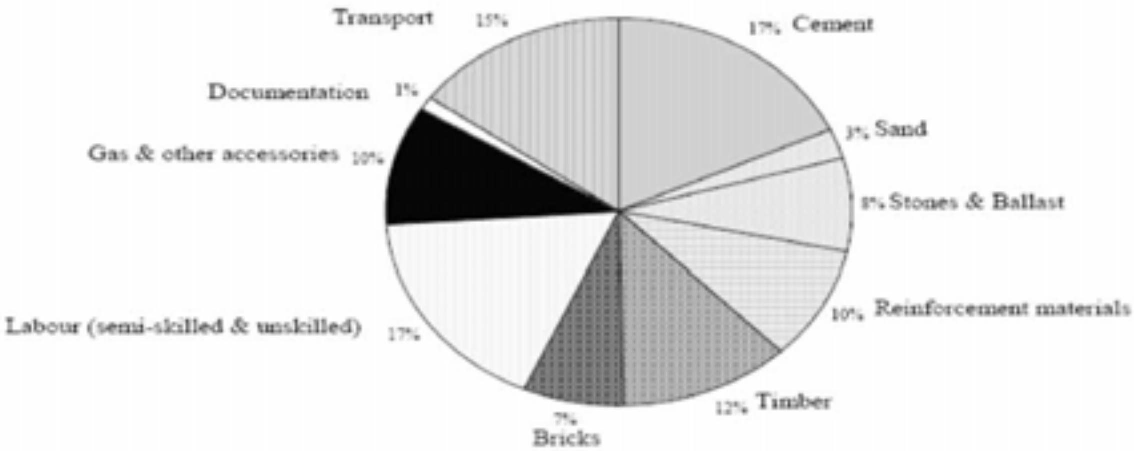

Figure 4. Cost Distribution of a BIOSAN Latrine Unit at KPGH.

Energy Potential and Benefit Cost Analysis

Not all the benefits of a BIOSAN unit can be readily priced or even compared with the price of similar products or services in the market. For example it is difficult to put money value on the protected stratospheric ozone layer due to reduced emission of methane (a greenhouse gas) in the atmosphere. Even though there are economic tools that can be used to assign money value to such benefits, they are complicated to apply (FAO, 2000).

The BIOSAN model at KPGH has provision to harvest the gas and package it in suitable containers. The packaged gas will be used in a wider user base: hospitals, schools laboratories, lighting and emergency fuel supply.

For simplicity purposes, the cost-benefit analysis of the present project, with respect to energy generated and used for kitchen (cooking) purposes has been considered. Most of the rural household and institutions use firewood for cooking. For this assumption, it is the quantity and value of firewood saved that becomes the benefits of the biogas plant. Problems associated with collection, storage and use of firewood are avoided by the availability of gas. These are the most appreciated benefits of the BIOSAN technology in terms of reducing the hard work of women who are responsible for most of these activities. The heavy reliance on fuel wood has caused not only irresponsible damage to the sustainability of agriculture and ecosystems in Kenya but also increased workload of rural women and large number of children, mostly girls, who have to allocate work time for fuel wood collection. Table 3 shows the effect of using biogas energy instead of firewood for a kitchen worker.

The relationship between the quantity of gas produced from the BIOSAN unit, the amount of firewood saved, and the values of such savings presented below were based on the following data:-

Population use per day	150
Waste (faeces) collected per day	0.3 cu. m
Biogas produced per day per fresh waste	5.0 cu. m
Energy potential of biogas	24,500 kJ/cu. m
Firewood energy potential	8000 kJ/Kg
Firewood equivalence of 1 cu. m	3.0 Kg
The cost of firewood	Kshs 4.00/Kg

Therefore the unit would save about 20Kg of firewood per day and 7 tones per year.

SN	Activity	Saving in Time (hrs/day)
1	Cleaning of the latrine	(-) 0.50
2	Collection of firewood	(+) 2.00
3	Cooking	(+) 1.00
4	Cleaning of cooking utensils	(+) 0.75
	Total	3.25

Note: the data on labour and energy saving is from experience while other data is theoretical.

Table 3. The effect of biogas plant on the workload of a kitchen worker.

From Table 3 it is seen that about 3.25 hours of labour will be saved per day if biogas is used in the kitchen instead of firewood. The results consider the time required cleaning the BIOSAN facility daily. The labour time saved can be used for leisure or for other economic activities. We value the labour time saved by assuming that the labour may be directly sold into the local labour market. The valuation of labour saved is based on the existing rate of employment and market wage rate for the unskilled labour as shown below: -

$$Y = \frac{T \times 365 \times P}{8} \tag{5}$$

Where:

Y = Net saving in time per day (3.25)
T = Value of saving in time per year
8 = Working hours per day
P = Current market wage rate for unskilled worker (Kshs 250.00)
365 = Total number of days in a year

Therefore, the value of saving in time is about Kshs 37,500.00.

The worthiness of the BIOSAN project was assessed by three investment discounting criteria: Net Present Value (NPV), Internal Rate of Return (IRR), and Benefit Cost Ratio (BCR).

$$NPV = \sum_{t=1}^{n} \frac{C_t}{(1+r)^t} - I \qquad (6)$$

Where:
- Ct = Cash flow at the end of year t, (Kshs 60,500.00)
- n = Economic life of the project (20 years)
- r = Discount rate, (16%)
- I = Initial investment (Kshs 205,500.00)

NPV for the project is Kshs 150,230.00.

YEAR/BENEFITS	0	1	2	3	4 to 20
Indirectly Priced					
Saving firewood	30,000.00	30,000.00	30,000.00	30,000.00	30,000.00
Saving time/labour	37,500.00	37,500.00	37,500.00	37,500.00	37,500.00
Sub-total	**67,500.00**	**67,500.00**	**67,500.00**	**67,500.00**	**67,500.00**
COSTS					
Investments	205,500.00				
Operation	-	6,000.00	6,000.00	6,000.00	6,000.00
Maintenance	-	1,000.00	1,000.00	1,000.00	1,000.00
Sub-total	**211,500.00**	**7,000.00**	**7,000.00**	**7,000.00**	**7,000.00**
NET BENEFIT (LOSS)	**(151,500.00)**	**60,500.00**	**60,500.00**	**60,500.00**	**60,500.00**

NPV = 150,230.00, Discount rate = 16%, IRR = Above 27.5%.

Table 4. Theoretical financial Analysis of BIOSAN unit at KPGH with reference to cooking.

Conclusion

BIOSAN latrine technology is environmental friendly sanitation facility, conserving the environmental resources. Chances are high that the technology would be widely acceptable and viable, socially and economically, in many communities. It provides a cntinuos and cheap source of energy. Locally available materials are used in construction of the technology. Do not require water, hence suitable for rural and urban communities; public, learning and social institutions.

There are circumstances where well meaning aid organizations have provided advanced technological devices, best food-stuffs, new expensive materials that do not match economic, cultural and geographical realities of the situation. Properly combined today's best innovative practices can often provide for basic human needs – clean water, food, sanitation, shelter, security, medical care and education – in ways that support poor populations, check the spread of poverty-inducing conditions, and restore vital habitat and infrastructure.

References

Adelegan J. and Ojo, S.I.A. (1999): low-cost Urban Sanitation in Nigeria. In the proceedings of the 25th WEDC Conference on Integrated Development for Water Supply and Sanitation Pg. 11-15.

Austin L.M. and Van Vuuren S.J. (1999): Case Study: Urine Diversion Technology. In the proceedings of the 25th WEDC Conference on Integrated Development for Water Supply and Sanitation Pg. 18-21.

Cameron B. (2002): Sustainable Settlements Charrette: Rethinking Encampments for Refugees and Displaced Populations.

GoK (2002): National Energy Policy, 2002.

GTZ (2000): Technical Information. Basic Sanitation and Human Excreta Disposal in Latrine.

Holden R.D. and Austin L.M. (1999): Introduction of urine diversion in South Africa. In the proceedings of the 25th WEDC Conference on Integrated Development for Water Supply and Sanitation Pg. 39-40.

Schonning C. (2002): Evaluation of Microbial Health Risks Associated with the Reuse of Source-Separated Human Urine. In the Proceedings of the 10th International Conference of the RAMIRAN Network, High Tetras, Slovak Republic. Pg. 49-53.

Terrefe and Edstron (1998) ECOSAN Technology in Ethiopia. In the proceedings of the 25th WEDC Conference on Integrated Development for Water Supply and Sanitation.

UNEP (2005): Environment Emergencies News. The Impact of Refugees and Internally Displaced Persons on Local Environmental Resources. Issue 5. December 2005.

US Committee for Refugees (2003): World Refugee Survey (2003).

WHO & UNICEF (2000): Global Water Supply and Sanitation assessment 2000 Report. Geneva, WHO and UNICEF.

World Health Statistics Report (1989): Community Water Supply and Excreta Disposal in Developing Countries, Review Progress, World Health Organization, and Geneva, Switzerland.

INDIGENOUS CONSTRUCTION TECHNOLOGIES IN FLOOD-PRONE AREAS OF WESTERN KENYA

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Abstract

Shelter and sanitation are essential for the well-being and development of most societies. The approach and technology for the provision of shelter and sanitation varies with the social, economic and environmental conditions of a place. Sanitation of places with piped water is different with places without piped water. Likewise, shelter technology for regions prone to earthquake is different from that for areas not prone to earthquake. The purpose of this study was to identify indigenous knowledge and technologies in post-disaster construction in the flood prone areas of Budalang'i, in western Kenya, with emphasis on shelter and sanitation. The study focuses on shelter systems such as; human living houses, food stores, and livestock shelters; and sanitation systems such as toilets, water wells and pans. The study considers social, physical and environmental conditions of the region. Baseline survey, and observation methods were used to determine the existing indigenous technologies. Interviews of key informants and direct observation methods were also used in the study. Identification and analysis of construction concepts in the area was done. The study recommends in-depth study of other indigenous technologies since are useful and easily sustainable in reconstruction phase of the disaster.

Keywords: indigenous technology; shelter; sanitation; flood disaster.

Introduction

Location. River Nzoia lies in the western region of Kenya. The catchment area is bounded by latitudes 1° 30'N and 0° 30'S and Latitude 34° E and 35° 45'E. River Nzoia flows into Lake Victoria just North of Yala swamp and rises from Cheranganyi hills in the East with tributaries feeding it from mount Elgon in the North. The basin covers an area of about 12,000 sq. km and a total length of 275km. River Nzoia basin transgresses many regions thus land use will vary accordingly. In the lower regions of Budalang'i the soils are poorly drained and mainly of clay type due to the frequent flooding. Thus, agriculture is not very prevalent in this area; the area is generally flat and swampy. The permanent swamps cover a total area of 25 sq. km. Figure 1, shows the location of Budalang'i on the map of Kenya.

Main Land Use. Livestock rearing and fish farming are common activities. Agro-economic conditions are generally poor throughout the sub-area. Cotton is practically the only crop produced for the market. Maize farming is done on small scale for the local market only. Sugar-cane farming is practiced on small farms. Most roads are not tarmacked, which poses a serious problem in the communication network.

The Hydrology of River Nzoia Basin

The mean monthly rainfall trend represents two maxima and minima over the year. The First and Second maxima occur from April to May and July to November

Post-Disaster Reconstruction : Meeting Stakeholder Interests : Proceedings of a conference held at the Scuola di Sanità Militare, Florence, Italy 17-19 May 2006, edited by David Alexander, Colin Henry Davidson, Andrew Fox, Cassidy Johnson, Gonzalo Lizzaralde, ISBN 978-88-8453-611-2 (online), ISBN 978-88-8453-612-9 (print), © Firenze university press, 2007

respectively. The minimum and maximum mean monthly rainfall is 20mm and 200mm respectively. The mean annual rainfall is between 1000 to 1500mm (Makhanu, 2005). The highest river discharges occur between May and September while the lowest river discharges occur between January and March.

Floods and Sedimentation

River Nzoia is characterised with flooding in its lower reaches. The river floods frequently, annually. This is due to the large catchment area versus one river to let the water into the lake. There is intense erosion in the upstream region due to deforestation. The soil blocks the channel or fills it, hindering the free flow of water. Deposition of the material eroded in the upstream takes place in the downstream. The deposition is intensive due to the low gradient of the riverbed (Makhanu, 2005). The deposition reduces the depth and thus the capacity of the river, which eventually results into flooding. Dykes have been constructed over 32 km stretch in the downstream of the river Nzoia to contain the flood problem, but floodwater breaks them at weak points. The introduction of food for work program by non-governmental organizations also destructed voluntarily repair work that was being undertaken by the community. Dykes are destroyed by burrowing animals such as rats, squirrels and ants,

Erosion in the upper catchment area of the basin is due largely to deforestation. Erosion in the lower reaches of the basin is caused by the progressive movement of the meanders causing bank materials to be moved downstream. Erosion in the upper catchment area leads to mass sedimentation in the lower areas. The solution lies largely in the control of erosion in the upper catchment. Annual sediment delivery in river Nzoia is between 158,400 to 326,350 tonnes (Dunnes, 1974).

Figure 1. Map of Kenya showing the location of Budalang'i floodplain.

Indigenous Knowledge

Indigenous knowledge has been widely used in expanding scientific knowledge and empowering the resident communities. According to McCall (1995), there is compelling evidence of the extent and rationality of utilization of indigenous knowledge in East Africa. In western Kenya, extensive knowledge of indigenous plant species and corresponding uses such as food, fodder, construction materials, herbal medicines, wood-fuel exist. In agricultural sector, local knowledge that has been used include: knowledge of crop rotation, seasonal planting of crops, hunting wild animals, trapping eatable insects, honey and fungi (mushroom) collection, pest and weed control. Indigenous knowledge has been brought about as a result of adaptation, individual trial or accidental discoveries. In East Africa many cases have been reported of deliberate farmers' experiments with crop breeding, crop mixes or protective measures (McCall, 1995). The pressing need for development of indigenous knowledge has been the occurrence of natural events, satisfaction of societal needs including protection from and influence of neighbouring communities, the regional climate and prevailing technological changes. Figure 2 below shows utilization of hydrostatic force to aid in emergency evacuation of non-absorbent household commodities by local persons.

Figure 2. Picture showing flooded area and flood victims tracking hand-woven basket containing household goods.

Has stated by McCally (1995) indigenous knowledge is not always universal within a community, but rather confined to a few experts, such as old people, women or 'progressive' farmers, the people of Budalang'i have specialized tasks among the family and community members. Women community members are knowledgeable in vegetable cropping, indigenous knowledge related to food and beverage preparation and storage; often related to health, drinking water and sanitation knowledge, and children care, while men are more knowledgeable in animal husbandry and shelter provision. According to Pablo (2004), the local cultures result into domestication of many species, spread and acceptability of new crops and eventually causing adaptation and shaping them to meet the emerging needs, environments and uses. This is well illustrated in Budalang'i area where food crops such as maize, sugarcane and fruits such as mangoes and pawpaw, indigenous outside this region have been assimilated into their cultures. The coping mechanisms from flood by Budalang'i residents has been over the years developed at the community level, just as the case of the Ribeirinhos of Amazon basin, who raise their crops by reducing the crop year to six months, through adapted plant management and cultivation techniques (Pinedovasquez, 2004). However, in construction industry, indigenous techniques have been misunderstood as being backwards and inferior (Baker, 2000).

History of Budalang'i Floods and Dykes

The flooding in Budalang'I region of western Kenya is as old as River Nzioa owing to its location as a low lying with flat terrain, which finds the river in its senile stage; hence flooding hazard is unavoidable. However, floods became a real hazard in Budalang'i since1940s through 1950s. Flood disaster occurred in 1945, 1948,1951, 1961 – 1962, 1975, 1977, 1978, 1997 –1998 (El Nino rains), 2001, and 2002 (Mango, 2003). Lately floods have occurred in April and August, 2003. The frequency has mendously increased due to increase in the population exposition to the flood hazards as human settlements and crop farming encroaches the river plains, thus high vulnerability.

The Kenya government in 1961, through local leaders initiated the construction of a dyke, which covered 9.5km stretch on the Southern part of the river to protect Bunyala Rice Irrigation Scheme, which had been established. Between 1976 and 1977, 4km stretch of the dykes was constructed. Major construction of the dykes on either side of the Nzioa River was undertaken between 1980 and 1982 covering a total of 19.3km. Currently the dykes cover s total length of 32.8km, 16.2km on the Southern side and 16.8km on the Northern side of the River. The local community through "Harambee" spirit (joint effort), then referred to as "Silabalaba", maintained the dykes, an activity which involved patching up weak areas. The community forms local groups which carry out situation assessment periodically along the dykes to identify weak points for repairs.

Shelter

Like other communities elsewhere, shelter is an important component of human live. The elements of shelter that are of great importance to Budalang'i residents are human living houses, food storage facilities and livestock shelters. The traditional homesteads of Bunyala people who lived in the flood prone areas were bounded with mud built dykes to prevent floodwaters from damaging houses. Shallow foundations were dug and fibrous tree branches placed in the foundation before a pile of clay soils being placed on the foundation in layers. The wood constructed ladder was used to pass over the dykes. Initially, flood impacts were less since people did not experience settlement problems due to low population. In flood emergency situation, camps were not there, people could shift to higher grounds without any resistance. Alternatively, they could put up with relatives and/or friends. During this time, polygamous was more rampant and unaffected household could host affected household belonging to one household head.

Human Living Houses

The Bunyala people in Budalang'i traditionally live in grass-thatched roof, wood poles structure support the roof and mud walls. These materials are generally ideal for keeping the house cool since the area experience high temperatures and long sunny days due to its location on the equator. However, due to dwindling vegetative cover, (grass twigs), and availability of more durable roofing materials, iron sheets are becoming more common. Houses are constructed with the exterior ground raised above adjacent ground level to prevent shallow floodwater from entering.

The raised part is usually well compacted against the wall and the ground level. Also houses in the flood prone areas are made of thicker walls than those in higher parts of this area. During walling, properly mixed mud is placed from exterior side of the wall, so that when damaged, mud that cave from the wall piles at the outside part of the house. There are two construction techniques practiced in this area; houses constructed to resist damage by floodwater and those constructed temporarily.

Houses constructed to resist damage require deep holes for wood poles foundation, and the support poles are closely placed. The wall materials are mixture of ant-hill soils and soils collected at the construction site, the thatching of the roof with grass is done by tightly tying grass twigs against the strong wooden runners with tree barks or sisal. When flooding is eminent, the mud wall is demolished from the ground to an estimated level of floodwater to avoid damage by wetting the upper part of the wall by capillarity movement (as shown in figure 3). In other cases, onsite wall materials are used for walling lower part of house, likely to be damaged by floods, while ant-hill and other imported soils are mixed with onsite soils before preparation of wall material for upper part of the wall, which is not likely to be damaged by the flood water.

Figure 3. The level of the house that is likely to be damaged by flood water demolished.

Figure 4. Traditional hut construction during resettlement of flood victims after displacement by floods.

The temporally houses are constructed with shallower foundation, they use wall material extracted at the construction site, the roof is thatched by placing semi-cured grass, closely without tying it against wooden runners, with strings. The support poles are widely spaced and cut from soft wood. Temporally houses are constructed in more vulnerable areas, which are sheltered from winds to avoid placed grass used for thatching being carried by winds, while at the same time allow easy removal when the river stage reach the threshold levels. Figure 4 shows a temporally house being enclosed by a more permanent structure which is under construction. House floors are made of compacted murram, topped with clay and periodically smeared with cow-dung–clay mixture. This help in destruction of insect vectors and other organisms living in cracked floors, especially after floods.

Food Stores

The development of indigenous food storage facilities has been on the basis of type of food available and occurrence of flood hazard. The staple food crops in this area are mainly cassava, sweet potatoes, finger millet, sorghum, bananas, maize and fish. The strategy for sustainable food production is through planting varying maturing food types and planting in various seasons. In this case the food crop remain on the farm until harvested for consumption. This method is only applicable for crops such as cassava and sweet potatoes. However when floods are eminent, the tubers are easily uprooted since the soils will have been softened, before floods submerge the area. However, floods do a great damage to these crops as they easily rot if left under flooded soils. Cassava and sweet potatoes are usually sliced, cured and stored in sacks or handwoven baskets. They are either suspended from the roof or stored in the food store. The food stores are granary type, constructed with strong hardwood poles. The granary is usually placed above the ground level to prevent damage of stored food by floodwater, through direct contact. The granary is periodically smeared with clay mixed with cow-dung to seal openings and prevent entry of insect vectors. The roof is usually grass thatched, although iron sheet stores are also emerging. However, grains stored as seeds for consequent planting season are not stored in iron roofed storage facilities.

Where there is no suitable higher ground for construction of grain stores, woven-baskets and sacks are used to stores the food, where the basket is either hanged inside the house or between the house verge and walls. In some cases underground storage is done, where the hole is dug and lined with clay and is used to store foodstuffs which have been placed in guards or pottery containers. During floods, the community has developed rescue boats for evacuation of stranded victims and food.

Livestock Shelters

Livestock domesticated in this region include cattle, sheep, and goats. Cattle are not sheltered in the roofed structures. Livestock shelters are located on higher grounds, often on ant-hill within the homestead. Where ant-hill or a raised ground is not available, ant-hill seeding is usually done within the homestead. The stacks used for tethering livestock are usually placed deep in the ground, to prevent being loosened and uprooted by floodwater or animal. Cattle shades are also located where there is natural vegetation, strong enough for tethering animals. Figure five below shows cattle being evacuated.

Figure 5. Cattle being evacuated from flood prone areas to higher grounds.

The higher grounds ensure that during floods, cow-dung is washed with floodwater to low areas leaving the livestock shelter clean. It also facilitates easy removal of cow-dung. Sheep, goats and calves are housed in roofed structures. However, most structures are not walled. Similarly, they are constructed on higher grounds to avoid floodwater.

Sanitation Systems

Floods are accompanied by a wide range of health hazards such malaria, cholera, typhoid and bilharzia, the situation leads to strain on medical facilities. The situation is usually made worse due overcrowding in the camps, due to this many deaths occur in camps. Toilet facilities although not common among the flood plain people, those that exist are submerged by the floods, hand-dug well even those at higher grounds collapse thus water becomes a great problem.

Toilets

Traditionally the indigenous community in the flood plain never used to have toilets. However due to continued disease outbreaks, the community has gradually adopted the pit latrine system. The latrines are only dug few feet down since they are highly vulnerable to floods and are reconstructed after every flood event. The latrines are the most temporary structures constructed by the community. In many cases are not roofed. Where they exist, are located in the downwind side of the homestead. The wall is usually made of mud or thatched with grass. Presently, there is efforts being made to sensitize the community on better sanitation technologies and mobile latrines that can be reused have been extensively distributed especially in public institutions.

Vector Control

The main prevalent vectors in this area include mosquitoes, tsetse flies, and rodents. Mosquitoes breed especially in rain season and more so during floods. The main technique used to reduce mosquitoes in to the house is by reducing ventilation through excluding window openings and construction of the walls to the roof level. However, non-structural measures such as use of smoke is widely used to fight mosquitoes, houseflies, and tsetse flies.

Water Supply

The main source of water for the community is Nzioa River water. The area does not have springs or seasonal rivers. In normal situation, the community fetches water directly from the river. However in flood situation the residents have to fetch water from lake Victoria. Those who stay far from the lake, still have to get water for use from the River. The men who engage in fishing carry water containers along with them, to fetch water far away from the settlement, where water is believed to be relatively clean. Because of swampy conditions along the river, there are always patches of water in flood plain during dry period, where the community fetches water until is completely dry. In higher areas from the river, hand dug wells are used as sources of water. The shallow wells are dug during dry season to the water level. Since the water level is relatively deep, the wells are relatively wide and workers carry banana leaves into the wells to provide them with oxygen. The wells are dug with a conical shape, the base being smaller to avoid caving in flood season. For relatively shallow wells with good quality water, stones boulders are set beside the wells, which are used to fill the well as river stage reach the threshold level, this helps to save the effort of digging another well after floods.

Conclusion and Recommendation

Although efforts have been done to identify indigenous knowledge in medicinal plants, cropping and animal husbandry, there have been little efforts done to establish the construction techniques in most regions, especially in disaster prone areas. However, if this knowledge is harnessed, it can be very appropriate in the rehabilitation and reconstruction phases of the disaster cycle. The practice will be easily acceptable and adaptable to the indigenous community hence sustainable in the long run. This will go a long way in saving training needs of personnel and reduce close post-implementation monitoring. Documentation for these technologies will make sure that technical knowledge that is considered scientific is not easily lost.

References

Baker, Laurie (2000). Rehabilitating Indigenous Technologies for Mud Construction, (electronic book from the internet), pg 123 - 130.

Dunne Thomas, (1974). Suspended sediment data for the rivers of Kenya, US department of Geological Sciences, University of Washington.

Makhanu S. K. (Ed.), (2005). Regional Power Integration in Hydropower, Project Report for Phase I, on Regional Power Integration in Hydropower: Workshop and Seminar on Nile Basin Capacity Building Network for River Engineering (NBCBN – RE) Held 13th – 16th June 2004, Cairo – Egypt, pg 26-27.

Mango Thomas, (2003). The Issue of Floods in Budalang'I division, (Report for Budalang'i Floods Stakeholders Forum, September, 1oth – 11th, 2003), Budalang'i – Kenya, pg 1-12.

McCall, M. K. (1995). *Indigenous technical knowledge in farming systems of Eastern Africa:* International Institute for Aerospace Survey and Earth Sciences. The Netherlands, (electronic book from the internet).

Pablo E., (2004). Ethnobotany of Crop Diversity and Evolution, the International Society of Ethnobiology – Ninth International Congress (Department of Anthropology -University of Kent, Centerbury, UK), 13th – 17th June, 2004, (electronic book from the internet).

Pinedo-Vasquez, M; Sérgio R; Fabiana M S, (2004). Evolution, Adaptation and Domestication Processes in Crop Species in Dynamic Environments of the Amazon River Floodplain. Center for Environmental Research and Conservation, Columbia University, New York, USA, (electronic book from the internet).

STRENGTHENING OF HISTORIC BUILDINGS IN POST-DISASTER CASES

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Abstract

The 96% of districts in Turkey, which includes many historical monuments, is under seismic risk. Historic buildings and monuments are an important part of our cultural heritage that we must protect and provide their sustainability. There are many cause of decay in materials and structure of historic buildings. Earthquakes which are the external cause of damage are different from other natural disasters. The earthquakes, which we cannot predict in time and intensity, may cause major structural damage, and the collapse of historical buildings and monuments. Whenever an earthquake occurs we give more importance to the great monuments rather than the vernacular architecture which constitutes the urban fabric. The timber and masonry buildings constitute the vernacular architecture of Turkey. However, most of the traditional wooden constructions succeed in reach our time even they are partially damaged. Timber structures are the most earthquake resistant among other traditional forms. The aim of this paper is to show the resistance of traditional buildings, especially timber construction against the earthquakes. Unfortunately, the examples of timber construction, which constitute the biggest part of the traditional houses architecture in Turkey are decreasing. For this reason, the strategies for the preservation and strengthening of the historical timber structures should be prepared without losing time. As a consequence, the original and damaged condition of a historical construction should be analyzed. In order to learn the values that we possess and the existing conditions of these buildings, the inventory of the whole timber construction in Turkey should be documented. Preserving and strengthening programs could be done on the basis of this documentation and conservation strategies could be developed according to them.

Keywords: historic timber buildings, Turkish house, earthquake, strengthening, modern and traditional methods, Istanbul

Introduction

Many severe earthquakes occurred during the history of Turkey and as a result of this; the major part of the historical buildings collapsed partially or have been ruined.

When we observe the history of earthquakes in Istanbul, 13 severe earthquakes happened since the year of 325. In these earthquakes, while thousands of people had lost their lives, buildings are destroyed and there occurred giant waves and clefts in the ground. According to the information taken from Turkey Earthquake Charitable Foundation (TDV), there occurred 13 important earthquakes on the years 325, 427, 478, 865, 986, 1462, 1500, 1509, 1719, 1754, 1766 and 1894. In the 1894 earthquake, which is probably 7 on the Richter scale, the clefts were formed on the seaside, some parts of the ramparts and masonry buildings are destroyed but most of the wooden buildings are succeeded in standing (Figure 1).

Post-Disaster Reconstruction : Meeting Stakeholder Interests : Proceedings of a conference held at the Scuola di Sanità Militare, Florence, Italy 17-19 May 2006, edited by David Alexander, Colin Henry Davidson, Andrew Fox, Cassidy Johnson, Gonzalo Lizzaralde, ISBN 978-88-8453-611-2 (online), ISBN 978-88-8453-612-9 (print), © Firenze university press, 2007

The history of earthquakes in Istanbul suggests that every 100-250 years there is a significant seismic event. For this reason, specialists are waiting for a major earthquake in Istanbul within 30 years. (Ahunbay, 2005).

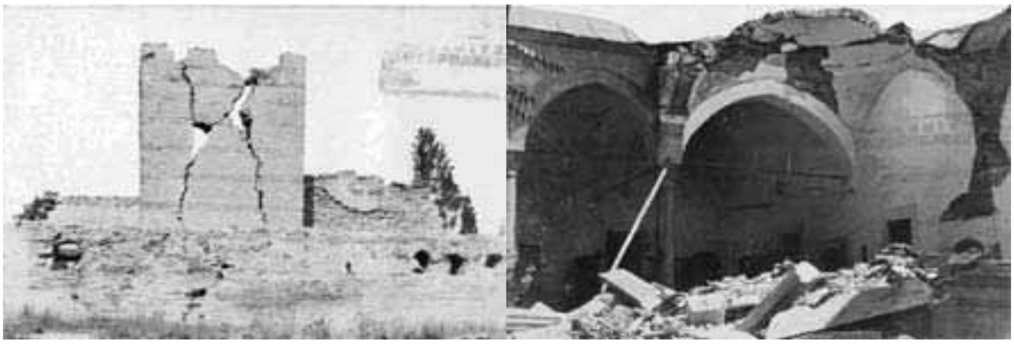

Figure 1. Earthquake of 1894 in Istanbul.

Although the timber structures are considered to be the most earthquake resistant among other traditional forms, after a major earthquake, historical timber buildings can be seriously damaged like modern buildings. Occupiers of those buildings, also, become homeless or are obliged to repair them if they are to live in them. Unfortunately, most of the people who live in the traditional buildings are the ones, who have low incomes. In that condition, the people, whose houses are damaged or collapsed after an earthquake, have two choices. They will either be settled in the "post-disaster houses", which are offered to them by government or they will repair their own houses with the financial support of the government.

In both of these solutions, there are many criteria that should be taken into consideration. As the homeless people are settled in the "post-disaster houses", firstly they will encounter a cultural shock. Instead of their few storey houses, victims are obliged to live in multi-storey houses, built in reinforced concrete. People, who live in city centres under usual conditions, have to settle outside of city centers and encounter a social environment totally unfamiliar to their life style.

If the project, specialist team and financial support can be provided to the victims by the government to repair their houses, the cultural heritage, that the traditional constructions formed, could be preserved and people could continue to live in their own social environments and conditions as well.

Another important point that should be taken into consideration is that the unconscious interventions, which are done by humans, destroy the structural continuity of the historical constructions. Especially in Istanbul, where the historical fabric is dense, by the increase of the commercial functions large openings are formed, the bearing components are removed or their order is changed in order to create a front for the shops on the ground floor. This intervention destroys the supporting system of the buildings and decreases its resistance against earthquake. In the upper floors, while window openings are widening, the distance between the corners of the buildings and the openings are decreased in the constructional system. Furthermore by making the distance of the spans wider, the system is changed and some of the diagonal braces and studs which are forming the timber frame are removed (Figure 2). By the way, the integrity of the construction is destroyed and it became non-resistant to the earthquake. This case suggests another point that should be cared: a control mechanism. Besides the conscientiousness of the traditional houses users, governments' supervision association should control the traditional buildings as well as the reinforced concrete buildings.

Figure 2. Examples of traditional houses that openings and construction systems have changed.

Type of Building, Construction and Material in Turkey

The earthquake of 1999 in Adapazarı caused major losses of human life (30.000 people) and severe damage and destruction of the architectural heritage. The same earthquake had also important effects in Istanbul. Hagia Sophia, Sergius and Bacchus, Edirnekapı Mihrimah and Fatih Mosque were among the seriously affected great monuments (Figure 3). Great monuments show different problematic of their own and it is impossible to generalize strengthening methods. There are many criteria for them and each case is unique. Whenever an earthquake occurs we give more importance to the great monuments rather than the vernacular architecture which constitute the urban fabric.

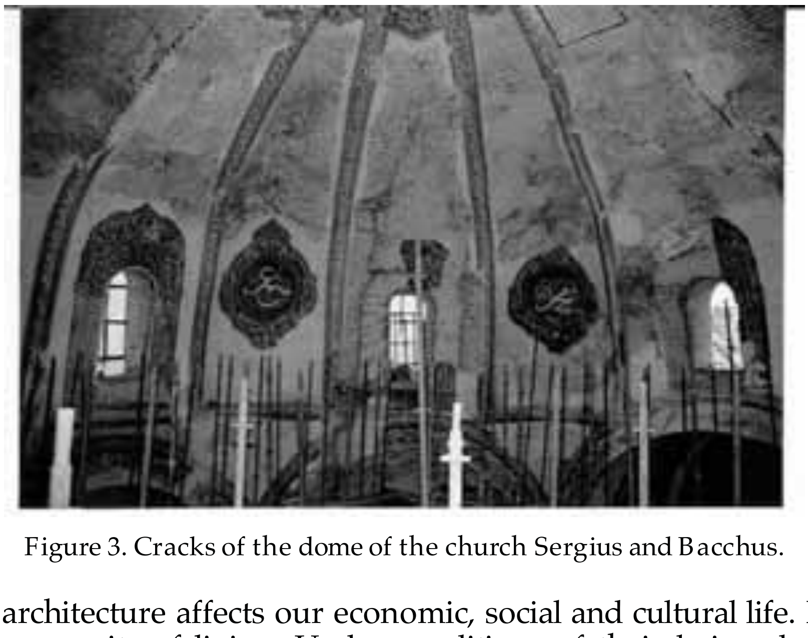

Figure 3. Cracks of the dome of the church Sergius and Bacchus.

Vernacular architecture affects our economic, social and cultural life. Firstly, we use these buildings as units of living. Under conditions of their being damaged or collapsed, many people will be homeless. Secondary, they help us to understand the construction techniques and materials of the past. Along with modernization and globalization, the borders of Istanbul are expanding and reinforced concrete takes the places of traditional constructions. As the traditional construction systems are not used any more, they continue to disappear and with them the appropriate craftsmanship.

The timber and masonry buildings constitute the vernacular architecture of Turkey. Choosing the timber, stone or adobe for the houses in different regions depends on the material possibilities and the climate of that region. Timber is the most common building material used in the traditional Turkish House. As it is light, easy and fast to build and especially resistant against the horizontal forces, timber has become the most continuously used material in the part of Turkey that lies on the earthquake zone. Wooden frame structures are quite ductile and able to absorb substantial movements.

In Osmaneli, a village near to Adapazarı, traditional forms of construction for dwellings are "hımış" construction. Of the few those "hımış" buildings, most appeared undamaged in the 1999 earthquake. Some damage could be found in shedding of the plaster or fall down of the infill material of the timber frame. There isn't a major destructive crack (Figure 4).

Figure 4. The timber frame with adobe infill construction in Osmaneli.

Nevertheless, on the regions, where the forest resource is more limited, stone, brick, wood and adobe is used as the filling material of the timber frame (Figure 5).

Figure 5. The timber frame construction with masonry infill and masonry construction examples of traditional houses.

Two or three storied traditional timber constructions, are generally, formed by a timber framework building system on a stone basement wall or, a masonry ground floor. The wall of the ground floor is constructed with the rubble stone technique, which has the thickness of 60-80 cm, and is reinforced by beams (*hatıl*) placed at intervals 100-150 cm. Plaster is rarely used. The construction system of the upper floors is timber frame. Evenly spaced bearing studs are placed on the wooden beam, which is set on the basement wall or ground floor wall. On the floor level it is again linked with a beam. There are diagonal braces between the main studs. The studs are linked to each other with horizontal wooden pieces (Figure 6). This system changes according to the region and time. In the last century, thinner but more closely spaced studs are used. Preserving the wooden framework used at the exterior surface of the building is generally provided by plastering or covering with wood clapboards. In general, wood clapboards are used in the humid and/or windy regions (Sözen, 2001).

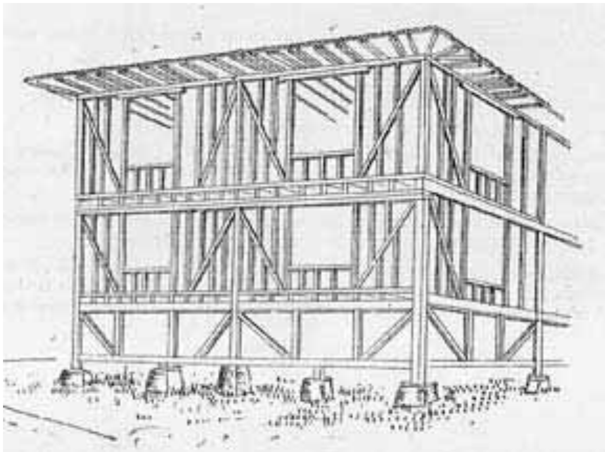

Figure 6. The timber frame of traditional house (Kafesçioğlu, 1955).

As it is same in other regions of Turkey, the houses in Istanbul were generally plastered *"hımış"* structures until the very beginning of the 19^{th} century. Due to industrial production of the timber and the ease of importing in Black Sea area; from the second half of the 19^{th} century, wood clapboards buildings had taken the place of *"hımış"* structures (Figure 7). This continued until the World War I but later on, as it is the same in all over the world, the timber buildings could not be constructed in Istanbul because of the economic problems after the second half of the 1920's. (Tanyeli, 1998)

Figure 7. The examples of traditional houses with wood clapboards and "hımış" at the beginning of the 19th century in Istanbul (Eldem,1984).

Unfortunately, in Istanbul none of the examples of *"hımış"* construction could last until our time and also the wood clapboards constructions are disappearing rapidly. The urban and rural architectural heritage in Turkey is both neglected and damaged. Reinforced concrete buildings are constructed instead of the old fabric as a result of the change in the society's life style, preference of modern materials and the new construction specifications. Without registering their cultural existence and knowledge accumulation that they carry, the "hımış" buildings are disappearing. Although they survive the earthquakes with little damage, most of the traditional buildings are abandoned and they are about to disappear by being pulled down. At the end of this fast disappearance, traditional architecture would totally be lost. Because of this, without losing time, we should develop conservation strategies to preserve these traditional buildings, which form the important part of our cultural heritage.

Strengthening Historic Timber Structures

Diagnosis and Investigations. Before starting an intervention, we should analyze the social, cultural, economic and political characteristics of the building. The first step must be the examination of the structural system (effects of the horizontal loads and static study of building) and the characteristics of the wood which was used. After that, we should determine the causes of decay and previous earthquake damage in the building as the timber historic buildings still standing after earthquakes may have been weakened.

All these studies must be done by a specialist team experienced in historic conservation and strengthening. They should record structural survey results and constitute a detailed reinforcement plan. The analysis studies must provide for the structural continuity of the building and be available before starting the interventions of reinforcement. Interventions must be as little as possible but must ensure adequate continuity and connections between all the main structural elements.

Maintenance. When the historical buildings are examined after the earthquakes, most of them are seen to be abandoned or empty. The timbers of these buildings are rotten or infested by insects. The cause of this damage is lack of maintenance and regular inspections (Figure 8).

Figure 8. Lack of maintenance: case of Amcazade Yali on Bosphorus (Can Binan's archives).

The continuous maintenance is the main point in keeping the cultural heritage. The neglected buildings which have leaky roofs, grass growing on their walls, broken eaves, and with the access of water inside the building, are not resistant against earthquakes. For strengthening the traditional buildings that have evident structural weaknesses, we are obliged to give priorities to interventions, which does not dam-

aged their authenticity, to choose material and techniques, which are compatible with historical constructions more than the strengthening criterion, which is based on modern technology and the calculations of new construction structures. We are obliged to make these types of interventions become widespread.
strengthening the historical buildings with proper repairs on their own will have the most successful result from the point of view of conservation principles.

Occupiers of the historic buildings should be informed and encouraged for maintenance of their houses. Government should provide permanent funds.

Traditional and modern techniques. The principles of conservation must always be followed. The most important purpose of conservation is to maintain the historical authenticity and integrity of the cultural heritage (Figure 9). Reinforcing a historic building with new construction methods can destroy a historic building's appearance and structural integrity. Each intervention should be follow for preference:-

- Apply traditional methods
- Be reversible, if technically possible. (ICOMOS)

Figure 9. The eldest timber house on Bosphorus: Amcazade Köprülü Yali, 1699.

The modern technologies should be used when the traditional methods are insufficient. Modern technologies must respect the cultural significance of the historic buildings. They should be used carefully and not cause an irreversible damage. New materials used for strengthening should be compatible with, but also distinguished from original materials of the historic building.

These specialized technologies include: vertical and center core drilling systems for unreinforced masonry buildings, base isolation at the foundations, superstructure damping systems, bonded resin coatings, and reproducing lost elements in lighter materials. (Look et al., 2004)

A specialist team should evaluate these methods.

If the joints of the timber buildings are sound and the timbers are not attacked by insects and fungi, we can accept them, to have good earthquake resistance (Feilden, 1982). If wood element of the building is unable to continue to function as a load-bearing structural member in the building, it is a sign that there is a need of strengthening. There are many methods for reinforcement of weak timber structures.

Strengthening technologies are developing all the time and they are designed to conform to the historic character of the building.

Strapping of a building. Earthquakes, the shifting of the earth's crust, affect firstly a building through its foundations. For this reason, the analysis of soil and the foundation system should be made. The structure can be bolted to its foundation or the timber frame can be strapped together. While strapping of a building the meeting points of the cables with the building should be cared for. It is necessary to protect original elements to prevent the cable cutting into them. Using wooden angle plates at the meeting points of metal materials and structure is suitable. It is very important how the turnbuckles which provide the tension of strapping cable will be used. The walls must be connected to each other with using braces made from timber, steel, synthetic fibers, etc (Figure 10). We can give additional strength by using plywood stiffeners between the building and strapping cables. By the way, this provides the structural continuity of a building, and also be used as a plate. Strapping of a building is probably the most common reinforcement method and can be applied to masonry buildings as well. Strapping provides for the building to perform structurally as a whole.

Figure 10. Temporary consolidation of the timber frame structures (Can Binan's archives).

Infill openings. Another method of providing the structural continuity is to fill in openings. As it effects on the appearance of the historical building, it is not much preferred. In order to infill the openings masonry or timber framing are used. But costs are very high. This method also provides for the building to move as a single unit.

Repair weakened wooden structural systems by bracing existing members. Interior bracing system is always better than exterior ones as they do not ruin the original appearance of the building (Figure 11). Bracing system aim for emergency consolidation after a disaster and must be integrate with the existing structural system of the building. Reinforced bracing should be added in order to have minimal impact and not overload the structural system. The compatible materials should be selected in this system. Timber braces are usually used in historical buildings. Another point that should be cared for is to provide a strong ground as the system transfers the loads to the soil.

Figure 11. Interior and exterior bracing systems (Can Binan's archives).

Reinforcing the joints of the timber buildings between floor, wall and roof connections, column and beam ties using mechanical fasteners like anchor ties or bolts, metal straps, dowels or pegs of wood, metal or glass fiber reinforced plastic, etc (Figure 12). Care should be taken while using these fasteners as the timber elements shrink and expand because of the humidity and the temperature differences. Missing areas of wood can be filled with epoxy resins or other filling materials compatible with the historic character of the building.

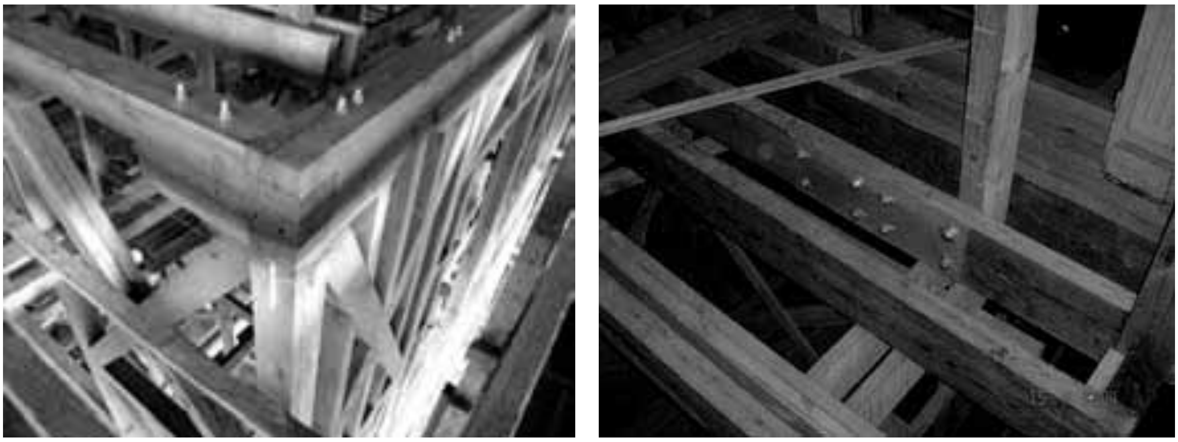

Figure 12. Reinforcing the joints of the timber buildings using mechanical fasteners (Can Binan's archives).

Conclusion

The historical buildings and monuments are an important link between our time and history. They reflect the social, cultural and economic experiences of the past. Unfortunately, most of the historical buildings are generally neglected in our times. They are damaged or have collapsed because of the interior factors such as their ground features and location, and the exterior factors such as earthquakes, other natural disasters and vandalism. For this reason, it is very important to protect them by taking measures from structural aspect without loosing time. But, it is harmful rather than being useful to apply misguided repairs without determining the reasons for the damage and analyzing the structure of the buildings.

First of all, the original and damaged condition of a historical construction should be analyzed. The applied intervention and strengthening should be determined respecting the results to the integrity and authenticity of the historical building.

The work of analysis and evaluation should be done as a result of the cooperation of the specialists, who are from different disciplines like earthquake specialists, architects, engineers and art historians. Besides, it is necessary for these specialists to have common knowledge on the subject of conserving and strengthening the historical buildings.

In 2001, Turkish Academy of Sciences (TÜBA) has started the "Cultural Inventory of Turkey" in order to label the cultural possessions of the country systematically. A similar work has been done on the extent of the project of Turkey Archeological Settlements (TAY) since 1994. In this project the aim is to make the inventory of the whole archeological existence of Turkey. These inventory studies are made on the scale of a region and a house. The earthquake factor should also be added to these studies and should constitute a whole by combining them with the studies of analysis and evaluation.

Thanks to these inventory studies, we will both learn the values that we possess and the existing conditions of these buildings will be documented. Preserving and strengthening programs could be done on the basis of this documentation and conservation strategies could be developed according to them. By examining and researching earthquake-resistant historical constructions, and their details, we can adopt them for modern buildings in earthquake zones.

References

Ahunbay, Z. (2005). "İstanbul'daki Büyük Depremler ve Kültür Varlıklarına Etkileri, Alınacak Önlemler", *mimar.ist*, vol. 4, pp 17-18.

Eldem, S.H. (1984), *Türk Evi*, İstanbul.

Feilden, B.M. (1982). *Conservation of Historic Buildings*, Elsevier, Oxford.

Günay, R. (2002). *Geleneksel Ahşap Yapılar, Sorunları ve Çözüm Yolları*, İstanbul.

ICOMOS. *Principles for the Preservation of Historic Timber Buildings*.

Look, D.W. Wong, T. Augustus, S.R. (2004). "The Seismic Retrofit of Historic Buildings: Keeping Preservation in the Forefront", *The Preservation of Historic Architecture,* Globe Pequot Press, USA.

Kafesçioğlu, R. (1955). *Kuzey-Batı Anadolu'da Ahşap Ev Yapıları*, İstanbul.

Sözen, M. (2001). *Türkler'de Ev Kültürü*, Doğan Edition, İstanbul.

Tanyeli, U. (1998). "İstanbul'un Ahşap Geleneği, Bir Tarihlendirme Denemesi" , *İstanbul*, Vol. 25, pp 52-57.

LEARNING FROM THE POOR

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Abstract

Post-disaster housing solutions are rarely developed upon empirical information and case-based knowledge. Instead, solutions for housing reconstruction are usually the result of what a restrained group of professionals from the formal sector consider the most appropriate solutions given the limited resources available. Very often, these solutions fail to address the expectations of the users and to efficiently address the needs of low-income families. Spontaneous housing construction provides crucial information about how low-income families (and, in general, the informal sector) normally cope with limited resources to solve their needs for shelter and services under extreme conditions. A detailed analysis of spontaneous housing in Colombia and South Africa demonstrates that despite cultural differences, various common characteristics exist in the housing solutions of the informal sector. The comparison of these characteristics with previous studies conducted in India confirms the existence of fourteen common patterns among the cases studied. Despite the fact that the informal sector has been the only sector capable of housing the majority of poor residents in developing countries, many of these characteristics are often neglected in post-disaster low-cost housing reconstruction. In fact, the solutions and priorities of formal post-disaster projects often contradict the ones used by the informal sector. While the formal sector seeks to reduce costs through standardization, uniformity and speed through mass production, the informal sector emphasizes variety, often slow evolution and recycling. If properly adapted to contextual aspects, these fourteen patterns bring important lessons for improving post-disaster housing solutions.

Keywords: informal housing sector; post-disaster reconstruction; low-cost housing; emergency housing; spontaneous housing solutions

Introduction

The systematic observation and analysis of spontaneous housing in order to bring information to the development of housing strategies is not new. In fact, this approach has been promoted by various researchers since John Turner (1972) first challenged the idea of conventional housing norms and promoted a better understanding of the housing standards of the informal sector. Since then, important authors in the field of low-cost housing such as Peter Kellet and Graham Tipple (2000) or Vikram Bhatt and Witold Rybczynski (1999) have proposed similar approaches for a better understanding of low-income families' needs and the solutions they require. Keivani and Werna (2001) also distinguish between the conventional (formal) and the unconventional (informal) provision of shelter. According to Bhatt and Rybczynski (1999)., "In spite of its often spontaneous and improvised character, the informal sector, which maximizes self-help and mutual aid building, has been virtually the only group that has had any success in providing appropriate, low cost solutions to the shelter problems of the urban poor".

Very little, if any, of this knowledge has been applied by NGOs and governments for the development of post-disaster housing reconstruction (Johnson, Lizarralde and Davidson, 2005). Instead, organizations leading post-disaster strategies often opt for the development of pre-conceived forms of housing that a group of experts consider "appropriate". In some cases, the concerned community is consulted regarding

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these solutions, in a simulation of involvement of the beneficiaries in the design process. Unfortunately, this involvement easily falls into tokenism and contributes very little to upset the balance of the decision-making power of the professionals that benefit from their eloquence and from the power given them by their capacity to use resources and technical knowledge (Davidson et al., 2005).

This study seeks to validate the following hypothesis:

> *Post-disaster reconstruction projects developed by the formal sector in developing countries ignore solutions and strategies that are used in the informal housing sector to efficiently shelter the poor.*

This research does not suggest that post-disaster reconstruction projects must automatically duplicate the solutions of the informal construction. However, the study does assume that it is unwise to ignore solutions that have proved effective in many years of construction in the biggest construction sector in the world: the informal housing sector. Even though contextual characteristics might alter the application of the findings of this study, the research itself will demonstrate that some principles are common to various contexts, regardless of cultural, economic, political and social differences.

Research Methods

In order to validate the proposed hypothesis, this research compiles results of various studies. The methods follow the case study methodology (as suggested by Yin, 1984) through a non-chronological sequence of eight activities:

1. Visits to and analysis of post-disaster projects in Colombia, El Salvador, Turkey and Honduras. Collection of drawings, project reports, pictures and notes.
2. Visits to informal settlements in Bogotá (Colombia) and Cape Town (South Africa). Collection of data though drawings, pictures and notes.
3. Identification of common characteristics among the informal settlements.
4. Comparison of the characteristics found in activity "3" with results of previous research in order to obtain common patterns.
5. Identification of common characteristics in post-disaster reconstruction projects in El Salvador, Honduras and Colombia.
6. Comparison of the characteristics found in activity "5" with results of previous research in order to obtain common patterns.
7. Comparison between the patterns found in activities "4" and "6".
8. Condensation of research results and analytical generalizations (Yin, 1984).

The research included four case studies of spontaneous housing (called in this paper "informal solutions"):

- *Spontaneous housing in Bogotá (barrio El Paraiso) and Armenia, Colombia:* (First-hand information, study conducted in 1992 and 2002). Built by low-income residents along the "circunvalar" highway. The houses - that range from cardboard shacks to 3-storey masonry houses – have been and still are constantly consolidated; indeed, the settlement was later "legalized" and the infrastructure was upgraded.
- *Spontaneous housing in Cape Town. Settlements of Guguletu and Mitchel's Plain:* (First-hand information, study conducted in 2006) Spontaneous construction built by mostly-black residents in illegally occupied land. During a 2-week period, 250 housing units recently had to be relocated in order to free the space required for the construction of the municipality's infrastructure upgrading project.

- Spontaneous housing in informal settlements of Indore, India: Study conducted by Vikram Bhatt and Witold Rybczynski through the Minimun Cost Housing Group of McGill University, published in Dines and Brown (1999).
- *Spontaneous housing in informal settlements in New Dehli, India:* study conducted by Peter Kellett and Graham Tipple (2000).

Six case studies for post-disaster housing (called in this paper "formal solutions") were also conducted:

- Choluteca, Honduras: Post-Mitch reconstruction project developed in 1999 to relocate about 2000 families of the Choluteca region. More than 18 local and international NGOs participated in various projects of one storey detached units.
- La Paz, El Salvador: Post-earthquake reconstruction project of detached 36m2 houses developed in 2001 and 2002 by the Salvadorian NGO FUNDASAL (Lizarralde, 2004).
- El Cantarito, Colombia: 972 houses built by Colombian NGO Antioquia Presente in the "Cantarito" settlement (La Tebaida town). The 72 m2 masonry units were built as a relocation project for families affected by the 1999 earthquake (Lizarralde, 2004).
- Calarca, Colombia: Post-earthquake (1999) housing project developed by Colombian NGO Fenavid using the cement-panels pre-fab system developed
- by Servivienda (Lizarralde, 2004).
- Turkey, Marmara region: Study conducted by Cassidy Johnson and published in Johnson et al. (2005) and in Davidson et al (2006). Post 1999 earthquake temporary housing reconstruction in the Marmara region. Directed by the Ministry of Public Works and Settlements, 32,000 temporary units were built by private contractors within 5 five months and 41,000 permanent units were built within 3 years.
- Emergency shelter proposed by Architect Nader Khalili After finding similar patterns in built projects, we compared this pattern with the famous emergency shelter domes proposed by Khalili (as explained in Stevenson, 2004). According to Stevenson, these domes were originally inspired by shelters to be built in the moon; they are to be built with spiral layers of plastic bags filled with earth.

Research Results

The research looked for common patterns; these concern:-

1. flexible use of enclosed and open space,
2. combination of one, two and three storey units,
3. priority to interior comfort and quality of the interior spaces with limited interior subdivisions,
4. unclear distinction between original core and later additions/modifications,
5. unclear distinction between temporary units and permanent houses; progressive approach with quick first construction and no clear end,
6. no uniformity in façade; variety of textures and colours,
7. great variety between housing units,
8. intensive use of recycled materials and components,
9. combination of different materials and technologies; progression from 'light' to solid technologies,
10. variety of functions and uses, mixture of residence and income-generation activities,
11. strong emphasis on safety from theft and robbery; delimitation of the land and fencing is a priority,

12. variety of open spaces,
13. hierarchy of streets and paths,
14. variety of plot sizes and forms.

Table 1 summarizes the patterns found and the six categories in which they were classified. It shows the occurrence of those patterns in the selected case studies. "Y" means that the pattern occurs in the example, "N" means that the pattern does not occur and "na" means that the pattern is not pertinent or cannot be identified with the information available. Table 2 compares the form in which the fourteen patterns occur in spontaneous settlements and in post-disaster (formal) projects.

Patterns Related to Housing Form

1. Spontaneous housing translates a great variety of domestic activities in the mixed use of indoor, outdoor, enclosed, open and semi-open spaces. Income generation activities, children's baths, laundry, eating, playing and a great variety of social activities occur very often in semi-open or enclosed (but not roofed) spaces outside of the house. Particularly in warm climates, a great integration of indoor and outdoor spaces facilitates the development of these activities. Spaces delimited by walls but without roofs and by roofs without walls help the development of these activities. In the informal sector, the projection of domestic activities outdoors helps reducing the built (roofed and enclosed) area, thus reducing construction costs. Formal solutions often make a clear distinction between interior domestic activities and the "outside". This lack of integration between indoor spaces and the exterior creates what we call the "box effect": users are inside or outside of the box with little options in between (see Fig. 1 and Fig. 3).


Figure 1. *Left:* Interior of a spontaneous unit in Armenia, Colombia. Despite that the unit is built on illegally occupied land, the interior demonstrates the care for comfort and quality of space. *Right:* unit in Choluteca, Honduras. The design dramatically separates indoor and outdoor space creating "the box-effect".

2. The informal sector takes full advantage of housing evolution. Informal units grow over time following the availability of resources and the family needs (see Fig. 2). When units are erected on small plots (increasing affordability) later additions require the construction of a second level. Informal settlements in Bogotá, Colombia, might include 3, 4 and 5-storey units built on 6m-wide lots. On the other hand, formal reconstruction tends to follow a 1-storey pattern, a type that is associated with ease of construction and efficiency for mass production through mutual aid programs targeted to unskilled labour.

3. Even in cases where the exterior facades of informal housing seem 'unfinished and dilapidated' (by formal standards), the interior of informal units frequently demonstrates the particular care put into interior comfort and quality of indoor spaces (see Fig. 1). Sometimes equipped with TVs, DVD players, stereos and refrigerators, these interior spaces tend to have minimum subdivisions and to serve various uses during the day. Following conventional "western" standards, formal units demonstrate an effort to classify and subdivide interior spaces, thus bedrooms, kitchens and living rooms are separated. This can be seen as an effort to prioritize "conventional" standards of functionality over the informal flexible notions of comfort.

Figure 2. *Left:* Informal settlement in Bogotá showing 4 different stages in the housing evolution process: from a shack made of scrap wood to a three storey unit made of concrete and masonry. *Right:* 1-storey units in El Cantarito. Despite that higher densities were obtained and infrastructure was provided, few months after the project was finished, users had already modified the rigorously standardized facades to personalize them with colours and finishes.

Patterns Related to Housing Evolution

4. In the progressive evolution of informal units, the original core and later additions and modifications tend to merge into a unified unit. The use of light materials (wood and corrugated iron sheets) and recycled components plays a fundamental role in the flexibility of the units. Formal solutions, on the contrary, rarely anticipate later modifications and additions, reducing the possibilities of properly articulating them to the original core. Underestimating the importance of housing evolution leads to the need to later demolish brick walls or concrete slabs and reduces the possibilities of having structurally-sound joints between the core and the additions. Despite that they use a non-traditional technology, Khalili's domes do not escape from many of the traditional patterns of the formal sector: the use of one or minimum materials and technologies, unification in the facades, clear distinction between indoor and outdoor spaces, little articulation between the core and later modifications, etc. (see Fig. 4).

5. In the progressive evolution of informal units, the temporary shelter - frequently used for land invasion in the early stages of the settlement - is smoothly transformed into a permanent or "solid" solution. This evolution brings affordability for the majority, for an improvised shelter (illegally built overnight) can become a house in the lapse of few years (see Fig. 3). Despite the fact that this pattern is found in almost every informal settlement in developing countries (Ferguson and Navarrete, 2003), formal reconstruction still follows a 2 or 3-step process in which temporary, transitory and permanent sheltering are dramatically separated, usually provided by different bodies and usually using uncoordinated products.

Timescales also differ in the formal and informal sectors. In order to succeed in the illegal occupation of land, very often the informal sector relies on quick construction through the use of improvised units made of recycled and unfinished materials. These units act as "seeds" that are then improved upon over long periods of time; in other words, these constructions do not follow the traditional definition of a project, with clear beginning and a clear end, that is to say with a limited duration, typical of the formal sector.

Figure 3. *Left:* Informal dwelling in Bogotá. The progressive improvement in materials and technologies increase the value of the property (the sign reads: "on sale"). *Right:* Free standing unit in La Paz, El Salvador, characterized by the box-effect and four-façade uniformity in technology and materials.

Patterns Related to Aesthetic Principles

6. Despite of common misconceptions about informal settlements, they usually are a tangible proof of the importance that low-income residents attach to the aesthetic appearance of their homes. The use of vibrant colours, façade decoration, and careful choice of textures demonstrate that not everything in informal sectors is about lack of choices. The formal solutions for reconstruction favour the opposite strategy for aesthetics and cost reduction, opting for homogeneous facades with minimum variety of materials, finishes and colours (see Fig. 2).

7. Variety in housing forms, sizes, finishes and technologies is an important strategy for cost-reduction in the informal housing sector. This allows every family to have – at each stage over time – exactly the amount of invested capital it can afford. In this way, each household slowly evolves at its own pace from rough and precarious materials to more expensive finishes. This becomes a powerful way of personalizing each of the units incidentally allowing visitors to discover something different in every shelter. By adopting the opposite approach, the formal reconstruction sector emphasizes uniformity among housing units in order to guarantee equality in the distribution of resources and to reduce costs through mass production. Before residents actually personalize their units with colours and modifications, this formal approach often builds boring rubber-stamp settlements that "advertise" the poverty of beneficiaries and that contradict the basic notion that every single family is different.

Patterns Related to the Use of Materials

8. As we previously explained, the recycling of materials and construction components is one of the most efficient cost-reduction strategies adopted by the informal sector. It is therefore not rare to find an aluminium window, a ceramic toilet, an industrial truss or a pre-fab kitchen counter in a spontaneous shelter. This reuse of components saves energy and capital to households, allowing them at the same time to increase the value of their property. It is always surprising that despite the fact that disasters rarely completely destroy all the components and materials of the affected houses, very little recycling is applied to post-disaster reconstruction strategies. This is probably due to the fact that governments and NGOs feel uncomfortable with allowing exceptions to construction standards.

9. The combination of construction technologies (masonry, pre-fab panels, concrete, etc) is also an important solution for cost reduction in the informal sector. This variety allows each family to progressively invest capital in their house and to increase its value over later modifications only at the pace that additional resources become available. Besides, very often 'light' technologies such as timber frame and corrugated metal sheets are slowly replaced by 'solid' technologies such as masonry and concrete structures. On the contrary, minimum variety in construction technologies is adopted in formal reconstruction. Once again, standardization and uniformity are prioritized over variety and individual multiplicity of choice.

Patterns Related to Functionality

10. Informal housing solutions in various parts of Colombia and South Africa confirm a pattern found by Kellet and Tipple (2000) and Bhatt and Rybczynski (1999) in spontaneous settlements in India, namely the inseparable interdependence of domestic and income generation activities in low-cost housing. During the day, spaces might change their use and thus, domestic spaces might serve for storage, workshops, stores or small manufacturing in the informal sector (see Fig. 4 and 5). The interdependence of their activities facilitates both housing affordability and income generation to households. Very often this is the only choice of production for women that need also to take care of children and domestic chores. All of this is often neglected in formal reconstruction projects that artificially distinguish between commercial and residential uses. This distinction is worsen by the "box effect" (pattern 1a) that limits the possibilities of interaction between the interior and the exterior. In the informal solutions, the possible link between indoor and indoor-outdoor spaces and the street is crucial for the delivery of services (ironing, clothes repairs, haircutting, etc) and for the productivity of stores and retail (see Fig. 5).

11. The widespread use of bars for windows and doors, fences around the plot and locks demonstrates the importance that informal dwellers give to prevention of theft, robbery and break ins. The common use of exterior fencing or even low walls is also interpreted sometimes as an effort to clearly delimit the acquired property. These priorities are rarely considered in the initial core of formal housing reconstruction. It is therefore not surprising that four years after the post-Mitch project was finished in Choluteca (Honduras), the majority of modifications to original cores were related to plot security and delimitation of land (Lizarralde and Boucher, 2004).

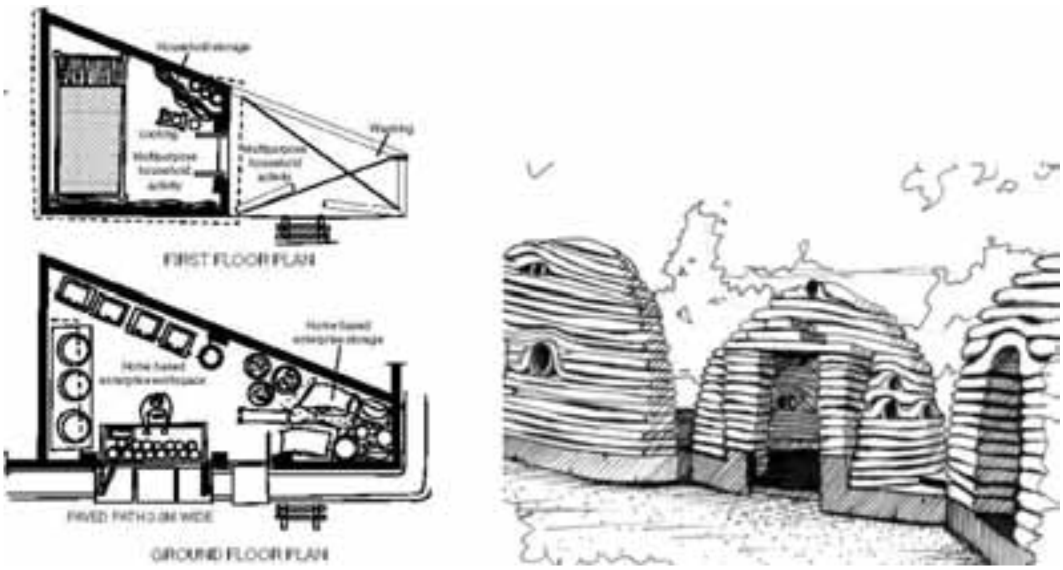

Figure 4. *Left:* Example provided by Kellett and Tipple (2000) of a 2-storey spontaneous home and workplace in New Delhi. *Right:* Image of Khalili's post-disaster domes (drawn after images presented in Stevenson, 2004).

Patterns Related to Settlement Layout

12. Spontaneous housing is frequently developed around a great variety of open spaces that include small plazas, irregular squares and open areas in between units. These public or semi-public spaces play a fundamental role in community building and in social interactions between residents. It is therefore not rare to find in informal settlements a cluster of units around an open area (featured by a tree, a water tank, a shaded area or a parking place). In the settlement layout, these open areas vary in importance and functionality providing multiplicity of interactions between dwellers. Post-disaster formal solutions distribute housing units among a standardized pattern of streets. Public spaces provided in Nueva Choluteca (Honduras) consist of large public parks, but very little attention was paid to small-scale clustering of units (Lizarralde and Boucher, 2004).

13. As much as public spaces for social interaction, streets and paths in informal settlements also follow a hierarchy of different widths, finishes and public importance (see Fig. 5). Narrow streets and paths that might not provide access to cars are land-efficient and also serve for the ventilation and lighting of the units. In many cases, narrow alleys also permit to have double access to the units, which is particularly useful for units that combine residence and income generation activities or for units that house an extended family, for example by giving an independent access to the family of the married children. In case of insufficient land availability, this solution permits increasing densities and therefore allows more affordable solutions for the majority. Higher densities also help reduce infrastructure costs (for building and maintenance) and consolidate the settlement as a whole. Even when resources are extremely scarce, formal standards of infrastructure (wide roads accessible to vehicles, sidewalks separated from the street, double-lane roads, etc) frequently influence post-disaster reconstruction projects challenging densities and thus challenging the long-term sustainability of infrastructure and public services.

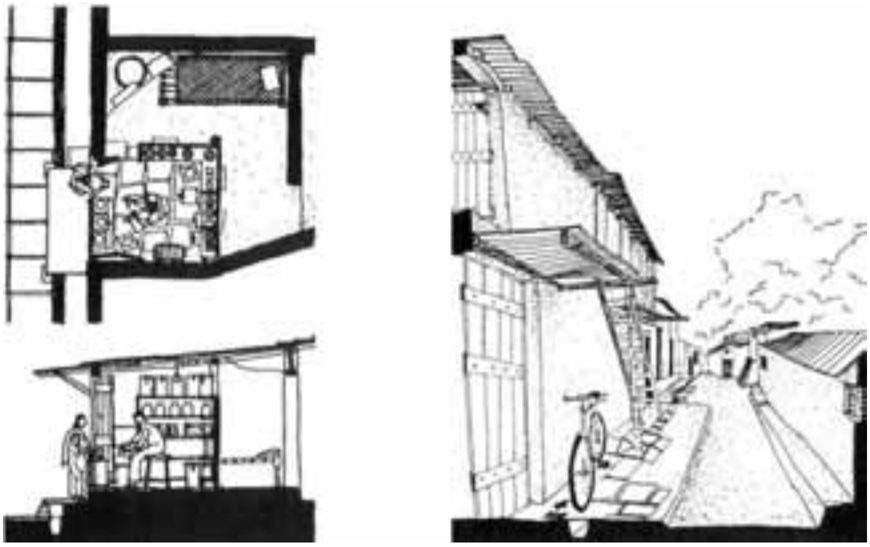

Fig. 5. *Left and Right:* Images of informal housing in Indore, India as published by "How the other half builds" (Bhatt and Rybczynski, 2005). The images show the combination of domestic and commercial activities and the use of narrow streets.

14. In the informal sector, an increased variety of plot sizes and forms permits that families of different sizes and with different incomes can afford a housing product that closely accommodates their own needs and possibilities. This feature is often ignored in formal reconstruction projects in which standardization of products and services (including lot sizes and forms) predominates over variety of choice.

Category	Patterns	Spontaneous housing					Post-disaster projects				
		a. Colomb.	b. Cape T.	c. Indore	d. New-D	e. Hond.	f. Salvad.	g. El Cant.	h. Calarca	i. Turkey	j. Khalili
Housing form	1. Flexible use of enclosed and open spaces	Y	Y	Y	Y	N	N	Y	Y	N	N
	2. Combination of one, two and thee storey units	Y	Y	Y	Y	N	N	N	N	N	N
	3. Priority to interior comfort and quality of the interior spaces with limited interior subdivisions	Y	Y	Y	Y	N	N	N	N	Y	Y
Housing evolution	4. Unclear distinction between original core and later additions/modifications	Y	Y	Y	Y	N	N	N	N	N	N
	5. Unclear distinction between temporary units and permanent houses. Progressive approach with quick first construction and no clear end.	Y	Y	Y	Y	N	N	N	N	N	Y
Aesthetic principles	6. No uniformity in façade. Variety of textures and colours	Y	Y	Y	na	N	N	N	N	N	N
	7. Great variety between housing units	Y	Y	Y	Y	N	N	N	N	N	Y
Materials	8. Intensive use of recycled materials and components	Y	Y	Y	na	N	N	N	N	N	N
	9. Combination of different materials and technologies. Progression from 'light' to solid technologies.	Y	Y	Y	Y	N	N	N	N	N	N
Function/ty	10. Variety of functions and uses. Mixture of residence and income-generation activities	Y	Y	Y	Y	N	N	N	N	N	Y
	11. Strong emphasis on safety from theft and robbery. Delimitation of the land and fencing is a priority	Y	Y	na	na	N	N	N	N	N	na
Settle-ment layout	12. Variety of open spaces	Y	Y	Y	na	N	na	N	N	N	na
	13. Hierarchy of streets and paths	Y	Y	Y	na	N	N	Y	N	N	na
	14. Variety of plot sizes and forms	Y	Y	Y	Y	N	N	N	N	N	na

Table 1. Occurrence of patterns in the settlements studied

Conclusions

1. Despite contextual differences, various common patterns can be identified among spontaneous housing solutions and also, but differently, among post-disaster reconstruction projects. This might be surprising if one considers that housing is largely affected by contextual characteristics. However, it also confirms the notion that despite the fact that no two final products are equal, a number of restraining process variables exists in the informal housing process.

2. The (formal) post-disaster reconstruction projects studied do not follow the same priorities and patterns found in the spontaneous settlements used for the study. This means that the hypothesis proposed is true. Even though this does not permit one to argue that the projects do not respond to the priorities of their local beneficiaries, it raises the question about the sensitivity of the projects towards common solutions used in the informal sector to produce affordable shelter for the poor.
3. Housing construction in the informal sector does not follow the traditional definition of a project in the formal sector (an enterprise developed within a clear beginning and a clear end). In the case of illegal occupation of land, the building appears rather suddenly and is only finished over long periods of time so that the "project" does not really have a clear end.
4. One of the main differences between spontaneous (informal) construction and professionally-designed (formal) projects is the strategies used for reducing costs and increase affordability. The formal reconstruction sector emphasizes standardization and uniformity in materials, forms, sizes, technologies and layouts (at both the level of the house and the lot). On the other hand, spontaneous settlements demonstrate that the informal sector relies on, and takes full advantage of: (i) recycling of used components; (ii) progressive construction; (iii) variety of house sizes and forms, (iv) variety of plot sizes and forms, according to different economic possibilities of each household; and (iv) combination of residential use with income-generation activities.
5. The use of recycled materials, the use of light technologies (timber, corrugated metal sheets, etc) and the acceptance of housing *evolution* contribute to the speed of construction of spontaneous settlements. Many of these aspects are often neglected in formal post-disaster projects, suggesting that it might be prudent to start "learning from the poor".

Patterns in spontaneous housing	**Patterns in post-disaster projects**
1. Flexible use of enclosed and open spaces	1. Box effect: clear distinction between indoors and outdoors
2. Combination of one, two and thee storey units	2. Exclusivity of one-storey units
3. Priority to interior comfort and quality of the interior spaces with limited interior subdivisions	3. Subdivided layouts and clear subdivisions of spaces
4. Unclear distinction between original core and later additions/modifications	4. Lack of coordination between original core and later additions or modifications
5. Unclear distinction between temporary units and permanent houses. Progressive approach with quick first construction and no clear end.	5. Clear distinction between temporary units and permanent houses. 2 or 3-step approach, Project with clear end.
6. No uniformity in façade. Variety of textures and colours	6. Great attention to façade uniformity, finishes and colours
7. Great variety between housing units	7. Uniformity and standardization between housing units
8. Intensive use of recycled materials and components	8. Little use of recycled materials and components
9. Combination of different materials and technologies. Progression from 'light' to solid technologies.	9. Uniformity in the use of materials and technologies
10. Variety of functions and uses. Mixture of residence and income-generation activities	10. Clear distinction of uses. Oriented towards residential use

11. Strong emphasis on safety from theft and robbery. Delimitation of the land and fencing is a priority.	11. Strong emphasis on structural safety. Delimitation of land and fencing is not a priority
12. Variety of open spaces	12. Uniformity in open spaces
13. Hierarchy of streets and paths	13. Homogeneity in streets and paths
14. Variety of plot sizes and forms	14. Uniformity of plot sizes and forms

Table 2. Comparison of the patterns found in spontaneous housing and in post-disaster (formal) projects.

References

Bhatt Vikram and Witold Rybczynski (1999). "How the other half builds" in *Time-saver standards: Site construction details manual*. Ed. Nicholas T. Dines & Kyle D. Brown. Montreal : McGraw-Hill.

Davidson et al. (2005). "Truths and myths about community participation in post-disaster housing projects". *Habitat International*. To be published in 2005. Dines and Brown (1999). *Time-saver standards: Site construction details manual*. Montreal : McGraw-Hill.

Ferguson, Bruce and Jesus Navarrete (2003). "A financial framework for reducing slums: Lessons from experience in Latin America", *Environment & Urbanization.* Vol 15, No. 2.

Johnson, Cassidy, Gonzalo Lizarralde and Colin Davidson (2005). "Reconstruction in developing countries: A case of meta procurement". CIB Proceedings W92, T23, W107 Conference in 2005. Las Vegas: CIB.

Keivani, Ramin and Edmundo Werna (2001). "Refocusing the housing debate in developing countries from a pluralist perspective". *Habitat International*. Vol 25.

Lizarralde, Gonzalo (2004). *Organisational design and performance of post-disaster reconstruction projects in developing countries*. Unpublished thesis. Université de Montréal.

Lizarralde, Gonzalo and Marie-France Boucher (2004). "Learning from post-disaster reconstruction for pre-disaster planning". *Post-disaster reconstruction: Planning for reconstruction.* Andrew Fox. Ed. i-Rec 2004 Proceedings. Coventry: Coventry University.

Stevenson, Seth (2004) "Ces architectes qui inventent des abris de refugiés". *Courrier International.* Oct-Dec, 2004. (Section Maisons, writtenby Seth Stevenson from extracts of The New York Times).

Turner, John F.C. (1972). "Housing as a verb." *Freedom to Build*. Eds. John F.C. Turner and Robert Fichter. New York: Macmillan. 148-175

Yin, Robert (1984). Case study research: Design and methods. London: Sage Publications.

GIMME SHELTER: TSUNAMI MITIGATION AS PART OF A PERMANENT SHELTER PROGRAM FOR ACEH, NORTH SUMATRA.

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Abstract

The resulting housing solutions developed for permanent shelter as part of aid packages and reconstruction often belie the complexity of their resolution. This paper briefly outlines the often hidden subtleties in such designs and in particular the complexity that "mitigation" can require. Mitigation is the accepted "notion" that any reconstruction should address former issues by reducing those perceived problems and issues. The hope is that they can be completed eliminated so that the disaster does not happen again. This may not always be achievable. The development of a permanent shelter reconstruction program for the United Nations High Commissioner for Refugees (UNHCR) for tsunami victims on the west Coast of Aceh, North Sumatra is documented. And in this program the obvious mitigation need was for "tsunami proofing" of housing. Drawing on the tsunami report by Wilkinson, the paper highlights the process, design and planning considered as part of this mitigation and the practicalities of "balancing" the wishes of people to return home to sites ravaged by the tsunami against the responsibility to ensure "safe" housing (Wilkinson, 2005). The starkness of the engineering "numbers" against the social costs is compelling and the paper highlights in practical terms the difficulties sometimes faced to reduce and thus "mitigate".

Keywords: tsunami, permanent shelter, safety, mitigation.

Development of a Permanent Shelter Strategy

The development of any shelter program requires answers to three main questions:

- "What" do we build?
- "Where" do we build?
- "Whom" do we build for?

The first question of what to build was addressed by a spatial survey of low cost housing in Banda Aceh (USAID 1996).

A Spatial Survey of Low Cost Housing in Bandar Aceh

The need to recognise local standards and norms into any proposed house design was understood by all the NGO's and UN Agencies involved in permanent shelter in Aceh (Fox 2004). However, there was not full agreement on how that should be achieved. Our approach was to initiate a spatial survey of low cost housing complexes in Bandar Aceh. The aim was to ensure that whatever the house design the size and scale of the house was comparable (and preferably slightly less) than existing low cost houses. Otherwise, provision of "better" housing to tsunami victims could generate long term jealousies within the community. On the other hand it is debatable that the provision of a "mortgage" free house (when those living in Gov-

Post-Disaster Reconstruction : Meeting Stakeholder Interests : Proceedings of a conference held at the Scuola di Sanità Militare, Florence, Italy 17-19 May 2006, edited by David Alexander, Colin Henry Davidson, Andrew Fox, Cassidy Johnson, Gonzalo Lizzaralde, ISBN 978-88-8453-611-2 (online), ISBN 978-88-8453-612-9 (print), © Firenze university press, 2007

ernment low cost houses were often paying it off over 20 years) would not generate such jealousies nonetheless? This dilemma could never be resolved short of not helping those in need. And consequently, the integrated programs (housing together with schools, roads, water sources, mosques, health clinics etc) had to be managed so that existing communities also felt that they were "benefiting". This was never going to be simple.

Over 30 such housing complexes were reviewed and it was noted that an Acehnese house had the following four main "zones" with the following typical dimensions and areas:-

- Porch area 4.00 sq. m and average dimensions of 2.61m by 1.43m.
- Living/ lounge area 14.26 sq. m and average dimensions of 4.68m by 3.03m.
- Kitchen 10.09 sq. m with average dimensions of 3.78 by 2.54 metres
- Toilet/bathing area 4.31 sq. m with average dimensions of 2.28 by 1.84 metres.

Figure 1. Low cost houses for hospital, police and government workers.

Low cost houses typically had two bedrooms. But the inclusion of separate bedrooms into the UNHCR proposed house was abandoned in favour of one common living area or lounge area. Families would initially live in the living/ lounge area and subsequently extend the house to suit their requirements. This subtle but important design aspect was not well understood but can be understood when one considers the family demographics. For example, if the family consisted of one set of parents and children of the same gender then a two bedroom house would "fit". However, if the children were of different genders or if there were grand parents staying in the house as well then a two bedroom house would not be sufficient. Who would "sleep on the couch?" Moreover, the "two bedroom house" design did not lend itself to modification. Thus, for the latter family not only would someone be sleeping on the couch but the family would be helpless to easily alter the house to better accommodate the family. Such a situation is unsustainable from several points of view and hence the development of the core house concept.

The size of the core house would vary by changing the length of the lounge area (while holding the width of the house) for different family sizes as follows: Family size up to 4 people 3.2 metres length of lounge area 5-7 people 4.8 metres length of lounge area 8-9 people 6.4 metres length of lounge area 10+ people Special design.

It is interesting that the above dimensions were based on the logistical requirements for the corrugated iron. In Indonesia the thickest corrugated iron sheet is 0.4 mm thick (compared to the thinnest section of 0.55 mm used in New Zealand). When stacked sheet lengths longer than 1.8 metres can not be lifted with a fork truck without buckling and consequently this is the maximum sheet length. Allowing for roof angle and sheet over lap results in a working plan dimension of 1.6 metres and hence the above room sizes. Failure to recognise this would result in excessive (and unnecessary) wastage.

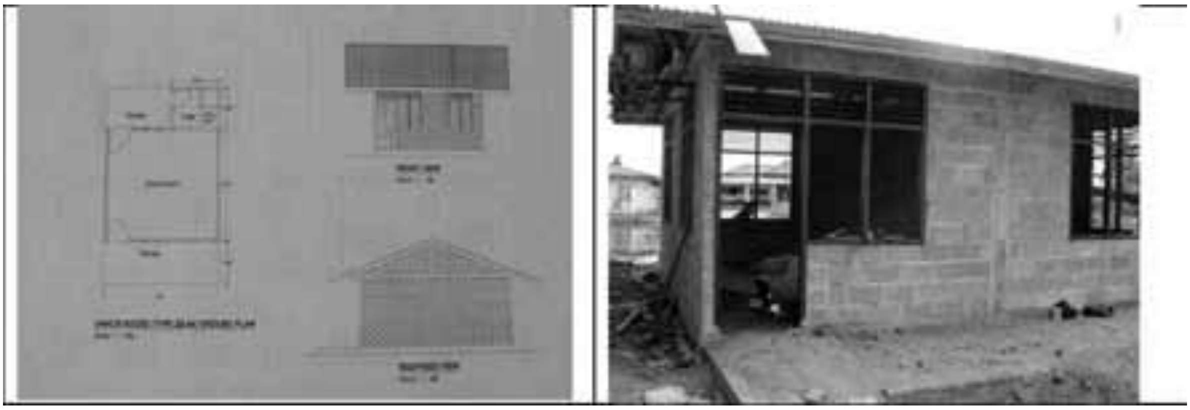

Figure 2. The UNHCR permanent shelter house or "core" house .

An Acehnese house (much like many South East Asian communities) actually has two kitchens. One is a "dry" kitchen and the other is a "wet" kitchen. Unlike many "western" households where food such as chicken arrives frozen ready for storage and later cooking. In an Acehnese household the food arrives "alive" and for example chickens would need to be killed, plucked and cooked. All this would be completed in the "wet" kitchen with the cooking of rice and eating meals being done in the "dry" kitchen. The "core" house only provided the "wet" kitchen which was also the case in many modern low cost housing complexes reviewed.

From this work evolved the UNHCR "core" house drawn and photographed in figure 2 above.

Harmonised Permanent House Design for UN Agencies and NGOs

An agreement was also reached between the UN Agencies and NGO's in Aceh involved in permanent shelter regarding house specifications. This agreement was intended to eliminate (or at least minimise) any significant differences between the housing aid programs offered by the different agencies. The following was agreed:-

- Houses would have concrete floor
- Houses would have a corrugated iron roof
- The house cladding material was left up to each Agency.

The final decision of the cladding material was left to each Agency in developing their permanent shelter program. At the time it was felt that specification of the cladding would result in a "monotone" housing landscape. Moreover, there were several competing values associated with the selection of the cladding material and together with a lack of site resource information made any such selection premature. These competing values made any selection complex and the selection of the cladding material for the UNHCR house is discussed in more detail later in this paper. That aside, this agreement was a major achievement and one that was particularly appreciated by those NGO's with large programs.

The Selection Of The House Cladding Material

Three locally used cladding materials were identified namely:-

- Timber
- Concrete Block with grouted infill
- Brick with a concrete frame.

Examples of these (taken from the Spatial Survey) are shown in figure 3 below. Other options such as styrene foam boards, rice board, bamboo and rammed earth were not considered as it was felt that the use of non local materials could be easily rejected by beneficiaries despite any "technical" advantages.

However, such options were not discarded completely but because of the complexity of the issues involved it was felt that further complication with a new material would not be advisable. Consequently, only these three options were studied.

Figure 3. Local cladding options for low cost permanent housing in Aceh.

The complexity of what is apparently a straight forward issue can be gauged from table 1 below. Many do not understand the "balancing" process involved in selecting cladding nor the process and design of shelter let alone permanent shelter. Nonetheless, this has to be done and initially because of cost it was felt that the cladding selection tended towards timber but with the proviso that availability be confirmed at each location. This was countered by the need to complete a sustainability evaluation and the need to ensure that a sustainable harvesting scheme was adopted. There was a concern with the perceived quality of timber over the other two hard surface materials. This was confirmed both by UNHCR's spatial survey of low cost housing in Bandar Aceh and by national construction figures obtained from BPS (Indonesian Government Statistics Department) that 95% and 94% of houses had hard surfaces. This was countered by the traditional wooden house (more common in rural areas) and the feeling amongst UNHCR national staff in Bandar Aceh that if you did not have a house than any house was a better option. Thus, in the initial stages timber appeared to have potential advantages over the other two options.

This was followed by intense concerns based in part around the East Timor Shelter program experience that the selection of the cladding (and the complete permanent shelter solution) was largely a question of logistics and procurement (UNHCR, 2001). The impact of at least the logistic issue can be seen in the number of 40 kg bags of cement that are required for each of the housing types. A timber house requires 25 bags while a concrete block house requires 100 bags (4 times that of the timber house) and a brick house requires 150 bags (6 times that of the timber house option). Given that corrugated iron and cement would be the two "bulky" and heavy items to be potentially transported to site underlines the impact of the above figures. On the face of it this would appear to also favour timber but the difficulty of grading, quality control and procurement meant that timber also had a down side.

Issue	Timber	Concrete Block	Brick with a Concrete Frame
Cost1	19,000,000 Rph	22,000,000 Rph	26,000,000 Rph.
Cement Usage2	25 bags each 40 kg	100 bags each 40 kg (not including cement in concrete blocks).	150 bags each 40 kg
Building Expertise	low	high	High

Quality Perception	Lower quality material	Higher quality material. 94% of buildings have "solid" walls.	Higher quality material. 94% of buildings have "solid" walls.
Material Life	2-5 years	30+ years	30+ years
Specification Issues	Highest. Previous experience suggests issues of grading, source, durability and problems with	Medium. Skilled trades people required for concrete and block laying	Medium. Skilled trades people required for concrete and brick laying
Capacity Building	Good	Better	Better
Seismic Design	Light seismic loads and better seismic performance	Heavy seismic loads and the need for specific seismic design and detailing to achieve acceptable seismic performance.	Heavy seismic loads and the need for specific seismic design and detailing to achieve acceptable seismic performance.
Construction time	1.-2 weeks	4 weeks	4 weeks
Sustainability Issues	Deforestation and potential erosion	Embodied energy and source of materials	Embodied energy and source of materials
Thermal Properties	Fast to heat and cool	Slow to heat but slow to cool	Slow to heat but slow to cool
Material resources at site	Timber is anticipated as being available in Lhoong and Lamno areas. Confirmed availability in Calang/Krueng Sabe but is not expected to be readily available further south in Teunom	Sand, aggregates and stone are available in Calang/Krueng Sabe and are anticipated to be available in Lhoong and Lamno but is not expected to be readily available further south in Teunom	Suitable clay materials for bricks could be expected between Lhoong and Calang/Krueng Sabe but is not expected to be readily available further south in Teunom.
Tsunami debris generation.	high	low	Low

Notes:

1. *Based on Bandar Aceh prices (March 2005) with no ceiling or painting and no plastering of the concrete block and brick options.*
2. *This does not include the cement required for the concrete block production.*

Table 1. Competing issues for different house cladding options.

Those with experience from earlier shelter programs both in Indonesia and Sri Lanka were strongly suggesting the use of light gauge steel sections and the use of hard surface materials.

Work by UNHCR's Tsunami/Coastal Protection expert pointed to the need for the reduction of debri and that timber houses within any potential tsunami zone (within 3.5 kilometres of the shore line) should be restricted or preferably eliminated (Wilkinson, 2005). The presence of timber not only doubles the tsunami loads on other buildings (by increasing the "density" of the water flow) but also creates "projectiles" within the tsunami itself that increases any death toll.

From this apparent melting pot developed the view that the paramount issues for the cladding selection were the following:-

- The quality of the material
- The durability of the material
- The perception of timber being an inferior material.

And despite logistical and cost disadvantages the house cladding material should be concrete block.

The selection of concrete block over brick was made not only because of cost (though this appears to be significant itself) but because of concerns relating to structural integrity, thermal comfort, weathering and constructability. In all these areas concrete block has advantages (though at times marginally so) over brick but taken overall these constitute a definitive preference.

Tsumani Proofing

It was accepted by the humanitarian community that the issue of tsunami design should be addressed and that new houses should be have better "tsunami proofing" where previously there was none (Molin-Valdes 2003). The first suggestion by central Government was to build houses outside a "green zone" of 3 kilometres from the shore line. This was decisively rejected by the local authorities in Aceh. Moreover, victims had already started moving back to their original house sites and had started erecting temporary shelters. Thus aid agencies were faced with the dilemma of assisting victims to rebuild in areas that were clearly tsunami risks. And it was anticipated that a smaller tsunami wave than the 10+ metre event that occurred on December 26 2004 would be sufficient for design. The assumption was that the December event was "rare".

However, expert advice was that this event was not rare and had a return period of once every 100 years (Wilkinson, 2005). It was in effect the engineering design event. Moreover, the Wilkinson report also stated that in the next 30-40 years that the return period of a tsunami in the area was of the order of 1 in 35 years. To make matters worse, the report also concluded that an early warning system would not work for the habitants along the west coast of Sumatra (including Banda Aceh) and thus other options had to be investigated. These options were as follows:-

- Safe haven (natural)
- Safe havens (constructed)
- Moving people away from the coast

Though there was a 15-20 minute time lapse after the earthquake before the tsunami came a shore, 10 minutes of that time was taken up by severe ground shaking. People could not move. Consequently, the "evacuation" time was as little as 10 minutes and based on this it was estimated that any safe havens would have to be no further than 250 metres away from houses. Unfortunately for most (if not all of the west coast area) this meant that there were minimal natural safe havens such as hills. And those safe havens would need to be constructed. Moulds were quickly deleted from any further considerations. Besides being 10+ metres in height to match the tsunami they also had to be another 15 metres to protect against the tsunami run up. Cost and space simply made such an option impractical. Steel frames were also considered but again would be required at 500 metres spacing in village areas and would have to be designed for the full tsunami loads which would have been in the order of 50-100 times the required code seismic loads. Housing budgets would be taken up quickly by such structures.

And there remained the issue of early warning. Certainly one could evacuate at every earthquake but not every earthquake will result in a tsunami.

Thus, the conclusion was that people would have to shift to higher ground. And this was the position of the Wilkinson report.

Unfortunately, in almost all the areas along the west coast the Indonesian Government and Local Government confirmed that there was no land to move tsunami victims to. And more over people did not want to move away from their original sites and their associated (but diminished) communities. Thus, at least in the immediate future moving was in most (if not all) cases not possible. (And moreover, would quickly out price itself if land purchases were to go ahead).

Thus the conclusion for many of the tsunami victims was that they would suffer a similar event potentially within the next 40 years. And the consequent dilemma for aid agencies was should they assist by building new homes back on tsunami risk sites?

It was clear that mitigation against the tsunami, despite good intentions was not feasible. And as noted by Quarantelli people in such situations faced by a "… lack of data and inadequate preparedness of citizens has led residents to respond in the only way they thought they could save themselves – prayer. In a survey of two coastal communities in Bangladesh struck by a cyclone, it was found that "praying to Allah" was undertaken by 73 percent of residents in one village and 90 percent in another. In both localities, it was the most frequent precautionary measure taken" (Quarantelli 2002).

Conclusion

This shelter program (and others) has been described as constructing thousands of "garages". And while on the face of it this is correct such a comparison belies the complexity of such shelter programs, a complexity that required both spatial surveys and detailed analysis for the cladding selection. Moreover, when this is combined with the need to "mitigate" further highlights the complexity of such an apparently "simple garage". And what about building houses back in tsunami risk areas? The decision to put Indonesia nationals back into risky situations is one that no agency should make and the decision must rest with Indonesian Government (or its representative). Shelter programs are complex and sometimes the option to mitigate is not possible. This is disturbing.

References

Fox, A. (2004) Planning for Improved Resilience I-Rec Conference 2004, Coventry. http://www.corporate.coventry.ac.uk/content/1/c6/01/02/90/PLANNING%20FOR%20IMPROVED%20RESILIENCE.pdf

Molin-Valdes. H. (2003) Living with Risk, A Global Review of Disaster Reduction Initiatives Proceedings of the Parallel Event on Reconstruction and Recovery Following Conflict and Natural Disaster, During the 19th session of the Governing Council, 7 May 2003 Nairobi, Kenya pg 21-31.

Quarantelli. E.L. (2002) Urban Vulnerability to Disasters in Developing Countries: Managing Risks in The Future of Disaster Risk: Building Safer Cities: Conference Papers, ed. by Alcira Kreimer, Margaret Arnold and Anne Carlin, Washington, D.C, The World Bank, 2002 pg 237-262.

United Nations High Commissioner for Refugees UNHCR (2001) Shelter Rehabilitation Programme: Final Report. Liaison Office Dili East Timor Oct 2001 UNHCR Geneva pp 8-13.

USAID (1996) Performance Monitoring and Evaluation Conducting a Participatory Evaluation USAID Center for Development Information and Evaluation 1996 no. 1.

Wilkinson T (2005) Report On Coastal Design And Tsunami Mitigation For Shelter House Reconstruction Along West Coast Aceh Province pub. UNHCR.

PROTECTING CHILDREN IN POST DISASTER PLANNING

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Abstract

Disasters affect children as much as they affect the adult population. Children's increased vulnerability in the post-disaster situation and the need to protect them is yet to be included as a major part of longer term post disaster planning. The objectives of the research are 1) to examine programmes started in the wake of disasters in 2004/2005 for their strengths in the protection of children and 2) to make proposals for increasing protection of children in post disaster planning. The methodology is a mix of project visits, participatory research with children, and staff/ community interviews. The results of this research suggest ways for allocating safe and child friendly spaces for children, explaining natural disaster to children and involving children in site planning and design. The impact of the research will be to increase the profile of children's protection in post- disaster planning.

Keywords: children; protection; disaster; tsunami; earthquake.

Children as Stakeholders

Convention on the Rights of the Child. The Convention on the Rights of the Child guides work in almost all countries in the world. It is the world's most widely ratified convention or treaty, with all but Somalia and the US having ratified it.

Its key principles of protection, survival, development, participation, decisions being taken in the best interests of children, and non-discrimination. The rights are non-hierarchical and inderogable (one cannot be taken without the others).

Applied to post disaster planning, children have a right to survival after the disaster, to be protected from harm (including exploitation and abuse), to develop as normally as possible, to participate in decisions which affect them, to have things decided in their best interests rather than the interests of those taking decisions, and that children themselves, or one particular group of children (e.g. minority ethnic, children with disabilities) should not be discriminated against. Children's rights models look at the two aspects of rights:

- rights holders (the children)
- duty bearers (those with the duty to implement children's rights)

In post disaster planning, as in other situations, there are a number of duty bearers (Figure 1).

This paper looks at the key risks for children after a disaster, and actions which can be taken by different duty bearers in post disaster planning to improve the protection of children, and therefore their survival, development, and participation.

Post-Disaster Reconstruction : Meeting Stakeholder Interests : Proceedings of a conference held at the Scuola di Sanità Militare, Florence, Italy 17-19 May 2006, edited by David Alexander, Colin Henry Davidson, Andrew Fox, Cassidy Johnson, Gonzalo Lizzaralde, ISBN 978-88-8453-611-2 (online), ISBN 978-88-8453-612-9 (print), © Firenze university press, 2007

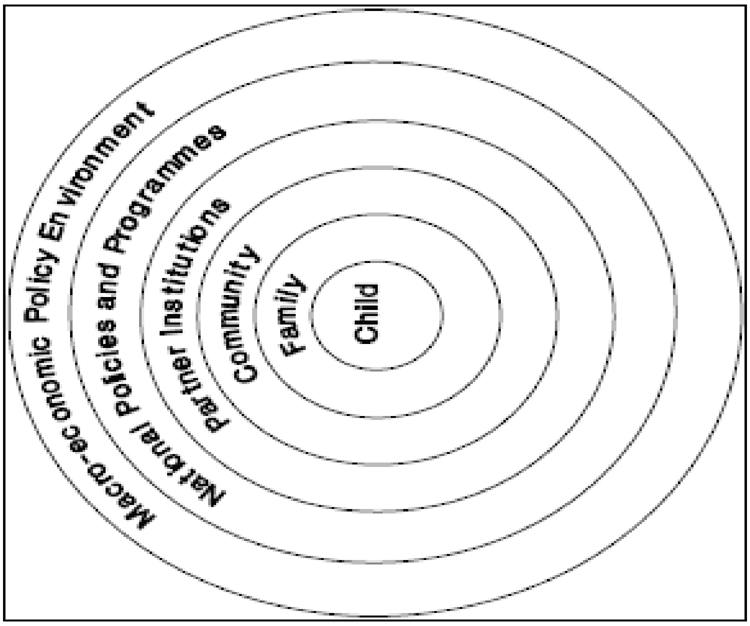

Figure 1. Duty bearers.

Key Risks for Children After a Disaster

Health risks. Disasters present big risks for community health, and above all for children. The destruction of health care facilities, the break in cold storage chains for vaccines, death/ injury of health care workers,[1] loss of medical and vaccination records, are risks along with the increase in communicable diseases, especially ARI and diarrhoea, experienced after major disasters.

Lack of opportunities for constructive use of leisure time. A disaster can reduce children's access to youth clubs, playgrounds, organised activities, and other positive uses of leisure time. This can mean more opportunity to play in damaged / collapsing buildings, near heavy lifting machinery, and in construction sites

Environmental risks. Damaged buildings, destruction of water supply systems, breakdown in rubbish (garbage) collection, lack of toilets/ latrines, inappropriate aid, can all be risks to children's safety.

Family stress. Families may be exposed to more stress as a result of losing property, death of relatives and friends, having to live in a very small space, worrying about when the next food delivery will be, concerned for their safety. All this can impact on children's psychosocial well being.

School drop out. After a disaster, even if schools are still accessible, children may stop attending for a variety of reasons.[2] In Sri Lanka, children did not want to go back after the tsunami because they did not have uniform, and before the tsunami they knew they would be beaten if they attended without uniform. Children may drop out to earn money, or to stay at home to look after younger or older relatives so that other family members can earn money.

[1] For examples see p 12, The public health response to the tsunami, Carballo and Heal, FMR. July 2005.

[2] For example, see http://www.unisdr.org/eng/mdgs-drr/dfid.htm

Figure 2. Collapsed buildings can become ideal playgrounds for adventurous children .

Child labour. Reduced family income, the opportunity to work in construction projects, the need for girls to stay at home and care for younger/ older relatives and other factors can contribute to an increase in child labour after a disaster.

Separation from parents and carers. Separation can occur because a disaster happens during the day when children are at school or with friends or carrying out chores and parents at work. After the disaster, one group cannot find the other. For the youngest children who do not know their names or details, family tracing may be particularly difficult. Forced separation occurs when families are separated for example because one member has to go to hospital, or in a different situation when people are being transferred from one location to another and family groups are separated.

Abuse/ exploitation in the community or by aid workers. Abuse and exploitation exists in all communities and it does not cease because of a disaster. The influx of strangers into a community may include those with bad intentions as well as good.[3]

Recruitment to the fighting forces. In areas where children under 18 are recruited to armed groups or fighting forces (government or militia), increased recruitment is a risk after a disaster because schools and other activities which occupied children in the day (and kept them safe) have been destroyed. The impact of a disaster on family incomes may also lead to pressure on young people to join armed groups.

Trafficking. After a disaster, children are particularly vulnerable to trafficking for a number of reasons: their family incomes may be reduced; there may be more strangers in the community; promises of education and material support may be alluring when everything has been lost.[4]

Inappropriate placement in orphanages/ institutions. After a disaster there is often a rush to take children whose parent(s) has (have) died out of their communities and to place them in institutions/ orphanages. Research has shown that no institution can provide the same attention that a consistent carer in a family based situation can.[5] Taking children out of their home communities, extended family and away from their friends at a time of crisis is not usually in their best interests.

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[3] See www.savethechildren.org.uk/**scuk**_cache/**scuk**/cache/cmsattach/1550_**unhcrscuk**_wafrica_report.pdf

[4] http://www.basiced.org/factsheet.html

[5] David Tolfree (1995) *Roofs and Roots: The care of separated children in the developing world*, London, Save the Children UK.

Figure 3. Inappropriate aid in Pakistan (October 2005) collected in the streets and became an environmental hazard.

Figure 4. Children in Bam, Iran, play on a homemade see-saw (following the earthquake of December 2004). Obvious nearby hazards are the pile of bricks in the background, the collapsing house, and the metal frame in the trees.

Early marriage. In some societies, early marriage can be an increased risk after a disaster. This was seen in some tsunami affected cultures, especially where benefits were given to separate households and there was an incentive to subdivide households to smaller units to receive more benefits.[6]

Actions to Protect Children After a Disaster

Assessment of the situation. A clear assessment focusing on the specific risks and threats for children after a disaster needs to take place as soon as possible. This would include the number of children who have been separated from their parents, the number of children who are without adult caregivers, how many children were injured or killed in the location, the number of children without access to water, shel-

[6] Field reports, Sri Lanka February 2005

ter, food, health care and education. Too often assessments simply count the number of children and do not look at specific concerns such as the number with disabilities, minority groups or particular issues faced by girls including threats of assault.

Ensuring that communities, aid workers, local volunteers, military, rescue teams, medical staff are aware of threats and risks to children, both preexisting and new. If these groups are not aware of the issues, they may contribute to exposing children to risk. For example children may be moved from one place to another without their parents, and with no identification, so that once in the new location, no-one knows who they are. If local volunteers are not aware that traffickers may prey on vulnerable children, they may not tell children to be careful about going away with strangers.

Ensure right to survival is protected--food, shelter, water for families. The immediate life threatening issues faced by children have to be mitigated, and then the right to survival met through provision of food, water, sanitation, and shelter targeting all children including those with disabilities or from other vulnerable groups.

Provision of safe places for children to gather and play after disasters. As soon as possible after a disaster, when immediate survival needs have been met, children's development needs can be addressed. It is important to try to provide a safe place for the children of the community to gather, to play, to meet old friends and make new friends (particularly where some children have died and some have been displaced to other locations). Education is likely to be disrupted and so children who formerly went to school may not have that opportunity for some time. Therefore in the day, they need safe places to go, and activities to participate in.

World Vision, along with other major aid agencies, advocates for the provision of child friendly spaces (CFS) after a disaster. CFS are places which are physically safe-from collapsing buildings, falling masonry, floods, and which are designated for children. Often a tent or other building is erected. The community, along with aid agency staff, work with the children to design and implement activities such as sports, art and craft, reading, and of course play. Where possible a playground is put up near the site. However this is often difficult in the early weeks when site allocation is still fluid. There are a number of variations on the programme design. Some CFS focus on child to child health promotion, others can be sports focused, or arts focused. The models tend to evolve locally dependent on interests, talents and adult support.

The standards which should be expected include:-

- an area where children feel safe
- provision for girls and boys
- provision for children with disabilities to be included
- open for activities at regular times
- liaison with other providers of services

Figure 5. A child-friendly space.

But the community must be involved in design of facilities: for example in Sri Lanka, one of the child friendly spaces' playgrounds was adult dominated because adults had nowhere to gather and talk. Also adults like sitting on swings as much as children. So community participation in design, and in awareness of need for all groups to have public spaces to gather, is essential. In communities where there is very little for children, it's also important to check the amount of equipment which should be supplied.

The CFS model provides an entry point to working with communities. Other activities can use the CFS as a starting point- for example public health information dissemination on handwashing or promotion of breast feeding. The CFS are usually staffed by members of the community. They receive training in working with children in a participatory way (as needed) and on how to deal with the issues children may be facing as a result of the disaster.

Providing time and a place where children can learn about what happened in a disaster is also important, as well as learning about how to deal with the impact. Immediately after the tsunami, many children were scared that another tsunami would come. Picture boards and discussions were used to help children understand that tsunamis are very rare. Following the earthquake in Pakistan, CFS are being used to teach children basic health and hygiene such as washing their hands after using latrines, and how to avoid hypothermia.

Because staff in the CFS know the children with whom they work, they are able to identify children who are struggling or in difficulty, and to refer them to social workers or to appropriate agencies. For example, a child in Pakistan was referred to a special fund for assisting earthquake victims when staff found out his parents couldn't afford the transport to hospital in Islamabad for follow up appointments. This sort of assistance is only leveraged by knowing the communites.

The community relationships built up through this type of programme post disaster provide a mechanism for consulting the whole community, including the children. Parents' meetings are held regularly in CFS programmes, and they can be used to consult parents on siting of new homes, whether they are receiving appropriate aid, or what their vision of a new community is.

On the surface, a CFS may seem to be a basic type of kindergarten or youth centre, but underneath, there is probably much more going on.

Figure 6. In Hambantota, Sri Lanka, the roundabout got overused!

Involving Children as Stakeholders: Difference Techniques to Take Children's Views Into Account

Creating Better Cities with Children and Youth[7] is a manual which provides many useful examples of how children's participation in community design and implementation can improve their lives. Although not specifically aimed at the post disaster situation, the techniques described therein are applicable in post disaster reconstruction.

The key techniques which can be used are:-

- Interviews (structured and unstructured) with children, but also with parents, officials and other adults in order to explore their views about children's lives.
- Focus group discussions allow a group of children to give their views. Those running the sessions (whether adults or children) need training and skills in group management. Care has to be taken not to allow any one person to dominate.
- Mapping allows children the opportunity to draw their current community, to indicate where they spend time, and to show which places are viewed as safe and which places are viewed as not safe.
- Drawings with explanations provide children with a tool to express their views of an area at present, their views of how it should be in the future, and their favourite types of place or activity.
- Where time and conditions allow, photography or art projects where children take photos of or draw their current environment and then report on the changes needed, and what needs to be replicated after the disaster, are often useful.
- Transect walks,[8] where adults and children walk through an area, noting usage, conditions, people, issues in different areas of a community provide an opportunity for planners to understand the issues from a children's perspective.

Principles which should be observed:

- Non-discrimination: ensuring that all groups of children, including girls, minorities, those with disabilities including learning disabilities, children who work, and other hard to reach groups have the right to participate and to give their views. The time that this will take, and the skills necessary to ensure children who want to contribute can. Modifications such as picture forms (for children who can't read), translation to minority languages, changing to an accessible location, may have to be made.
- Participation by choice, rather than by compulsion. No child should be forced to participate. Children should be told what will happen to the information gathered, how it will be used, and what their role is in post disaster planning.

These techniques were used in reconstruction of a school in Aceh. Children had died at the school because a perimeter wall collapsed in the tsunami. The children (and community) wanted some means of keeping the children safe inside the school grounds, marking where the school land was, but yet didn't want another wall because of the tsunami. Discussions led to the construction of a fence which wouldn't hurt anyone if it fell down.

International Standards in Post Disaster Planning Which Impact Children

Sphere standards.[9] The Sphere standards contain the minimum standards which can be expected in disaster response. All the major NGOs and UN agencies have

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[7] David Driskell (2002), *Creating Better Cities with Children and Youth*, London, UNESCO.

[8] For a good description, see http://pcs.aed.org/manuals/cafs/handbook/sessions10-12.pdf

[9] http://www.sphereproject.org/

agreed to implement them. "Children" is a cross cutting issue in the handbook, which covers:-

- Water Supply, Sanitation and Hygiene Promotion
- Food Security, Nutrition and Food Aid
- Shelter, Settlement and Non-Food Items
- Health Services
- *Children:* Special measures must be taken to ensure the protection from harm of all children and their equitable access to basic services. As children often form the larger part of an affected population, it is crucial that their views and experiences are not only elicited during emergency assessments and planning but that they also influence humanitarian service delivery and its monitoring and evaluation. Although vulnerability in certain specificities (e.g. malnutrition, exploitation, abduction and recruitment into fighting forces, sexual violence and lack of opportunity to participate in decision-making) can also apply to the wider population, the most harmful impact is felt by children and young people.

Convention on the Rights of the Child

According to the Convention on the Rights of the Child, a child is considered to be an individual below the age of 18. Depending on cultural and social contexts, however, a child may be defined differently amongst some population groups. It is essential that a thorough analysis of how a client community defines children be undertaken, to ensure that no child or young person is excluded from humanitarian services.

World Vision

World Vision's soon to be published manual on child protection in emergencies[10] also provides guidance on protecting children, and sets guidelines and standards for emergency response. These are based on inter-agency[11] principles.

Experiences in Difference Countries in Protecting Children

Gender. In many countries women do not mix with men, and older girls are separated from boys. Girls in an Islamic area of Sri Lanka were struggling with the heat in their new houses because they had been constructed so that people could see in from the outside. This meant they needed to cover their heads in the house. Had full consultation been carried out on house design, this might have been avoided.

Disability. Pakistan had people with disabilities before the earthquake. The attitude in rural areas towards them wasn't very positive. The creation of a whole new generation of people with disabilities presents challenges in construction, income generation, and above all, societal attitudes. How we reconstruct and take their views into account can contribute to positive change. On the other hand if we don't take their views into account, we can contribute to reinforcing pre-existing prejudices.

Indonesia. After the earthquake in Nias, much reconstruction was needed. Thelocal community was fearful about outsiders coming in to work on construction and harming women. It was agreed that local staff would be used as much as possible to mitigate risks to women and children from men being away from home for a long time.

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[10] Title not finalised yet.

[11] The Inter agency Working Group on Separated Children includes UNICEF, UNHCR, ICRC, IRC, SCF and World Vision.

World Vision has a standard that all contracts must include an agreement by contractors not to exchange sex for aid, not to abuse beneficiaries, and to report any concerns. If they infringe the agreement, their contract is terminated.

Much of the post disaster reconstruction work involves "cash for work" or " food for work" programmes. It is important to note that these can provide benefits for families such as increasing family income for food and education, but also risks, when children are left alone without carers, or children are encouraged to participate in the programmes. Careful monitoring and work with the community is needed to ensure that children do not get exploited or put at risk.

Conclusion

Disasters affect children as much as they affect the adult population – some would argue even more so than adults. Children's increased vulnerability post-disaster to protection issues is yet to be included as a major part of longer term post disaster planning.

Nearly all governments have committed to base their laws on the Convention on the Rights of the Child. Children's rights' models view children as active participants in their own lives in all situations, rather than as passive victims of. This positive view of children, and the contribution they have to making their own lives and communities better, whilst not taking away from adult responsibilities, is important for post disaster planners to note.

This paper offers insight into specific challenges facing children post disaster, what is being done in the field to address these and areas that post disaster planners, as duty bearers need to consider carefully and intentionally in order to address the rights of children.

TRANSFORMING ORGANISATIONS: FROM DEVELOPMENT ORGANISATION TO DISASTER RESPONSE PROGRAMME, A CASE STUDY IN CAPACITY BUILDING

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Abstract

Building capacity in NGOs is a complex but frequently sought strategy for these organisations, due to a desire to increase their impact. In this paper I explore one organisation's experiment with a disaster response programme after the 2004 Tsunami, where they leveraged their existing development programme network, with the intention of scaling up its impact and simultaneously providing an effective post-disaster response programme. While the short-term objective was for an accelerated disaster response, there were many difficulties that hampered this effort, some of which were largely outside the organisations control such as political, cultural, environmental, systemic, and legal issues. In the short-term these organisational strategies are more dissimilar than similar, and timing may actually make them largely incompatible. But longer term there is wider scope to realise the intended benefits. This paper compares two variations to this model, one in India, one in Sri Lanka and evaluates the strengths and weaknesses of the strategy. Finally the paper concludes with recommendations for organisational strategy in the post-disaster environment.

Keywords: organisational strategy; project management; capacity building; post-disaster reconstruction.

Introduction

The Tsunami of 2004 took the lives of over 200,000 people and changed the lives of millions around the Indian Ocean. The international response was unprecedented, with billions of dollars raised, and volunteers, charities and relief and development organisations arriving from around the world to assist the affected areas.

One international non-governmental organisation in this effort has been developing an interesting disaster response (DR) model to deliver post-disaster reconstruction services, in the form of house-building and construction expertise. The model aims to take advantage of existing local resources and relationships from the main development programme which helps low-income households build their own simple, decent, affordable housing. It also aims to benefit from the organisation's experience in building communities. In turn, the normal development programme can benefit from a scaling up on its capacity. This combination is ambitious, as despite the potential mutual benefits, the requirements for the main development programme are fundamentally different to those of a DR programme.

Having trialled the DR model at a small scale after other disasters, the organisation made the strategic move to make its post-tsunami response the first large-scale implementation. However, going large-scale highlighted several of the differences in the programmes, from the change in management and structure, to the dramatic change in the environment factors. The question poses by some critics of the programme is whether the programmes are too divergent in their operations to be compatible, or whether the programmes are synergistic. It will be argued in this paper that the strategy can work, given some modifications, and in the right affiliate.

This paper compares the organisational strategy of the development programme with that of the disaster response, and looks at the two case studies presented by the

Post-Disaster Reconstruction : Meeting Stakeholder Interests : Proceedings of a conference held at the Scuola di Sanità Militare, Florence, Italy 17-19 May 2006, edited by David Alexander, Colin Henry Davidson, Andrew Fox, Cassidy Johnson, Gonzalo Lizzaralde, ISBN 978-88-8453-611-2 (online), ISBN 978-88-8453-612-9 (print), © Firenze university press, 2007

offices implemented in Sri Lanka and India. By comparing variations of the structural models, the strengths and weaknesses of each approach are highlighted. Finally, based on this assessment, a recommendation will be made about modifications to the structure, and its reflection back on the strengths and weaknesses of the organisational strategy itself.

The Organisational Strategy

The development programme. The NGO's normal development programme, to help low-income families build their own dwellings, is predominantly funded by volunteer donations and is a user-led programme, responsive to local demand rather than a driving force for change. The programme also relies on volunteers to construct the houses, both the home-owners themselves and international visitors. This element of the strategy impacts on the nature of the construction. As Lewis notes [Lewis, 2001], complexity in the operational strategy of NGOs is very common.

Capacity building strategy. Edwards & Hulme discuss the ongoing desire for NGOs to increase their impact, and improve the situation of poverty for more people [Edwards & Hulme, 2002]. They define three possible frameworks for this capacity building: expanding existing operations, local advocacy, and advising at government level [Edwards & Hulme, 2002]. A few years ago, the organisation identified an opportunity to expand the existing operations by becoming involved post-disaster. It was recognised that a natural disaster creates an urgent need for larger quantities of similar houses to what is built in the normal programme. It was seen as a natural offshoot of the primary operations to be helping build back after a disaster. And by helping in a disaster, it can also jumpstart a regular programme to help low-income families nearby who were not affected by the disaster but who nevertheless require improved housing.

Hurricane Mitch prompted the organisation's first disaster response efforts. Since then they have been trying to expand the disaster response operations, seeing them as a way to expand into a country after the disaster is no longer a concern.

The disaster response (DR) model is based on the two situations (see Table 1): firstly, if there exists an affiliate in, or relatively near, the location, then the international organisation (that runs the disaster response) can supply the necessary resources and guidance to help the local office to contribute. At its most basic level, the development offices provide the bureaucratic structure for operating in the location in question, such as operating licences and bank accounts.

Alternatively, if there are no existing operations in a country, it provides the opportunity to partner with other NGOs with stronger presence in the location and prepare for longer term development work having had the opportunity to understand the environment and how things operate and to have established some trust. It is variations of the first model that this paper addresses.

DR Model 1	DR Model 2
• Build on existing development program in local/national affiliate	• Use local partners for resources and relationships
• Leverage resources and local relationships	• Bring construction expertise
• Use as a catalyst for upgrading program capacity	• Launch pad for future development programmes

Table 1. Models for Disaster Response Programme

The national affiliates are nearly autonomous organisations, similar to a franchise operation. This promotes the principle that the drive to build must come from the people themselves and in a way that is sustainable to their lifestyle. During the development programme, the international governing office provides a filter and funnel for funding and assists with some systems, primarily for financial control. The power that it holds over the affiliates is thus one of resources.

When the Tsunami hit, the organisation received unprecedented amounts of money from donors in order to assist the reconstruction. Four countries were chosen: Indonesia, India, Thailand and Sri Lanka. Sri Lanka had an exemplary development programme, having built a record number of houses in the 10 years since it was established through a tailor-made programme whereby groups of people work together to save money and take turns building each other's houses. The model has some similarities with the micro-finance group structures such as the Grameen Bank. This, along with the extent of the disaster compared to India and Thailand, led to the strategic decision that Sri Lanka would be the organisation's lead focus for its reconstruction efforts and receive the majority of funding.

The Post-Tsunami Context

The national and international humanitarian response to the Tsunami varied in each of the countries given differences in the area it covered, political context, impact as percentage of economy, culture, existing relationships to the donor nations and access to resources. In the countries of the two programmes I experienced, India and Sri Lanka, they naturally differed in all of the above. One aspect which was highlighted by the geographical spread that actually was similar in the two countries was the fact that even within the countries, there was not one homogenous culture but numerous, with often confusing and contentious, sub-cultures to be dealt with.

In Sri Lanka this is more obvious due to awareness brought by the civil war, but in India it came as a surprise that there was so much variation due to combinations of geography, religion, caste, livelihood and language.

In general the relief and reconstruction efforts in all locations were affected by:-

- Sudden availability of great quantities of money with minimal systems for spending;
- Increased visibility and focus on corruption;
- Wide geographical spread of relief operations making logistics and communications difficult; and
- Competition for resources (both staff and supplies).

Implementation

Model variations. Within what is defined as Model 1, the organisation two variations occurred, one in Sri Lanka and one in India. In the first the programme (Fig. 1) was grafted onto the existing programme with the DR office essentially being but a branch of the main office. The site offices were enhanced upgrades to the existing offices rather than new offices. In the second variation in India (Fig. 2), the disaster response office was set up independently and with completely new staff and new site offices.

Initially comparing the performance of the two models, Model 1 - Variation 1 successfully leveraged existing local relationships to find available land and funding to move projects quickly and get around other political obstacles that hampered foreign players. However, this model suffered from poor project definition and control systems, through a lack of project management capability.

Model 1 – Variation 2 did not have the existing local relations to call upon (although the organisation did have a presence elsewhere nationally). However, it did have more management flexibility (local buy-in to the importance of management) and more appropriately skilled resources. In the short-term this model was hampered by the lack of influence on the ground to secure land and effective partnerships and trust with the end-users. It was also hampered by insufficient experience in managing projects of this scale at ground level.

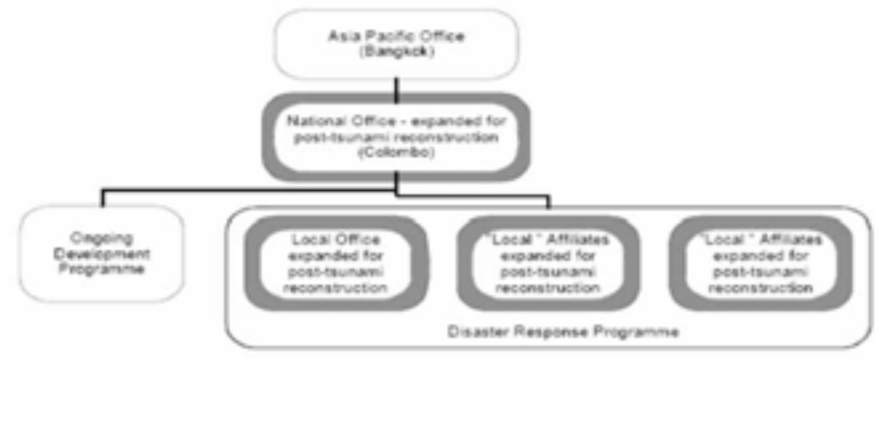

Figure 1. DR Model 1 – Variation 1, Sri Lanka.

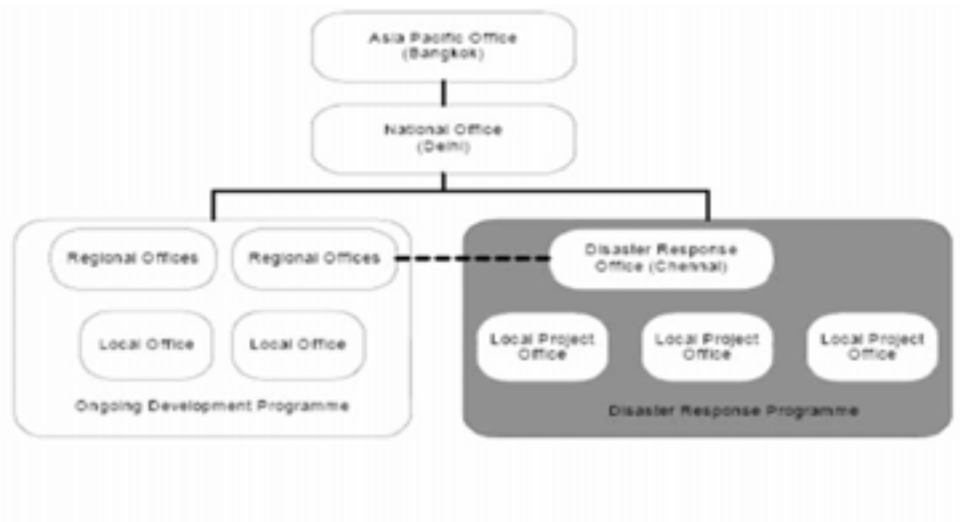

Figure 2. DR Model 1 – Variation 2, India.

Comparing the Development Strategy to the DR Strategy

At first glance the similarities between the programmes, particularly building low-cost houses, would seem like a natural fit for capacity building. However, if we break down the programmes into the components of operation, objective, resources, structure, management and environment, (see Table 2) it becomes easier to define where the challenges developed.

To begin with, the operation and objective of either model looks like it remains the same, with the core being building low-income housing, however the scale and speed dramatically change in the DR programme. To give some perspective as to what that meant on the ground, in Sri Lanka as an example, the national affiliate had had an impressive record of building over 5,000 houses in 10 years. But now they were now asked to build 7,500 houses in 1 year! At best, it requires the organisation to become large-scale project-based, which could be organised and managed over time. Unfortunately however, no time was allowed for the actual change within the organisation.

Again, the organisation may not have realised the changes in requirements for resources. In general, in a major post-disaster such as the 2004 Tsunami, both human and material resources are over-demanded which slows progress and drives up prices. This is more a component of the environment that I describe in more detail later. The internal difference in resources derives from the situation that in the development programme, the construction is very basic and in developing countries very little expertise is required at the scale the programme operates. However, when they must increase the capacity in quantity and speed, more experienced and skilled resources are required to actually manage the projects. We saw even the benefit of the person who is consulting the end-user, not just being experienced in consultation, but also in understanding the construction process so that they could better understand what aspects of the design and construction were open to influence and at what time.

ELEMENTS	DEVELOPMENT	DISASTER RECONSTRUCTION
Operation (task and technology)	Help people build their own single, affordable family units.	Build single, affordable family units – resistant to natural disaster. But 10 times the normal production capacity.
Objective (products)	Communities and homes	10 times more communities and homes
Resources (human and non-human)	Development workers, families/ communities, international volunteers, local tradesmen, local materials. Limited money.	Construction professionals, families/ communities, contractors, international volunteers, materials from wherever they can be sourced. Money may not be as restricted.
Structure (formal & informal)	Grassroots – driven by the communities. Small-scale.	Professional, large-scale.
Management (strategic & operational)	Local.	International funding – direction from far away. Transparent, detailed accountability, speed.
Environment	Organisation selects locations that can support activity in relatively safe, stable environment (no wars). Local politics managed by local resources.	Unsettled due to human tragedy and impact on existing political structures. Unfamiliar international players. Over-demand on resources, both human and non-human. Increased levels of corruption.

Table 2. Comparison of the components of the different programmes

In addition to construction expertise, possibly large-scale, basic project management experience was also essential. For both of these skill-sets, smaller developing countries may not have people with this large-scale time-critical management experience and expats with these skills frequently don't have the experience to understand the environment adequately.

Following from these changes, the structure and management of the organisation is then different because it must grow significantly to accommodate the new people. In the development programme, each office unit is very autonomous, to the extent that the main office rarely has first hand knowledge of what is happening. The international office only checks very high level indicators of each national programme to see if they are on track. However in the DR programme, the international office must become much more directional in terms of providing processes, experienced personnel, controls, and resources. Add to this the growth in staff numbers within the local offices, and the controversial break of autonomy, and one can understand why these changes could be so painful to those on the ground.

Environment

Because the greatest benefit identified in the strategy for the DR programme is the ability to leverage existing relationships, I think it is critical to highlight that this is not effective in the dramatically changed environment, post-disaster. Most importantly, certainly in the first months, the environment is one of tragedy, loss, and bereavement. There is often chaos and disorganisation, and physical as well as emotional hardship on the survivors. The beneficiaries of the DR programme are not hopeful in the way they are in a development programme, as it takes much more time to recover from the sudden loss.

Using Sri Lanka as an example again, the country has a domestic house-building capacity of just over 5,000 houses per year. After the tsunami the country that had over 300,000 houses to rebuild as quickly as possible. Thus our national affiliates were not only being asked to step up capacity 10-fold in a non-existent ramp-up period, but would be competing for the limited national resources, facing an even greater capacity challenge.

Post-disaster the political environment also changes dramatically as a flood of new players arrive on the field, each with their own agenda, and with their own baggage of experiences. Coordination of these players, and ensuring communication and involvement is very different to the normal partnering in development. There is much pressure on the politicians in these countries as well. There is pressure to be seen both internationally and locally to be doing the right thing by the people. It is a chance to win political mileage by tactical moves enabled by the influx of resources and money. And there is frequently the revealing of older issues that can no longer be avoided (this happened even in the US where the poverty in New Orleans had largely been overlooked until the hurricane brought it to international attention and forced the politicians to take action).

Speed

One of the fundamental issues that face the DR programmes is that of speed. It was seen as a benefit of this particular strategy, and it is one of the key factors that make the two programmes different and possibly incompatible. To begin with, some of the learning that the normal organisation intended to transfer to the DR programme was that of accelerated building projects for entire communities of on average 100 households. These quick builds are then completed over the course of a few weeks by volunteers. However, what is deceptive is that it takes months to a year to actually prepare for these events. Especially, when carried out in environments where information and land are difficult to get hold of, the preparation process takes a very long time. They are impressively organised, but arguably don't offer any long-term advantages to the community (as speed is an illusion), except for the community-building it inspires.

But another issue that became apparent in the reconstruction, was that speed may not be so crucial in reconstruction. Although there is a desire to re-settle people as quickly as possible, once their immediate, emergency needs are taken care of the following process is inherently time-consuming. While there are ways to decrease the actual building time, it is very difficult to accelerate the participation and community building processes, vital to the long-term success of the new communities. This is extremely relevant as a risk to these projects, as to quote just one source, assuming that crisis and poverty will make any house desirable is wrong:

> "…from Bosnia that out of the 116,000 internationally funded houses physically identified by February 2003, 8,000 were completely abandoned. One would imagine that the donors providing millions of their

own public funds, as well as the country in question, plunged into poverty by a devastating war, would have made sure that the funds available were spent to enhance recovery." [Skolte, 2004].

Important to understanding the strategy is the fact that this organisation is involved in reconstruction that is possibly the third phase after a disaster, following emergency relief and then transitional shelter. Therefore there is actually some time to help the organisation change before the projects get fully underway. That is, as long as it is understood and structured sufficiently to begin the process immediately.

Conclusion: Improving the Strategy

Looking back, the original strategy appeared to be an easier opportunity than the actual implementation revealed. Finding out where that there were fundamental weaknesses occurred relatively quickly. In Sri Lanka, within the early months the implementation of project controls and monitoring revealed significant misappropriation at board level and ground level, which led to several suspensions and ensuing court case. The leadership that remained was nevertheless resistant to the controls being insisted by the international organisation and external funding was necessarily cancelled, although the program continues at a much smaller scale with local funding. This was the major prompt for this evaluation.

Having thus far identified that the key challenges were in the structure and management changes, as well as the impacts of the changed environment and focus on speed, these challenges can be appropriately addressed in some adjustments to the strategy and incorporated in an organised roll-out.

First, addressing the structure and management changes, any capacity building will require growth to a certain extent. In the short-term there is no viable alternative (except perhaps partnering locally where possible) to having the international office provide support and direction, which has the side affect of changing the power structure, at least temporarily. In order to achieve this successfully, the international office will need to have sufficient trained resources ready to deploy. There will need to be adequate time given for the change to take affect and for results to be expected to begin. The local team would need to be intensely involved in the process, but this cannot be done by consensus. It should be emphasised however that the DR structure is largely temporary and that once the organisation has expanded and finished its initial DR objective, the aim is to hand over the enhanced organisation back to the local operators.

Where this approach is rejected (this must be allowed for as different local leaders will respond to this differently), then it may not be appropriate to work with the existing organisation. As, from my analysis above, there is less benefit to the DR programme from the development programme than possibly vice versa, it should be seen as a valid option to set up an independent DR office in the disaster-affected area. This office will liase with the existing offices, but will be controlled by the international office.

With regards to the environment, a review of the results of hundreds of World Bank projects concluded that the success of projects in the developing world is largely interfered with by external factors outside the control of the project manager [Youker in Oladapo, 2002]. Thus, the uncertainty in developing world environments is more of an issue than the post-disaster specific one. Project managers must therefore set up a process to scan the environment, to identify potential problems, and to try to establish power relationships that can help them manage the key actors and factors [Youker in Oladapo, 2002]. If this were established as one of the key tenants of a new project management culture, the organisation would be much more versatile in any situation.

And finally, the issue of speed should be handled with caution. I would primarily recommend the maximum use of the time afforded at the front end of the post-disaster where the other agents are struggling to secure the environment, that this organisation does not just immediately begin looking for partners and appropriate land, but also address the full change that the organisation must undergo. The organisation should do everything possible to have plans and structures ready to roll-out so that the internal issues are minimised in terms of their impact on time. The external issues will be unavoidable, and relationships with governments and local partners, as well as user engagement and community building cannot be sacrificed for speed.

To summarise, while the development programme is likely to be enhanced, and capacity extended, through the use of a DR programme in the right situation, the DR programme itself does not benefit as significantly from having existing operations on the ground, except from the basic bureaucratic support. The actual programmes are actually very different in strategic components, and while strong management processes can help address these differences, time for accommodating the significant changes must be factored in. And finally, the strategy may not work in all locations. Where a development programme already exists, the local leadership must buy-in to the dramatic changes that this will require.

References

Edwards M & Hulme D. (2002). "Making a Difference: Scaling-up the Developmental impact of NGO's – Concepts and Experiences." *The Earthscan Reader on NGO Management.* Ed. Edwards M, and Fowler A. Earthscan Publications Ltd.

Lewis D. (2001). "Culture and ambiguity: Anthropological approaches to NGO management." *The Management of Non-Governmental Development Organisations: an Introduction.* Routledge.

Naoum S. (2001). People & Organizational Management in Construction. Thomas Telford Publishing, Thomas Telford Ltd.

Oladapo, M.A. (2002). Procurement Systems and Project Organization Model for Low Cost Housing. FIG XXII International Congress, April 19-26.

Skolte, H. (2004).Tents in Concrete: What internationally funded housing does to support recovery in areas affected by war. The case of Bosnia-Herzegovinia. Dr. Ing Thesis.

Youker, R. (2003). The Nature of International Development Projects. PMI Conference, September 21.

MEASURING THE QUALITATIVE ASPECTS OF A RECONSTRUCTION PROGRAMME: ACEH, INDONESIA

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Abstract

Aid Agencies are accountable for the funds that they administer and consequently there is a reporting requirement to demonstrate that any intervention (such as a permanent housing program) is beneficial to those that the Agency seeks to assist. The WHO Quality of Life Tool (WHO QLT) is one such measure of well being and has been extensively used since it was developed in 1996 (predominantly in the health sector). However, it does requires a before and after study to produce results. This is not necessarily problematic but the paper reports on the application of the Depression, Anxiety, Stress Survey tool that consists of 42 questions (hence its name DASS42) as part of a shelter program for the West Coast of Aceh following the December 2004 tsunami. The advantage of the DASS42 is that it can quantify results based on one survey (Lovibond, 1995). The DASS42 was developed at the University of New South Wales, Australia and while it enjoys wide acceptance this was the first time it was applied to a shelter program. The results from the DASS42 can be used to prioritise beneficiaries and when combined with the Disaster Life Continuum Model (rather than a 4 R Model) provides insights into the psycho-social status of beneficiaries. The paper outlines how the DASS42 was used to quantify the impact of the tsunami disaster in terms of gender, age and resilience of the Acehnese people. The survey was completed by 600 respondents at 5 different locations along the West Coast during the first two weeks of March 2005, less than 3 months after the tsunami.

Keywords: DASS42; Aceh; survey; well being; quantitative; qualitative; indicators.

Introduction

Ask any person involved in a large disaster "how they are" and they will no doubt answer negatively. Ask them again some months later and one would hope for a less negative response but would not expect a completely positive reply. The challenge to measure that change of well being or quality of life is central to the process of providing aid and assistance. Any assistance should produce a positive increase in that well being or quality of life (QOL). To date, hard quantitative indicators such as families housed, children receiving education, livelihood skills training given and health indicators have been used (UNDP, 2004). And this paper suggests that these hard quantitative measures need to be extended to cover softer qualitative issues with quantitative measures.

QOL is difficult to completely define. Wikipedia defines well-being or quality of life of a population as "…an important concern in economics and political science. There are many components to well-being. A large part is standard of living, the amount of money and access to goods and services that a person has; these numbers are fairly easily measured. Others like freedom, happiness, art, environmental health, and innovation are far harder to measure. This has created an inevitable imbalance as programs and policies are created to fit the easily available economic numbers while ignoring the other measures that are very difficult to plan for or assess." (Wikipedia, 2006). The discussion about the meaning of the QOL dates back to Aristotle who defined it in terms of "eudaimona" or "happiness".

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Not surprisingly there are now many indicators or composite measures of well being.

Sharpe's report that reviewed 38 such QOL indicators noted that "…Historically almost all indicators of well-being have been based on objective data. In recent years, the importance of subjective well-being, also called happiness or life satisfaction, has grown and a number of national indexes in these areas, such as the Australian Unity Well-Being Index, have been developed." (Sharpe, 2005).

However, many of these indicators are intended to measure (and compare) national well being and moreover in developed OECD countries and consequently would not be useful in the constantly changing context that is post disaster reconstruction in developing countries (OECD, 2006).

In discussing this dynamic Hallam suggest that "..evaluations should comment on the impact of humanitarian aid programmes, and not focus solely on monitoring the efficiency of project implementation. However, humanitarian programmes often take place in complex, confused circumstances, where plans change regularly, where information is scarce and where little is predictable. As a result, qualitative and deductive methods of measuring impact, that involve beneficiaries, are likely, in general, to be more appropriate than methods that seek to be 'scientifically rigorous'. (Hallam 1998). The importance of community involvement and the need to have "an approximate measure of the right things is more meaningful than an exact measure of the wrong things" approach is also supported by Malcolm (2006).

Mayne has taken this process one further step by developing Contribution Analysis as reported by Poletti (2004). "…good evaluations have always dealt with the issue of causality in a pragmatic way. It may not be possible to prove causality, but it is possible to suggest reasonable causal links, which can then be used as a basis for informing changes to programmatic design. John Mayne, from the Canadian Auditor General's Office, has developed an analytic framework based on this pragmatic approach which clarifies how performance measures can be used to examine causal links and attribution. Contribution analysis, the name of his suggested approach is pragmatic and aims for better (as opposed to perfect) information with which to make a case for plausible (as opposed to proven) associations"

The need to incorporate QOL factors within development programs is also recognised in the building literature. For example part of step 4 in a 10 step suggested process for local holistic recovery is "..determining what quality of life concerns are important to local residents, before and after the disaster" (Monday, 2002).

However, the need for QOL factors is more often hidden behind the concepts of community participation, protection, integration, evaluation, monitoring, effectiveness and coordination. (UNHCR, 2000), (Sphere, 2004).

Given the above context how can QOL factors be included into a reconstruction program?

Measuring the Quality of Life

The most widely known and readily available survey tool is the World Health Organisation (WHO) Quality of Life tool (QLT). It has had extensive use in examining the QOL aspects of health related interventions and while it is suitable for architectural and physical engineering and planning interventions its predominant use remains in the health sector (Hawthorne et al, 2002). It consists of 100 questions in the standard version (25 questions in a brief version) and is a comprehensive self assessment of the individual's QOL. This is defined as ""an individual's perception of his/her position in life in the context of the culture and value systems in which he/she lives, and in relation to his/her goals, expectations, standards and concerns. It is a broad-ranging concept, incorporating in a complex way the person's physical health, psychological state, level of independence, social relationships, and their relationship to salient features of their environment" (WHOQoL, 1994).

The DASS42 on the other hand, is relatively new survey tool and was developed at the University of New South Wales, in Sydney Australia (Lovibond, 1995). It is a "set of three self-report scales designed to measure the negative emotional states of depression, anxiety and stress" and was "constructed not merely as another set of scales to measure conventionally defined emotional states, but to further the process of defining, understanding, and measuring the ubiquitous and clinically significant emotional states usually described as depression, anxiety and stress" (DASS, 2006). The characteristics of high scorers on each DASS scale are as follows:

- Depression scale: self-disparaging, dispirited, gloomy, blue, convinced that life has no meaning or value, pessimistic about the future, unable to experience enjoyment or satisfaction, unable to become interested or involved, slow, lacking in initiative.
- Anxiety scale: apprehensive, panicky, trembly, shaky, aware of dryness of the mouth, breathing difficulties, pounding of the heart, sweatiness of the palms, worried about performance and possible loss of control.
- Stress scale: over-aroused, tense, unable to relax, touchy, easily upset, irritable, easily startled, nervy, jumpy, fidgety, intolerant of interruption or delay.

The two approaches are compared below in table 1.

However, the DASS42 has the distinct advantage of not requiring a before and after survey and it achieves this with what it calls the "severity" table.**WHO Quality of Life Tool** (Hawthorne, 2003)	**DASS42 (DASS, 2006)**
Set of 100 questions in the standard version and 25 in the Brief version. Measures an individual's physical health, psychological state, level of independence, social relationships, and their relationship to salient features of their environment. Several language versions available Is well known and tested. Requires a before and after study.	Set of 42 questions in the standard version and 21 in a light version. Measures an individual's level of depression, stress and anxiety. Some language versions available. Relatively new but robust survey tool in that it is relatively insensitive to missing answers. Requires one survey.

Table 1. Brief Comparison of the WHO QLT and the DASS42 Survey Tools

The Severity Table

This aspect of the DASS42 survey allowed immediate rating of responses thus making the DASS42 a useful survey tool for the complexity that is the humanitarian context. The Severity Table, its rating and the associated DASS42 scores in each of the three scales are shown below in table 2. And hence, comparisons within and between the 5 different communities studied along the West Coast of Aceh could be rapidly completed.

	Depression	Anxiety	Stress
Normal	0 – 9	0 - 7	0 – 14
Mild	10 – 13	8 – 9	15 – 18
Moderate	14 – 20	10 – 14	19 – 25
Severe	21 – 27	15 – 19	26 – 33
Extremely Severe	28+	20+	34 +

Table 2. The DASS42 Severity Index Table (Devilly, 2005).

The Disaster Life Continuum (and the DASS42)

The most commonly used disaster model is the 4R model where the 'Rs' stand for Reduction, Readiness, Response and Recovery (MCDEM, 2004). It is a linear model with one phase leading to the next through the disaster. However, aid workers find such a model limiting in terms of what is seen in the field and other models such as the Disaster Life Continuum (DLCM) are more widely used (EMA, 2003). The DLCM is graphical represented in figures 1A and 1B below.

Disasters impact differently on people and families. The effects are sometimes immediately noticeable and other times can be held back and appear months after the disaster event. “The traumatic experience is so usual that the individual who undergoes it lacks a basis in previous experience to understand it” (EMA, 2003 pg 49). As illustrated in figure 1A the past is a line that extending into the present with a second line representing the future also extending into the present. The two lines are linked by a third line representing the plans and decisions an individual makes relative to the social context they enjoy. When disaster strikes (figure 1B) this protective family and social context disintegrates and the lines of future and past are disconnected with the loss of the ability to plan and make decisions. The affected individual initially feels unable to relate to the future or leave the past behind. This is shown by the past line folding back on itself under the preoccupation and fixation of life before the disaster. They are unable to deal with the present. The line of the future also folds back as the realisation and the sense of disruption to their life’s plans sinks in. This creates anxiety and despair about what the future may hold. Thus a recovery and reconstruction strategy needs to allow for this trauma and address the need for a social network so as to move the community from figure 1B eventually back to the socially sustainable condition of Figure 1A.

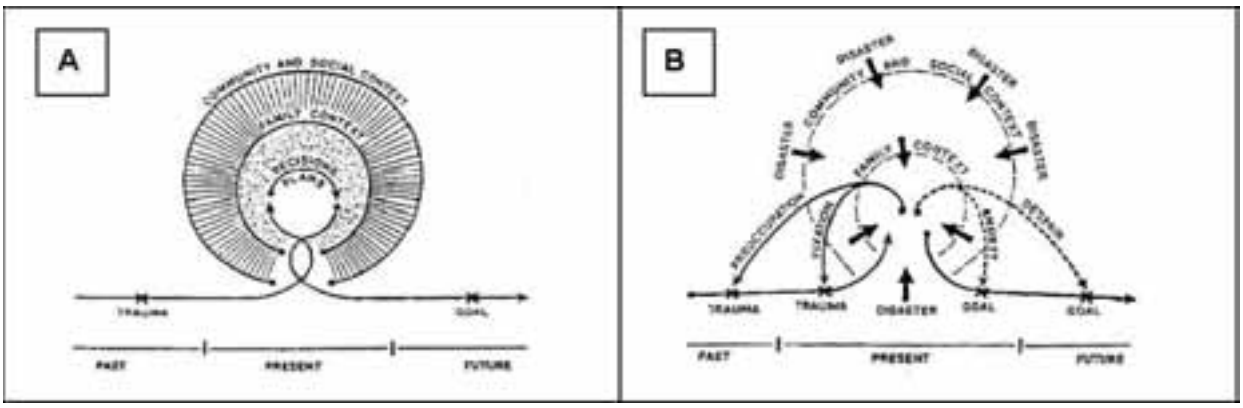

Figure 1: The Disaster Life Continuum Model. (DLCM)

The link between the three lines of the past, present and future in the DLCM and the depression, stress and anxiety scales of the DASS42 maps the resilience of the community concerned. For example, the past and present are predominantly the depression and stress scales of the DASS42 while the future is predominantly the anxiety scale and the relative severity rating between depression and stress compared to anxiety maps resilience in terms of reconnection the past and future.

In addition, such an exercise also maps the location of the community between conditions B and A of the DLCM (as shown in figure 1 above) and with successive surveys it would be possible to trace the reconstruction path the community has embarked on.

Thus, combining the DASS42 and the DLCM allows new metrics within reconstruction programs.

Survey Framework

Surveys at field offices along the west coast were undertaken with 100 people interviewed in the towns of Lamno, Calang, Krueng Sabe and Tenoum. In Meulaboh 200 people were surveyed because it was a larger city. The surveys were completed by a local NGO called Mapala using teams of 5 people that included at least two women team members. This gender balance was felt to be important because of the concern that women may not talk as candidly with a male as opposed to a female interviewer.

A pilot of the survey was trialled in Banda Aceh and this brought out that many of those completing the survey would not be able to read and that most would converse in Acehnese instead of the national language of Bahasa Indonesia. Consequently, the survey was read out to individuals and their replies marked on the survey sheets by the interviewer. The pilot also resolved issues of understanding and agreement about the translation between interviewers.

Furthermore, training of the team members involved was undertaken so that there was a level of uniformity of survey process, inquiry and data taking between the 3 teams involved. Communication between the teams and back to Banda Aceh would be difficult once they were in the field. And hence, issues needed to be resolved prior to departure. In addition, field living conditions were basic and the work physically and emotionally demanding. It would be problematic for the team should one of the team members require to leave prematurely.

Results

The results from the DASS42 created a baseline survey that was surprisingly consistent through out the 5 locations of the West Coast. Three main issues were addressed and these are discussed in detail below.

How resilient were the Aceh people? Cardona defines a lack of resilience as a lack of “capacity to confront or absorb the impact of dangerous phenomenon” (reported in Wisner, 2003 pp8). This inverse definition follows a trend to express vulnerability as the inverse of resilience rather than resilience directly.

The overall DASS42 results for the 3 scales of depression, stress and anxiety are tabulated in table 3 below. These are the averaged values for all the individual surveys completed in that area together with its severity rating from table 2 above. The overall results rated anxiety as severe while depression and stress were normal. This suggests as discussed in the DLCM above that the Acehnese people had (to an extent) contained the immediate effects of the tsunami and their main issue was what did the future hold? And this was an area where aid agencies could assist through housing programs, education and livelihoods.

Moreover, given that this was only 3 months after the tsunami suggests that these were resilient communities. This insight assisted many agencies in their planning and strategising of programs.

	Lamno	Calang	Krueng Sabe	Tenoum	Meulaboh 1	Meulaboh 2	Overall
Depression	9.2	8.2	9.0	12.0	8.8	10.4	Normal
	Mild	Normal	Normal	Mild	Normal	Mild	
Anxiety	15.0	14.8	15.2	17.0	13.8	15.6	Severe
	Severe	Severe	Severe	Severe	Moderate	Severe	
Stress	14.8	10.7	11.4	16.1	11.1	13.5	Normal
	Mild	Normal	Normal	Mild	Normal	Normal	

Table 3. DASS42 Overall results.

Despite the consistency of the results in Table 3 above there were three locations that differed from the others; namely Lamno, Tenoum and Meulaboh 2. Of these Tenoum is most significant with Lamno and Meulaboh 2 just slipping into "mild" from "normal". And it is not clear why there is such a difference for Tenoum? In terms of gender and age it is between upper and lower values for other areas. And in terms of building/ infrastructure damage suffered less damage than Calang or Krueng Sabe villages which were 90-100% destroyed. It was however, one of the last areas to receive aid and is inland thus hampering any assistance via boats. In addition, 80% the west coast highway and over 247 bridges were washed out (many of these bridges were in the flat plains between Tenoum and Meulaboh) making access into Tenoum problematic. The figures in table 3 above could suggest that Tenoum has missed out on aid and resources compared to the other areas of the West Coast. More investigation and a field trip to assess the situation in Tenoum would have been warranted. Finally it is interesting to note that Meulaboh 1 had the lowest level for anxiety.

The implications for a reconstruction program were as follows:-

- The need for permanent housing rather than transitional housing or barrack style Transitional Living Centres (TLC's)
- The provision of permanent housing as soon as practicable after the emergency phase. In Aceh the emergency phase was approximately 3 months long (emergency tents), the recovery phase 18-24 months (transitional shelters and TLC's) and reconstruction 10-15 years (permanent housing).
- The need to use the reconstruction program to kick start local economies.
- The need to buy locally and to use local expertise and skills in as much as possible.

While such conclusions are typical of many reconstruction programs the quantitative basis of the decision provided by the DASS42 survey was new and moreover the baseline data provided by the DASS42 survey could be the basis for further research and monitoring.

What is the impact of age? The UNHCR Handbook list "vulnerable people" as those that are sick, mentally incapacitated, the elderly, children and women head of households (UNHCR, 2000 pg 7). And no real differences were expected from that list for the situation in Aceh. However, table 4 below suggests that the impact of the disaster was felt more by the young than the old. In all areas and for all the DASS42 indicators (except for Tenoum) the young (those under 30 years of age) were more vulnerable than the old (those over 50 years of age). Moreover, the severity peaked for those under 30 and reduced steady through the 30 to 39, the 40 to 49 to those over 50 years of age. This was a consistent pattern throughout the west coast.

This is interesting and it could be that those over 50 years are perhaps the most vulnerable while those under 30 are the most exposed? This distinction is part of the risk equation which is as follows (Masure, 2003, pp3):

Risk = Hazard probability x Exposure value x Vulnerability

Exposure represents the global value of elements at risk in a territory Vulnerability represents the fragility of the elements at risk of the territorial system. Both expressed on a scale from 0 (no damage) to 1 (total loss).

Age (in years)	Lamno	Calang	Krueng Sabe	Tenoum	Meulaboh 1	Meulaboh 2	Overall
Depression							
Less							
than	9.8	10.4	11.3	11.3	11.4	10.5	
30	Mild	Mild	Mild	Mild	Mild	Mild	Mild
30 to	9.3	8.6	8.8	12.4	10.5	11.2	
39	Mild	Normal	Normal	Mild	Mild	Mild	Mild
40 to	9.6	7.4	8.5	12.5	8.0	11.3	
49	Mild	Normal	Normal	Mild	Normal	Mild	Normal
50+	10.7	7.1	8.1	8.8	8.4	9.1	
	Mild	Normal	Normal	Normal	Normal	Mild	Normal
Anxiety							
Less							
than	15.7	17.2	18.7	20.3	18.4	17.9	
30	Severe	Severe	Severe	X Severe	Severe	Severe	Severe
30 to	16.2	15.5	15.4	17.3	14.3	15.7	
39	Severe	Severe	Severe	Severe	Severe	Severe	Severe
40 to	13.8	13.7	13.8	16.4	16.0	14.6	Moderate
49	Moderate	Moderate	Moderate	Severe	Severe	Severe	
50+	20.8	13.4	13.9	12.4	12.6	16.4	Moderate
Years	X Severe	Moderate	Moderate	Moderate	Moderate	Severe	
Stress							
Less							Normal
than	16.0	12.4	13.9	18.4	14.4	14.9	
30	Mild	Normal	Normal	Moderate	Normal	Normal	
30 to	16.3	10.9	11.1	16.0	11.9	13.9	Normal
39	Mild	Normal	Normal	Mild	Normal	Normal	
40 to	14.2	9.8	10.5	16.4	11.7	14.3	Normal
49	Normal	Normal	Normal	Mild	Normal	Normal	
50+	13.0	10.3	11.4	10.9	10.7	12.6	Normal
Years	Normal	Normal	Normal	Normal	Normal	Normal	

Table 4: DASS42 Results for age.

The results are again consistent for all 5 areas along the West Coast with variations in Lamno, Tenoum and Meulaboh 2. Apart from the X severe anxiety rating for those over 50 years in Lamno (based on a sample size of only 6 people over 50, the smallest sample for this analysis of the impact of age) it is again Tenoum that has generally elevated ratings. The higher ratings for Lamno and Meulaboh 2 reflect a high percentage of females surveyed in both areas. Disasters are gender biased and impact on females more than males (discussed in the next sub chapter) and hence the increased DASS42 scales for both these areas (Lamno had 62% female respondents and Meulaboh (2) 66%). However, this was not the case in Tenoum which had 55% female respondents.

The implications for a reconstruction program were as follows:-

- Elderly people would remain a priority for housing provision (along with the other vulnerable groupings) but where ever possible local trades people and skills would be used. In addition, livelihood training and capacity skills should be available for those under 30 in particular but for anyone willing to work. Such an approach would address the vulnerability and exposure issues raised above.
- Housing programs should integrate the other aspects of a community and in particular business, education and social contacts. This in part is supported by the DLCM as well as addressing the exposure risk for those under 30.

These conclusions are again typical of many reconstruction programs. But the quantitative basis and the ability to monitor these aspects changes allows further progress to be achieved.

What is the impact of gender? There had been discussions amongst aid workers in Aceh as to the gender impact of the tsunami; did it affect females more than males? The experiences of many suggested that females were affected more than males but there was no quantitative evident and it remained a matter of opinion. The DASS42 figures quantified this gender bias showing that the tsunami did affected females significantly more than males. The results from the DASS42 survey are tabulated in table 5 below and show that that the impact of the tsunami is typical one scale higher for females compared to males in all 3 of the DASS42 measurements. This was consistent throughout all 5 locations in the West Coast including Tenoum which as discussed above had higher DAS42 ratings than the other 4 locations.

The role of females in disaster reduction has been identified previous (Wisner, 2005). And the role females can play in rebuilding houses in Aceh (WDB, 2005). Thus, it is essential that reconstruction programs seek out female participation.

	Lamno	**Calang**	**Krueng Sabe**	**Tenoum**	**Meulab. 1**	**Meulab. 2**	**Overall**
Female							
Depression	9.2 Mild	10.8 Mild	10.3 Mild	14.1 Moderate	12.3 Mild	12.8 Mild	Mild
Anxiety	16.1 Severe	17.9 Severe	18.2 Severe	21.7 X Severe	18.8 Severe	17.7 Severe	Severe
Stress	16.5 Mild	13.2 Normal	13.6 Normal	19.3 Moderate	15.3 Mild	15.4 Mild	Mild
Male							
Depression	9.1 Mild	5.7 Normal	7.8 Normal	9.3 Mild	7.0 Normal	6.6 Normal	Normal
Anxiety	12.9 Moderate	12.0 Moderate	12.4 Moderate	11.1 Moderate	11.2 Moderate	12.8 Moderate	Moderate
Stress	12.2 Normal	8.2 Normal	9.4 Normal	12.1 Normal	8.8 Normal	10.9 Normal	Normal

Table 5: DASS42 Results for gender

What Did This Mean for the Shelter Program?

The DASS42 survey quantified many (crucial) details that would not have otherwise been included. It gave validity to the notion of early reconstruction, the impact of age and quantified the greater impact of tsunami on females. The DASS42 survey indicated the following:-

- The need for permanent shelter soon (3 months) after the tsunami disaster.
- The need for an integrate community approach
- The need to target traditional "vulnerable groups" and in particular women and those under 30 years of age.

While these results are not "shattering" the ability to speak "quantitatively" and fine tune aid programs was invaluable. Moreover, there is potential to use the DASS42 (together with other indicators, interviews and information) for issues of accountability and transparency. The ability to have quantitative and qualitative measures is extremely attractive.

Conclusion

The DASS42 survey is a particularly useful tool for targeting shelter programs in disasters and emergency situations involving large populations. The use of the severity table, the Disaster Life Continuum Model and its ability to provide practical results based on one survey without the need for a before and after study make it a functional tool. In addition, the survey tool is freely available from the Internet thus increasing is serviceability.

Architects and engineers accustomed to the quantitative aspects of building should consider the need to quantitatively measure qualitative aspects of their projects. The difference between the quantitative and qualitative is the difference between a "house" and a "home". And while building shelter programs work to produce the first, it is the second that people desire.

References

BOND (2003) Logical Framework Analysis Guidance Notes No 4 Networking for International Development March 2003. 8 pp.

DASS (2006) Depression Anxiety Stress Scales (DASS) Psychology Foundation of Australia Viewed 26 April 2006 http://www.psy.unsw.edu.au/Groups/Dass.

Devilly G (2005) Depression Anxiety Stress Scale 42 (DASS 42) Lovibond & Lovibond (1995). Viewed 26 April 2006

http://www.swin.edu.au/victims/resources/assessment/affect/dass42.html

Emergency Management Australia (EMA) (2003). Recovery Management: Context of Recovery; EMA Institute, Mt Macedon August 2003 pp51.

Hallam A (1998) Evaluating Humanitarian Assistance Programmes in Complex Emergencies. RELIEF AND REHABILITATION NETWORK September 1998 pp 13 of pp128.

Hawthorne G (2003) About the World Health Organisation Quality of Life (WHOQoL) Project WHOQOL, viewed 26 April 2006.

http://www.acpmh.unimelb.edu.au/whoqol/default.html

Hawthorne G, Richardson J, Day N (2002). Using the Assessment of Quality of Life (AQoL) Instrument Version 1.Centre for Health Program Evaluation Monash University in collaboration with Melbourne University pp80.

Lovibond S. and Lovibond, P (1995). Manual for the Depression Anxiety Stress Scales. (2nd. Ed.) Sydney: Psychology Foundation.

Malcolm M-J (2006) Ripples in the pond: assessing the impact of a growing Not for Profit management programme in NZ and the Pacific. Unitec NZ Graduate Diploma in Not for Profit Management to be published at 2006 conference.

Masure P (2003) Variables and Indicators of Vulnerability and Disaster Risk for Land-use and Urban or Territorial Planning OPERATION ATN/JF-7907-RG INTERAMERICAN DEVELOPMENT BANK Universidad Nacional de Colombia - Sede anizales Instituto de Estudios Ambientales August 2003 pp28.
Ministry of Civil Defence Emergency Management (MCDEM) (2004). National CDEM Strategy 2003-2006 pub. by the NZ Govt pp14-16.
Monday J (2002). Building Back Better Creating a Sustainable Community After Disaster. Natural Hazards Informer No 3 January 2002 pp 7 of 12.
OECD (2006) About the OECD World Forum - Statistics Knowledge and Policy viewed 26 April 2006. www.oecd.org/oecdworldforum.
Polletti T (2004) Inter-Agency Health Evaluations In Humanitarian Crises. A Background Issues Paper. London School of Hygiene and Tropical Medicine March 2004 pp41 of 57.
Sharpe A and Smith J (2005). Measuring the Impact of Research on Well-being: A Survey of Indicators of Well-being. Centre for the Study of Living Standards CSLS Research Report Number 2005-02 February, 2005 pg x pp 119.
SPHERE (2004) Humanitarian Charter and Minimum Standards in Disaster Response 2004 pp339.
UNDP (2004). Reducing Disaster Risk: A Challenge for Development. United Nations Development Program (UNDP) chapter 1 pp13-15.
UNHCR (2000) Handbook for Emergencies UNHCR 2nd ed pp405
WDB (2005) Indonesia Women Headed Household Program (PEKKA) viewed 26 April 2006. http://web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/EASTASIAPACIFICE
T/EXTEAPREGTOPSOCDEV/0,,contentMDK:20478969~pagePK:34004173~piPK:34
003707~theSitePK:502940,00.html
WHOQoL Group (1994). The Development of the World Health Organization Quality of Life Assessment Instrument (the WHOQoL). In J. Orley and W. Kuyken (Eds). Quality of Life Assessment: Inter. Perspectives Heidleberg: Springer-Verlag pp43.
Wilkinson T (2005) Report On Coastal Design And Tsunami Mitigation For Shelter /House Reconstruction Along West Coast Aceh Province pub. UNHCR
Wikipedia (2006). http://www.answers.com/topic/quality-of-life accessed on April 26 2006.
Wisner B (2003). Information And Indicators Program For Disaster Risk Management Inter-American Development Bank Universidad Nacional de Colombia -Sede Manizales Instituto de Estudios Ambientales November 2003.
Wisner B. and Walker P. (2005) Beyond Kobe: A Proactive Look at the World Conference on Disaster Reduction. 18-22 January 2005, Kobe, Japan pp6 .

LOST AND USED POST-DISASTER DEVELOPMENT OPPORTUNITIES IN BAM EARTHQUAKE AND THE ROLE OF STAKEHOLDERS

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Abstract

Disasters provide physical, social, political and environmental development windows of opportunities that can be used during the post disaster recovery and reconstruction to not only to reconstruct the impacted areas, but also to improve the socio-economic and physical conditions of the impacted population in the long run. It is argued, however, that there is a limited time frame of approximately two years for such opportunities to be utilized efficiently. Bam earthquake in December 2003 that killed more than 27 000 and devastated the historical part of the city opened several unique opportunities for mitigation, socio-economic and physical development that could be used. This paper examines the roles that various stakeholders played in the Bam reconstruction and their contribution to the success and failure of using these opportunities. The results show that stakeholders' collaboration and participation, knowledge and experience, long term and holistic visions, division of labour and use of resources have had significant influence on the success and failure of using post disaster opportunities.

Keywords: post-disaster reconstruction, development opportunities, Bam earthquake.

Introduction

Looking at disasters as development opportunities is becoming one of the core principles of disaster and emergency management (Davis, 2005). Although disasters create major human sufferings and economic damages, they also bring opportunities for social, economical, cultural, physical, and political developments at local, regional, national and sometimes international levels. Disaster opportunities do not last long and need to be identified planned for and utilized through partnership and collaboration between a large number of stakeholders with different interests. On December

Post-Disaster Reconstruction : Meeting Stakeholder Interests : Proceedings of a conference held at the Scuola di Sanità Militare, Florence, Italy 17-19 May 2006, edited by David Alexander, Colin Henry Davidson, Andrew Fox, Cassidy Johnson, Gonzalo Lizzaralde, ISBN 978-88-8453-611-2 (online), ISBN 978-88-8453-612-9 (print), © Firenze university press, 2007

26, 2003 at 5:26 A.M. a 6.5 magnitude earthquake devastated the city of Bam, located in Kerman province and in the margin of Kavir-e-Lut desert in the south-eastern part of Iran that killed more than 27000 and left 75000 people homeless (Nadim et al., 2004). City's infrastructure including water supply, power, telephone, healthcare services, government buildings, main roads and the only airport were crippled. The major tourist attraction in the area, the 2400-year-old citadel (Arg-e-Bam), the world's largest dried clay structure, was totally destroyed (Akbari et al., 2004). Despite its huge human, economic and cultural losses, this earthquake also opened windows of opportunities for socio-economic as well as physical development for the city and the region which could be utilized during the reconstruction process.

Now, more than two years after this disaster, the question is whether these development opportunities have been used or lost. The aims of this paper are twofold: 1) to identify development opportunities generated by the earthquake; 2) to understand the role of different stakeholders in utilizing disaster development opportunities. Therefore, the rest of this paper is organized as follow. Section two provides a brief background literature on disaster and development relationships with special focus on disaster as development opportunities. Section three analyses the key stakeholders and activities in the Bam reconstruction. Section four examines the post disaster development opportunities and the roles that different stakeholders played in utilizing them. Section five concludes the paper with some recommendations for future reconstructions and research.

Disaster and Development

Disasters and development are linked in different ways and at least four models have been suggested in the literature: 1) Disasters set back development by destroying years of development initiatives; 2) Development can increase susceptibility and vulnerability to disasters; 3) Development can decrease the susceptibility and vulnerability to disasters and their negative consequences; 4) Disasters provide significant opportunities to initiate and enhance development (UNDP, 1994). Model one describes disasters as impediments to development because disasters destroy the social and economic infrastructure, redirect resources from productive economic investments to disaster mitigation and thus limit the growth potential of a country or a region, reduces the attractiveness of the impacted region to future investors, risky areas are less attractive to investors (Pelling et al., 2002), and reduce governments' ability to invest in development projects through lowering the tax base as a result of development opportunities foregone and production failures, and the additional burdens of hazard mitigation and preparedness, relief and reconstruction (IFRC/RC, 2001).

The second model views development as a source and cause for vulnerability to disasters. Here a link is made between the development policies and vulnerability to disasters (Pelling et al., 2002). For example urbanization can improve the quality of life for rural migrants and contributes to industrialization, but at the same time increases the chance for greater casualties in the event of an earthquake, with harder accessibility and the greater threat of loss of lives and livelihoods through fire and building collapse (Benson and Clay, 2001). According to the third model, development could decrease vulnerability to disasters through different ways. If poor and socially disadvantaged groups are the most vulnerable, then any effort to improve their conditions through development projects could reduce their long term vulnerability to disasters. In an ideal form development programs should even include vulnerability reduction as an integral component (Meliti, 1999).

The fourth model views disasters as development opportunities. The destruction of unsafe infrastructure and buildings can provide an opportunity for rebuilding with better standards, or relocation if the site was particularly vulnerable. Large disasters involve extensive rehabilitation and reconstruction investment and hence provide opportunities that may not be available previously (Badri *et al*., 2006). For example, during the disaster recovery and reconstruction periods, flows of foreign currency into a disaster-affected country from aid, debt relief, insurance, private transfers and remittances can produce an apparent improvement in national balance-of-payments, and provide the financial means for enacting new development priorities (Bertrand, 1993;). Damaged buildings may highlight structural weaknesses which could be rectified, and may serve to improve building and planning regulations. Post-disaster situations create some kind of social and political atmosphere that important social, institutional and physical development programs could be initiated and implemented. Moreover, disruptions caused by disasters can open political space for alternative forms of social organizations. Support for such organizations is one way in which new development priorities might be carried forward beyond the immediate response period. Finally, reconstruction process can serve as an opportunity for building disaster risk reduction mechanisms into post-disaster development planning.

Stakeholders in Post Disaster Reconstruction

Stakeholders' analysis. Stakeholder analysis has developed as a tool, or set of tools, with different purposes in its applications in the fields of policy, management and development planning (Varvazovszky and Brugha, 2000; Brugha and Varvazovszky, 2000). Stakeholder analysis refers to a range of tools or an approach for understanding a system by identifying the key actors or stakeholders (Ramirez, 1999; Brocklesby et al., 2002) on the basis of their attributes, interrelationships and assessing their respective interests related to the system, issue or resource. Stakeholder analysis is a central theme in conflict management and dispute resolution (Smith, 1993; Ramirez, 1999; Swiderska, 2002). Stakeholders' analysis can be used in post-disaster reconstruction to assess potential support or opposition to the reconstruction process among the interested parties such as the impacted people, administrators, private sector, and NGOs. A stakeholder is defined as persons, groups, organizations, systems, etc., that have a 'stake' in the reconstruction and that are either likely to be affected by the reconstruction, whose support is needed or who may oppose the reconstruction plans, policies, or projects. Stakeholders' analysis identifies the key stakeholders and analyses their relative power, influence priorities, resources, and their significance in the entire reconstruction process.

Stakeholders in a reconstruction process usually include representatives of the following:-

- Community members and citizens' groups.
- Governments (national and local), encompassing public and semipublic entities in a wide range of sectors and roles.
- Civil society organizationsincluding NGOs, civic groups, and voluntary associations.
- Private sector (i.e., the business and industrial groups).
- Professional groups, including academic, research, and training organizations, consulting firms, etc.
- Media includingnewspaper, radio, and television networks.

For the reconstruction process to be effective and successful all these stakeholders should demonstrate commitment to the cause through transparency, bottom-up planning, democratization, accountability, cost effective measures, ensuring proper utilization of resources, and strengthening close collaboration and partnership.

Table 1 shows the results of a preliminary stakeholders' analysis in Bam reconstruction. Information was gathered through field visits and interviews with some of the key stakeholders.

The Community Members and Citizens' Groups

Community members and citizens' groups are people who have been impacted by the disaster and directly involved in the reconstruction process. In Bam they include more than 25000 households and a few citizens' groups that emerged in response to the post disaster reconstruction needs and shortcomings. The most important priorities for the impacted population are housing, employment and restoration of urban services and facilities (MNA, 2004). Households bring their time, labor, money (provided to them through low-interest rate loans), and ideas to the reconstruction process. The reconstruction policy later increased their roles even further by engaging them in the decision making and monitoring of the process.

There are also a few citizens' groups that were established after the earthquake and contribute by their ideas, knowledge about the community, and skills to the reconstruction process. Media is playing an important role in information exchange among the stakeholders. One example of such groups is the Bam Reconstruction Society that is very critical about the reconstruction process and often publicly demands for more government inputs, attention, investments, and accountability (MNA, 2005).

	Community and impacted populations	**The Local government**	**The National Government**	**Civil Society Organizations**	**Private corporate sector**	**International Organizations**
Key representatives	Impacted population City Residents Local citizens' groups	Bam Municipality Bam city council	Iranian Housing Foundation National Heritage Organization Kerman provincial government	International NGOs National and Provincial NGOs Local NGOs	Building Materials Contractors Consultants Local businesses	United Nations UNDP UNESCO
Priorities	Housing Income and employment Improvement in Urban services	Urban infrastructure Urban planning Building permits Subdivision and setback applications	Housing National Cultural Heritage Infra-structure Agriculture	Social support Vulnerability reduction Psychological help Women and children Empowerment	Receiving contracts Selling the building materials	Capacity building Resource management Training and education Vulnerability reduction Coordination
Available resources	Labour Money Ideas	Knowledge of the situation Authority	Financial resources Technical resources Material resources	Technical resources Financial resources		Technical and advisory resources Financial Support

Table 1. Stakeholders' analysis of Bam reconstruction process

The International Organizations

International organizations such as the United Nations and its related agencies are among the key stakeholders in the Bam reconstruction. The United Nations Development Program (UNDP) works closely with the government of Iran, local and provincial authorities, as well as affected communities. The UNDP's priorities are mainly capacity building, empowerment, vulnerability reduction, and coordination of international efforts through various training programs. UNESCO is also involved in the reconstruction process by providing scientific and technical advise, training and education, mobilizing financial assistance, and also by creating a task force to coordinate UNESCO's actions in response to the damage to one of the world heritage sites.

The NGOs

Bam earthquake attracted a large number of NGOs in both response and reconstruction phases which was somehow unique as compared to previous disasters in Iran. NGOs include local, national and international organizations that have been involved in the reconstruction process and have played key roles mainly through the provision of social, cultural, and economic development programs such as assessing people's needs, fund raising, providing social and community services, vocational training and public education, and environmental protection. ACT (Action by Churches Together) has been one of the leading international NGOs that completed 48 housing units and also provided social and psychological support to disaster victims. Another active international NGO is ASB (Arbeiter Samariter Bund - Workers' Samaritan Federation) was very active in disaster recovery of schools and hospitals and assisting disadvantaged groups such as disabled and women headed households.

More than 30 NGOs from the province and other parts of the country are active in the reconstruction of the city. A coordinating council has been formed to enhance coordination among the NGOs and facilitate the exchange of knowledge and best practices and experimental applications of new methods. Local NGOs include Banuvan e Bam (Ladies of the Bam), Mashiz Charity Organization, Nejat Charity Organization, and Women Network. Banuvan e Bam and Women Network provide health services to women and conducts social and cultural activities and research that are supported also by the Iranian Handicraft Organization, Bam Governor and the Ministry of Health. Mashiz and Nejat Charity Organizations have been providing vocational trainings and conducting social and cultural activities in the city to help the social and economic recovery of the impacted population.

The Local Government

The Bam Municipality and the Bam City Council are the two most important local government bodies in the city. Issuing building permits, dealing with subdivision and set back applications, and recovering building titles and official documents have been among the major activities of the city during the past two years. Until January 2006 the City has issued more than 18000 building permits. The Bam City Council also plays a critical role in the reconstruction process mainly through participation in decision making process and also by exercising its legal powers and authorities in the city. City council has divided the city into 15 reconstruction districts and each council member is responsible for one district.

The National Government

National government through the cabinet of ministers and individual ministries has the strongest planning and decision making power in the reconstruction process.

Soon after the earthquake a national reconstruction steering committee was formed that included members of different national government organizations and ministries. Ministry of Housing and Urban Development, Ministry of Economic and Finance, National Heritage and Tourism Organization, Management and Planning Organization, Ministry of Welfare and the Iranian Housing Foundation are the permanent members of this task force. The Iranian Housing Foundation (IHF) was given the responsibility to administer, coordinate and manage the reconstruct process. IHF has been the leading agency in post disaster reconstruction in Iran since its establishment in 1980. Most of the activities of the national government are implemented through their regional and local offices in Kerman province and the city of Bam. National government provides financial, technical, and material supports for the reconstruction. The main priorities of the national government are housing, national heritage and administration and coordination of the process at various levels as well as recovery and rebuilding of damaged urban infrastructure, facilities and services.

The Private Sector

More than 5000 local businesses and industries were heavily impacted by the earthquake. They play the roles of disaster victims as well as stakeholders in the reconstruction process. Moreover, a considerable number of national building and construction companies have opened their branches in the city. They provide and supply various services and products and have been engaged in most of the small and large reconstruction projects and contracts.

Post-Disaster Reconstruction Development Opportunities

Bam earthquake provided a number of development opportunities which were identified and listed by Asgary (2004) a few days after the disaster. Similar to other disasters, this earthquake presented windows of opportunities for disaster mitigation, physical planning, and socio-economic and cultural developments. Earthquake damaged significant part of the city and created an opportunity for developing a resilient community that could be used as a model city for other parts of the country. Earthquake provided an opportunity for further development and growth of the city's unique and internationally known date production through more publicity, renovation of the old irrigation systems, and expansion of its related industries. Bam disaster created new opportunities for city's exceptional cultural heritage and further development of tourism. City could also use this disaster to reshape its physical planning and development by introducing new planning ideas and innovations. Now more than two yeas after the disaster this section reviews the extent that these opportunities were capitalized.

Post Disaster Mitigation Opportunities

Most of the damaged buildings in the affected area were constructed by sun-dried brick masonry with extremely poor seismic resistance. Prior to the earthquake, less than three percent of the housing units in the city were made of steel frames. This created an opportunity that not only could mitigate the future losses of life and property damages but also could make the city as a disaster resilient city that could be used as a model for the rest of the country. In order to achieve these goals, the UNDP in collaboration with other international organizations (UNIDO, ILO, WHO, WFP, UNICEF, UNESCO, UN-HABITAT) and some of the Iranian institutions (International Institute for Earthquake and Earthquake Engineering, Building and Housing Research Centre, and Disaster Reduction Institute of Iran, and the IHF) organized several workshops and training programs for various groups of stakeholders involved in the reconstruction process.

At the decision and policy making level a workshop was organized to provide national authorities with a menu of technological, financial and institutional approaches that have worked in other contexts and that can be adopted in Bam reconstruction program. This workshop brought together members of the Steering Council for Reconstruction of Bam, senior Government and UN officials and post-earthquake reconstruction experts from Iran, Japan, India and Turkey to share experiences and provide advice on issues such as institutional arrangements for reconstruction, site selection and land tenure, shelter sector reconstruction, rebuilding critical infrastructure and urban redevelopment and planning. The At the engineering and technical level several training workshops were held to establish appropriate delivery mechanisms that ensure rapid recovery, facilitate the mainstreaming of earthquake-resistant construction into the housing process, and optimize local employment opportunities. These training workshops provided an opportunity for policy-makers, reconstruction managers, engineers, architects and private sector contractors to consider the pros and cons of different building technologies and also helped participants to explore the potential linkages between different building technologies and the community's livelihood systems and end users needs.

At the operational and implementation level, UNDP organized training programs for key construction workers in collaboration with the IHF, Bam Technical and Vocational Training Organization, and NDRII. They helped construction workers to apply the basic methods that must be used for seismic resistant construction, especially those neglected in Bam. They focused on capacity building for the use of indigenous design and construction techniques and showcased the common bad practices to sharpen the local building workers on earthquake-resistant construction (UNDP, 2006).

At the community level there was a need to understand people's needs for housing design and educate them more about the importance of building codes and standards. In order to do so the UNDP in co-operation with the Swiss Agency for Development and Cooperation (SDC), together with a team of engineers, designers, technicians, contractors, members of the public and the beneficiaries prepared different housing designs and discussed them with the beneficiaries. As a result of this collaboration people were provided with more choices over the type of houses they could build. More than 60 housing models were designed by the certified and authorized engineering consultants and offered to people to choose from.

Although the reconstruction stared with delays and a full recovery and reconstruction will take a few more years, there have been some achievements in the mitigation areas. Seismic building codes are followed and construction engineers have applied even higher standards that have significantly increased the overall building costs. There is a general agreement among the stakeholders that the reconstruction of Bam is becoming a turning point in the history of reconstruction programs in the country. Therefore, an earthquake resilient city is not far reaching at least from a physical point of view. As such, the Bam reconstruction program has the potential to become a successful recovery program, in that it has not only enhanced earthquake safety standards in Bam but also has created an overall earthquake awareness in other parts of the country (United Nations Office for the Coordination of Humanitarian Affairs, 2004). This has been achieved mainly through collaboration, participation and firm commitments of the stakeholders in this initiative.

Economic Development Opportunities

Bam economy was based on its unique and internationally known date production and also its main tourist attractions before the earthquake. Iran ranks number 1 in date production and exports more than 250'000 tones of dates annually, considerable portion of which is produced in Bam. During the earthquake there was no direct damage to palm trees, but the traditional irrigation systems, known as Qanats, were heavily damaged and needed urgent repairer and reconstruction (UNESCO, 2005). The ancient Bam (Arg-e-Bam), the cities famous cultural heritage and the second source of employment and income was a remarkable example of ancient Iranian urban construction and one of the most representative examples of a fortified medieval town built in vernacular technique using mud layers. Most of this magnificent site, which was attracting more than 100,000 national and international visitors every year, was destroyed by the earthquake. Earthquake created several economic development opportunities for both agriculture and tourism sectors that are discussed here.

In the agriculture and date production sector three major windows of opportunities were opened. First, the city's most famous product could be known to larger number of people worldwide. Second, during the reconstruction process the traditional irrigation systems would be repaired and modernized and this would increase the quality and quantity of production. Third, earthquake highlighted the economic advantage of the city in date production and the need to further capitalizing on that by the government and the private sector.

Rapid reconstruction of the irrigation systems and timely supports provided to the date producers prevented the collapse of date production in the year following the earthquake. Reconstruction in this area was mainly done by the Ministry of Agriculture and technical assistance provided by some of the International NGOs. As a result the economic base of the city has come back to its pre disaster situation and the amount of harvest increased significantly. However more efforts should have been done to fully utilize these opportunities in the form of a major economic development program. This economic base has the potential not only to generate more jobs and income for the city, but also to create employment opportunities for the whole region. Expansion of the palm orchards, active marketing of the products and more investments in the relevant industries and infrastructure are among the major areas for further attention that have been relatively neglected almost by all of the stakeholders. More collaboration among the stakeholders and active role of the government could enhance the use of these economic development opportunities. Perhaps this was an area that neither the NGOs nor international agencies had little or knowledge and experience on that.

Earthquake also brought several opportunities for the tourism sector despite of the total destruction of Bam citadel. The first opportunity relates to the fact that the ancient Citadel and surrounding cultural landscape of Bam was simultaneously inscribed on the UNESCO's world heritage list and on the list of world heritage in danger list in 2004. The List of World Heritage in Danger is designed to inform the international community of conditions which threaten the very characteristics for which a property was inscribed on the World Heritage List, and to encourage corrective action. There is no doubt that the inclusion of Bam's citadel on the World Heritage in Danger List gave a much-needed impetus to the reconstruction efforts and plans. Inscribing a site on the List of World Heritage in Danger allows the World Heritage Committee (WHC) to allocate immediate assistance from the World Heritage Fund to the endangered property.

Secondly, the earthquake created new excavation opportunities and as a result archaeologists discovered new historic evidences such as remains of an ancient settlement and its irrigation systems dating back at least to the Parthian-Hellenistic period (2^{nd} century B.C.). These are added to the existing tourists' attractions of the city. The third opportunity was the fact that city and its unique cultural heritage became known to a larger number of people worldwide and it is expected that after the reconstruction and rebuilding of city's tourism facilities, it will attract more tourists that will come to the city not only to see the Arg-e-Bam but also to visit a city that was completely destroyed by an earthquake once.

The fourth opportunity that is also relevant to the tourism development is the role that this city can play in earthquake education and research in the future. A better utilization of this opportunity requires an earthquake museum and a research center to be created and some university programs to be established. Bam Azad University (private sector) used this opportunity and created new programs on civil engineering and archaeology.

Obviously some of the economic development opportunities have been utilized very well through the international, national, and local collaborations. Technical, knowledge, and financial supports provided by the international agencies, foreign governments (Italy and Japan) and ample technical expertise of well-trained Iranian professionals came together to capitalize these opportunities. Several workshops and conferences were held in Bam, Tehran and other parts of the world to discuss the reconstruction strategy for Bam citadel and a restoration plan was jointly prepared by the UNESCO and the Iranian authorities. The first phase involved reinforcing the structures that were still standing to prevent them from collapsing. Then data were collected and all available information about Arg-e-Bam studied to lay the ground for the reconstruction, which is now undergoing. The restoration of Bam citadel will certainly need several years to be completed. In the mean time, however, more stakeholders' collaboration and support are needed so that the city can regain some of its tourists to be able to support its economy and the reconstruction process. It especially requires government and private sector collaboration in rebuilding of the basic tourism facilities such as hotels and restaurants.

Physical Planning and Development Opportunities

Disasters provide opportunities for planners to exercise new ideas and planning innovations. Chicago fire in 1871 and Halifax explosion in 1917 are classic examples of disasters that created significant physical development opportunities (Asgary, 2004). Similarly Bam earthquake created new opportunities for planners to try new physical planning and development ideas. To utilize these opportunities a technical consultation on urban redevelopment and planning was held in April 2004 in which a large number of international, national and local agencies were involved. UNDP, UNICEF, UNESCO, WHO, UNIDO and other UN agencies provided technical and capacity building assistance for micro-planning of the city. Assessments began in close liaison with local, provincial and national authorities to identify physical, economic and social factors that influence the reconstruction of Bam and its infrastructure. For example, the possibility of a new master plan for the city created an opportunity to introduce the 'child friendly city' concept in the reconstruction plan initiated by the Iranian High Council of Architecture and Urban Planning and supported by the UNDP.

Despite of the existence of planning opportunities in the post disaster reconstruction phase, there have been major obstacles for capitalizing these rare and important opportunities. Stakeholders are less diverse and have conflicting interests and collaboration is relatively low. Moreover, there hasn't been much international support and involvement in this particular area. In fact physical planning has become one of the most challenging parts of the reconstruction process. It took more than a year for the planning company to prepare the city's new master plan. However, 2 years the plan has not been adopted and approved for implementation by the relevant authorities due to the conflict of interests that exists between the reconstruction office run by the IHF and the municipality. As a result the actual reconstruction was started without considering the new master plan and, therefore most of the physical planning opportunities were almost lost.

Physical planning decisions are lengthy. For example, one of the new master plan recommendations was to set back and widen a few streets, but because of the conflict of interest between the stakeholders (land owners, municipality and reconstruction office) this recommendation has not been implemented yet. As land owners increase their pressure, there is little chance for such physical planning opportunities to be used. Confusion over the land prices has partially created this problem. In order to widen the streets, city needs to purchase considerable number of properties. City has been able to purchase 1200 properties and plans to buy another 500 properties hoping to facilitate and speed up the implementation of the new plan's recommendations. However, lack of financial resources as well as the confusion over the land prices has created major problems for the city. There is little agreement between the stakeholders over the land prices because the city's real estate market has collapsed. Land owners are not willing to sell their lands based on the prices offered to them by the city or the reconstruction office.

Post disaster reconstruction created significant opportunities for improving urban facilities such as libraries, expansion of the Bam airport, highways, sport complexes, art and theater houses, health clinics and hospitals. Again collaboration among the stakeholders and financial supports provided by the NGOs, private sector, international agencies played a key role in successful use of such social and physical development opportunities.

Our observations shows that people are now playing a significant role in the reconstruction process despite their initial expectations that government and other agencies will take care of everything. People have leaned many things about the modern urban planning process and building methods in the city as they need to follow proper planning and development processes. Most residents are now familiar with large number of development and planning terms, especially those relevant to earthquake resistant building codes and standards. In the initial stages of the reconstruction, the Government insisted on using steel frame structure as its construction method of choice. However, as a result of several meetings and consultations with stakeholders, the government showed flexibility in handing over the choice of the design to the people by establishing an engineering services and exhibition site in Bam. This exhibition site has brought engineering consultants, building material suppliers and construction companies all in one place where they can offer their services and materials. The government has provided the facility for offering different design choices from a variety of standard building materials and even various styles of fences and walls for the housing units, commercial and public buildings. The government is now more open to alternative construction methods than before and instead of recommending a single technology she is recommending policies for earthquake proof buildings that also safeguard the cultural integrity of Bam. Kerman Province Association of Engineers and The Council of Bam Architecture are providing these services free of charge to the people through their contract with the IHF. This is a step forward towards a more participatory physical planning.

Conclusion

Bam earthquake provided numbers of pos-disaster mitigation, economic and physical development opportunities. Two years after the disaster there are evidences showing that the city has been able to utilize some of these opportunities and has failed to benefit from others. Several factors have possibly contributed to the success and failure in using these opportunities. First, there is little doubt that in the successful cases such as mitigation and registration of Bam citadel in the world heritage in danger list collaboration and participation of different stakeholders were very high. International organizations provided technical and training support, national government prepared the framework and financial and human resources, local government provided logistic and local knowledge, NGOs were active in capacity building and public education programs, and local citizens participated in the process with high level of motivation and interest. This success is partially attributed to the less conflict of interests and political commitment. On the other hand in the physical planning or economic development cases less collaboration existed and in fact in some cases there were little interests by stakeholders to get involved. The nature of post disaster reconstruction and the lack of cooperation among the stakeholders and less interest by NGOs and international organizations are among the factors contributed to these results.

Second, most of the stakeholders, specially the NGOs and international agencies involved in the post disaster reconstruction paid more attention to the small scale capacity building and social recovery issues as compared to the large scale development programs in agriculture and tourism that could have more significant impacts on the long term recovery of the city and the region.

Third, there is a potential relationship between the accumulation of knowledge and experience and the use of post disaster opportunities. As we get to know these opportunities, we are utilizing them much better. Mitigation opportunities are a good example. Most of the stakeholders that were involved in the reconstruction process had much experience and knowledge to share and apply. This was not the case with some other opportunities such as the physical planning or economic development opportunities that were not fully utilized in this case.

Fourth, International agencies can play a major role in the success and failure of the post disaster opportunities. This study provides evidences that post disaster opportunities were used better where international agencies were involved.

References

Akbari M.E., Farshad A.A., Asadi-Lari M. (2004), "The devastation of Bam: an overview of health issues 1 month after the earthquake", *Public Health,* Vol. 118, pp. 403–408.

Albala-Bertrand, J. M. (1993), "The political economy of large natural disasters with special reference to developing countries", Oxford: Clarendon Press.

Asgary Ali (2004), "The Third Bam: Post-Disaster Reconstruction Opportunities", Iran Newspaper, January 10.

Asgary, Ali (2004), "Planning and Disaster Management Education in Canada", Plan Canada, Autumn 2004.

Badri S.A., Asgary A., Eftekhari, AR., and Levy J. (2006), "Post Disaster Resettlement, Development and Change: 12 Years after Manjil Earthquake", Disasters, (forthcoming).

Benson, C. and Edward J. Clay (2001), "Dominica: natural disasters and economic development in a small island state", Disaster Risk Management Working Paper Series No. 2. Washington, D.C.: World Bank :
http://www.proventionconsortium.org/files/dominica.pdf

Brocklesby, M.A., Ambrose, B., Fon, T.C. (2002). Developing participatory forest management: the user group analysis on Mount Cameroon.

Brugha, R., and Varvazovszky Z. (2000), "Stakeholder analysis: a review", Health Policy and Planning, 15(3): 239-246 .

Davis, Ian (2005), "Problems with the Principles of Disaster Management", 2nd CRHNet Annual Symposium, November 17-19, 2005, Toronto, Canada.

MNA, (2004), "All budget must be spent for Bam reconstruction", Mehr News Agency, Tehran :
http://www.mehrnews.com/fa/NewsDetail.aspx?NewsID=108335

MNA, (2004), "All budget must be spent for Bam reconstruction", Mehr News Agency, Tehran:
http://www.mehrnews.com/fa/NewsDetail.aspx?NewsID=270033

Nadim F., Lindholm, C., Remseth S., Andresen A., and Moghtaderi-Zadeh M., (2004), "Bam Earthquake of 26 December 2003", ICG Reconnaissance Mission, ICG report 2004-99-1.

Pelling M., Özerdem A., and Barakat S. (2002), "The macro-economic impact of disasters", *Progress in Development Studies Vol.* 2, No 4, pp. 283–305.

Ramirez, R., 1999. Stakeholder Analysis and Conflict Management. International Research Centre, Ottawa, Canada.

Smith, L.G., 1993. Impact Assessment and Sustainable Resource Management. Longman Scientific and Technical, Harlow, England.

Swiderska, K., 2002. Implementing the Rio Conventions: implications for the south. WSSD Opinion, IIED.
UN Office for the Coordination of Humanitarian Affairs, (2004), "IRAN: Reconstruction efforts in quake-devastated Bam continue two years on" ANKARA, 26 Dec 2005 (IRIN) (http://www.payvand.com/news/05/dec/1210.html)
UNDP, (2004), "Disaster and Development", UNDP.
UNDP, (2006), "Progress Report: UNDP Sustainable Housing Reconstruction Program In Bam Through Community Mobilization and Participation", UNDP (www.undp.org.ir/reports/shelterreport.doc)
UNESCO, 2005, "Bam Citadel (Iran)", UNESCO, No 1208 http://whc.unesco.org/archive/advisory_body_evaluation/1208.pdf
Varvazovszky Z, and Brugha, R., 2000, "A Stakeholders Analysis", Health Policy and Planning, 15(3), 338-345.

AN OVERVIEW OF THE RECONSTRUCTION PROGRAM AFTER THE EARTHQUAKE OF BAM, IRAN

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Abstract

This paper reviews the approach that authorities have employed for the post-earthquake reconstruction of Bam, Iran, and highlights the importance of combining new construction technologies with local know-how to improve the sustainability of such projects. The conclusions of this paper are based on the information gathered through fieldwork and observations gathered in the city of Bam after the earthquake as well as a review of the literature concerning this earthquake. In addition, this research studies the problems and failures that the reconstruction program in Bam has in common with similar cases around the world. The paper consists of two main parts. In part one, the pre-earthquake building practices in Bam are studied to arrive at the conclusion that the failures of the buildings in the earthquake were neither the result of a lack of construction technology, nor the consequence of a shortage of building materials but were the result of poor workmanship and lack of construction knowledge. In part two, the reconstruction efforts underway in Bam are reviewed briefly to illustrate the general idea of the program, followed by a critical look at the top-down, imported technology-based approach of the program.

Keywords: Reconstruction; earthquake; Bam; top-down (technology-based) approach; construction know-how; balanced program.

Part One: Building Practices in Bam Before the Earthquake

A 6.7 magnitude earthquake severely damaged the city of Bam, Iran on December 26 2003. According to the International Federation of Red Cross and Red Crescent Societies (2004) approximately 45,000 people died, and more than 75,000 residents were left homeless. The majority of houses in Bam were built out of adobe and raw soil, and the vast destruction throughout the city was first thought to be the result of these supposedly poor construction materials. A closer look at what remained of the city, however, reveals that this is not the whole story. It is now known from the evidence in the ruins, that poor workmanship and lack of construction know-how were the main causes of the devastation, regardless of whether the buildings were made of earth, concrete or steel.

In the following paper, the flaws and mistakes of the construction practices that resulted in the destruction of buildings in Bam are studied based on the fieldwork conducted in February 2005, as well as information and pertinent literature gathered from respected authorities. Although some of the destroyed buildings were still in the condition as they were after the quake, the majority of damaged buildings were bulldozed at the time of visit, some 14 months after the earthquake. Luckily, there were quite a lot of pictures taken by others in the weeks following the earthquake. These were the main source of study in this part. The different types of buildings in the city and their devastation in the earthquake will be studied by focusing on two main problems: 1) design and construction knowledge; and 2) implementation. The report aims to uncover major problems existing in the construction practices in Bam. As a result, the current reconstruction situation in Bam will also be studied. The methodology is based on an analysis of pictures taken of buildings destroyed in the earthquake in tandem with a study of the literature published concerning the earthquake in Bam.

Post-Disaster Reconstruction : Meeting Stakeholder Interests : Proceedings of a conference held at the Scuola di Sanità Militare, Florence, Italy 17-19 May 2006, edited by David Alexander, Colin Henry Davidson, Andrew Fox, Cassidy Johnson, Gonzalo Lizzaralde, ISBN 978-88-8453-611-2 (online), ISBN 978-88-8453-612-9 (print), © Firenze university press, 2007

Design/know-how. The term *design* here refers to any sort of formal or informal knowledge of construction applied to the building by the builder. In other words, the *design* does not only address the technical and engineering aspects of construction; rather, the formal and popular knowledge employed comprises the *design* of a building. This section examines certain design failures that resulted in the destruction of certain buildings in Bam and is divided into two general categories: 1) structural components, and 2) implementation. Each of these is then divided into several subsections.

Structural Components

Foundation. The foundation anchors the whole building to the ground, reducing the movement of the building during earthquakes. The lack of a good and appropriate foundation is a common problem among the buildings destroyed in Bam, and a number of houses did not have any sort of foundation at all.

Walls. As walls were analyzed after the earthquake in Bam it was revealed that none of the walls were reinforced. The reinforcement of load-bearing walls is not a common practice in Bam, and even simple measures such as placing vertical and/or horizontal reinforcement bars are non-existent. Furthermore, some of the load-bearing walls were not thick enough to resist the bending and the shear force caused by earthquakes. Even in the cases where the walls seemed to have the appropriate thickness, the length of the wall and/or its height weakened its resistance to lateral forces. Moreover, the inappropriate placement of openings (i.e. windows and doors) and/or their proportions to the overall wall area greatly reduced the strength of the wall.

Columns, Beams, Bracings. The majority of post-and-beam buildings in Bam were built without adequate attention to engineering principles. For the most part, local masons or even the owners themselves were the builders, many of whom lacked knowledge about effective construction techniques. Their knowledge still remains very limited in this area because post-and-beam construction is relatively new in Bam. The people of Bam in the past, however, were quite knowledgeable in the type of construction used for over two thousands years, which includes wall systems composed of load-bearing earth walls, barrel vaults, and cupolas. Weak steel columns and beams, and a lack of cross-bracings are the dominant mistakes in the cases of steel-frame buildings destroyed in Bam. Concrete buildings had problems with the inadequate number and/or size of reinforcement steel bars. In one case, surprisingly, the steel bars of the beam were eliminated. This lack of knowledge about concrete construction is a serious problem generally in Iran, but in smaller cities, it is much more critical.

Roofs / Floors. Roofs and floors play an important role in the resistance of a building towards earthquakes because they constitute the main load of the building. Logically, the lighter a roof is, the less of a risk that the structure will collapse during an earthquake. This situation affected a majority of homes in Bam, which had very heavy roofs. Moreover, a number of houses were overloaded from the addition of new stories on top of the existing houses. These extensions, built on structures without properly engineered load-bearing walls, led to the destruction of many buildings and the loss of entire families (Maheri, 2004).

Building Plan. A building plan must always account for potential lateral forces that occur during earthquakes and include a design element to *resist* these forces. In order for a building to gain more resistance in earthquakes, it is useful to follow two general rules: first, the plan should be as simple and compact as possible, and second, complex shapes must be avoided. These two essential considerations were ignored during the planning phase of a number of the recently built homes that were consequently destroyed.

Implementation. No matter how well designed a building is, it will collapse in an earthquake if proper care is not taken in the construction process. A lack of construction knowledge among a majority of the laborers and masons, along with inadequate building inspection made many buildings in Bam vulnerable to the earthquake.

Moreover, the lack of decent yet affordable construction materials made the situation even worse, since the majority of Bam's citizens are poor or lower middle-class. It is thus hard for them to afford quality materials that are imported from other parts of the country. By and large, the problem with the implementation can be divided into two general categories: first, problems arising because of improper or poor construction materials, and second, problems arising from poor workmanship and construction details.

Building Materials. Needless to say, the quality of construction materials has an indisputable effect on the resistance and strength of a building to exerted forces. Buildings in Bam range from traditional earth buildings to those made of concrete and steel. Due to the poor quality of construction materials employed, severe destruction can be seen amongst all types of buildings, regardless of the building material. In the following, the buildings destroyed in Bam are studied in terms of the quality of their construction materials, categorized into four groups: 1) earthen, 2) steel frame, 3) concrete, and 4) hybrid buildings.

Earth Buildings. Building with earth has a long history in Bam, dating back some 2500 years, when the city was founded. This traditional mode of construction is common throughout Bam, a city well known for its glorious, magnificent earth architecture, where one of the biggest earthen complexes in the world existed, the Bam Citadel. Although the citadel was destroyed in the earthquake, its survival for such a long period of time indicates the strength and durability of earthen materials. A number of these buildings remained intact, proving that the use of appropriate materials, along with adequate maintenance in the case of old buildings, would help earthen buildings withstand severe earthquakes.

Since the soil used for making earthen buildings is naturally diverse in its contents, and since each type of soil suits a specific construction technique, great care must be taken in choosing appropriate soil for each construction method. For example, if one wants to build with adobe, the soil contents must be suitable for making adobe bricks. Otherwise, the strength of the building would decrease remarkably. The poor resistance of the many earth buildings in Bam was due in part to the inappropriate soil content for various earthen architectural techniques.

Steel Frame Buildings. The problem of materials in steel frame buildings in Bam refers primarily to the incompatibility of masonry materials used as wall infill and/or roofs. Masonry construction materials in Bam, which are mainly burnt brick and sand-cement mortar, fit together with a fairly good cohesion if skillfully executed. Nonetheless, the adhesive agent (i.e. cement in the case of sand-cement mortar) does not bond well with steel, and is often incapable of providing holistic cohesion in the building. The problem shows up in walls where the wall directly meets a column or beam, and in roofs composed of steel beams with jack arches in between, though the mortar is soil-and-chalk in this case.

In both cases, a lateral force like an earthquake tremor could easily make the walls or jack arches spring apart from the steel frames, leaving the brick mass detached from the structure, causing it to collapse. A lot of houses were observed in Bam where the body collapsed while the skeleton of the frame (i.e. posts and beams) remained standing.

Concrete Buildings. Construction with concrete is a relatively new practice in Bam. As a result, Bam is just now gaining knowledge about how to produce good quality reinforced concrete and how to build effective structures. Generally speaking, the performance of a concrete structure depends on the proper mix of ingredients as well as efficient reinforcement. Ignoring these essential factors and overlooking the importance of careful inspection in the production of concrete resulted in the destruction of the majority of concrete buildings in Bam, many of which were built very recently.

The defects of concrete structures in Bam mainly were rooted in the high price of materials necessary for quality concrete buildings, including cement, infill ingredients, and steel reinforcement bars. The price of cement for the average citizen is relatively high, because cement must be imported from other parts of the country, which impose shipping and handling costs. Quite understandably, from the point of view of a non-educated builder or owner, the increase in costs would likely lead to a reduction of the percentage of cement and/or steel in the concrete mix, in order to maintain the total cost estimates. In addition, the lack of construction know-how with concrete among local builders and masons resulted in the use of unsuitable concrete filler: ingredients such as construction waste and debris, which ultimately reduce the strength of the structure. Moreover, the high price of steel bars, imported from remote parts of the country, intensified the problem. Many builders and owners reduced the steel bar reinforcements in size (diameter), quantity, and quality, while increasing the distance between stirrups for the sake of minimizing costs. *Hybrid Buildings.* The term *hybrid* here refers to buildings employing two or more different structural systems. For example, a number of buildings in Bam were built using steel columns together with flat concrete span roofs, reinforced concrete columns with steel beams/girders, or load bearing earth walls with steel girders resting on the wall, and so forth. The combination of different structural systems, using various materials and methods was often the consequence of efforts to reduce the cost of building. Owners often looked for the cheapest materials and methods that are simple enough to be executed by ordinary laborers as opposed to sophisticated methods that need skilled masons commanding higher wages.

Generally, the major problem with hybrid buildings is the inconsistency of different building materials and designs unsuitably mixed together in one structure. When an external lateral force, such as an earthquake, is exerted on the different parts of the structure they do not behave in the same way and react differently, intensifying the destruction rate and reducing the resistance capacity of the building.

Moreover, the difference between materials of the walls and roofs in wall-bearing structures, common in many kinds of hybrid buildings in Bam, requires relatively sophisticated methods at the joints where the two systems meet. If improperly joined, these conjunctions are often the starting points of a collapse. In addition, it is very common in Bam, and in many other cities in Iran, to reuse construction materials, especially bricks, remaining from demolished buildings in the construction of new ones. The problem is that used bricks often bond poorly with mortar, and the walls made of such bricks cannot withstand earthquakes.

Workmanship and Details. One of the most important stages of any construction process that directly affects the strength of the building is the actual implementation of the construction. It can be said that the most serious problem with buildings in Bam is the result of the poor quality of construction details. In other words, it seems that builders and masons in Bam, especially those who build with new construction materials such as concrete and steel, either do not pay any attention to the execution and workmanship during the construction, or simply do not have appropriate knowledge of construction and detailing. The latter is most likely the case in the majority of houses in Bam since a great percentage of houses, if not all, were built by local masons, the majority of whom have no education in modern construction materials, neither formally nor informally.

When new construction materials were introduced to the locals, masons and builders tried to adapt these new materials to their traditional construction methods. The result was a variety of construction methods that were rarely designed appropriately, and never implemented correctly. In the following, the defects and mistakes are discussed in two categories: first, poor workmanship, and second, weak joints.

Poor Workmanship. No matter what the construction method, almost all of the destroyed buildings in Bam somehow suffered from poor workmanship, which means the ignorance of some simple yet essential considerations by laborers/masons during the construction of the building. For instance, much of the masonry in the city, usually adobe or burnt bricks, received great damage because of inappropriate or awkward bricklaying.

Although Bam has achieved fame for its adobe buildings and earthen structures, the knowledge of bricklaying has seemingly been forgotten among local masons over the last few decades. For example, even the simple though important practice of soaking dry bricks in water before laying them was ignored in the construction of many buildings in Bam. Serious problems occur when dry bricks suck the water from the sand-cement mortar, which needs adequate moisture to be cured and make a good bond.

Another dominant failure in the workmanship is the amateurish work in almost all aspects of steel frame buildings; often, the welding is inadequate and too weak to hold together during earthquakes. Joints are one of the most critical points of the structure and very little attention has been paid to them in the majority of steel-frame buildings in Bam. The lack of gusset plates, stiffener plates, and reinforcing plates were are very common problems of such structures in Bam; these problems are intensified by the poor quality of welding in the joints and anywhere else that reinforcement plates are placed (Hosseini Hashemi, 2004).

Poor workmanship in concrete buildings is also common, though not many concrete buildings have been built in Bam. First of all, the quality of concrete is far below the acceptable standard because it is very often mixed on-site by unskilled labourers, and consequently, the quality varies from time to time. Moreover, due to the lack of concrete construction know-how, there is a misconception that any crushed construction material can be used as an ingredient in the concrete mix. So, it is easy to find concrete columns and beams, most of which were destroyed in the earthquake, with crushed/broken bricks as ingredients. This lack of knowledge extends to the point where builders mistakenly reduce the quantity of steel needed by increasing the distance between stirrups, reducing the girth and number of reinforcements, or even eliminating steel bars from the beam.

Weak Joints. Some points of buildings are more vulnerable to earthquakes due to the diversity of forces exerted on them. Thus, a thorough construction system should reinforce these critical points. It must be emphasized that all structural joints are critical locations, including wall intersections, corners, roof-wall joints and the joints between foundations and walls. These vulnerable points need more attention and close inspection during the construction process. As is the case of majority of buildings in Bam, ignorance of the important role these critical joints play in the resistance of buildings to seismic forces resulted in fragile buildings. This problem can be seen in all types of construction methods in Bam, including earthen, steel-frame, and concrete buildings.

Part Two: The Reconstruction Effort

After the earthquake, the reconstruction program became the main concern of the government and local authorities. Soon after, the Housing Foundation of Islamic Revolution (HFIR) was assigned to take all the reconstruction efforts of Bam under its control. HFIR is a publicly funded, yet non-governmental, organization ruled by a principal designated by the Supreme Leader of Iran. All the activities with regard to the reconstruction of Bam must be accepted by HFIR from the first stages. This situation, considering the fact that many of the initial steps should be taken by the municipality of Bam, has made the process of the reconstruction time-consuming because of the numerous bureaucratic steps citizens face. Not surprisingly, as a result, not many houses had been rebuilt by the time of my visit, some 15 months after the earthquake, though quite a few reconstruction projects had been initiated. Consequently, people who lost their homes in the earthquake were still living in containers or other sorts of temporary accommodations; some even lived in first-aid tents.

In order to take part in the reconstruction of the city, a number of construction factories, building contractors, and architectural consultants have either moved to Bam or established a representative office; the majority of these offices are housed in a complex building provided by HFIR at the periphery of the city. This building is the main core of the reconstruction engineering and architectural enterprise. Beside this HFIR has designated an extensive lot for construction companies and architectural firms to build samples of their proposed buildings, to demonstrate their proposed construction methods to the locals. Each building offers earthquake-resistant features, according to the promoters, who try to convince the citizens to use their specific techniques in the reconstruction of their house. In the following section, all the construction techniques proposed by HFIR and various building companies are briefly reviewed in order to illustrate the general reconstruction concepts designated for Bam.

Housing Foundation of Islamic Revolution (HFIR). A comparatively small house of 9x9 sq. m has been designated by HFIR engineers and architects as the standard size of a house for an average-sized family in Bam. All the construction companies and architects are thus advised to design and build within these fixed dimensions. In addition, HFIR has designed a prefabricated steel-frame structure that fits the 9x9 m^2 house. HFIR recommends that all use this structure in the new buildings that are to be built in Bam.

The structure proposed by HFIR consists of prefabricated steel posts, beams, and bracings that are designed in a way that can easily and quickly be assembled, using only bolts and nuts for fastening the elements together. For example, the structure of a regular house (9x9 m^2, as HFIR recommends) can be installed in place in just few hours, employing only two labourers. Aside from the quick installation, the idea is that using labourers to only fasten the bolts would remarkably reduce the number of failures caused by inadequate welding (Figure 1).

HFIR has built an educational sample of the proposed structure on the exhibition site, where citizens can visit and learn about essential construction details. The whole structure is placed on a reinforced concrete foundation, to which the frame is connected using bolts and nuts (Figure 2). The roofing system and wall infill technique remain flexible to the constructor/owner's decision. HFIR, however, is building a number of publicly funded buildings, using ordinary bricks and/or hollow blocks as wall infill, and a reinforced concrete slab roofing system.

Figure 1. The structure proposed by HFIR.

Figure 2. Detail of the HFIR's structure; posts and beams are connected by bolts and nuts.

To strengthen the bond between bricks and steel columns and prevent bursting corners during earthquakes, either L-shaped steel bars are used to reinforce corner joints, or the columns are wrapped with chicken wire to enhance the bond with the sand-cement mortar. The roofing system proposed by HFIR consists of prefabricated I-steel beams as girders, which hold a 7-10 cm concrete slab moulded on corrugated galvanized steel sheets as left-in-place moulds. Small Z-shaped steel laths are welded to the girders, connecting the concrete slab to the girders every 50 centimetres. HFIR has built a sample house with its recommended techniques at the demonstration site. The house employs the HFIR prefabricated steel structure, hollow blocks are used as wall infill and the roof is concrete slab. This construction method may change, however, when citizens or other builders in the city begin to make decisions concerning their building. For instance, the wall infill may change from double-side-meshed polystyrene sandwich panels to ordinary burnt bricks or hollow blocks. The roofing system also may vary from thin concrete slabs on steel girders to block-joist system.

Other Construction Companies/Practitioners. All the construction methods offered by building practitioners other than HFIR fall into one of the following categories:-

- HFIR's structure, different components: The construction method employed by this group consists of the steel frame structure that HFIR has recommended but with different building components such as different roofing or wall infill systems. For instance, some building companies offer drywall and steel stud system for walls and/or pre-stressed concrete slabs for roofing the HFIR's steel frame structure.
- Prefab structure and components: Some construction companies offer prefabricated structures such as sandwich panels, prefab trusses, or cold-formed joists and studs as the structure of their proposed building method. Prefabricated components such as drywall panels and/or precast concrete roofs are usually the complementary parts of these systems.
- Conventional steel-frame structure and lightweight materials: This group consists of techniques that employ a conventional steel-frame structure, using welding to join the structural components (i.e. posts and beams) together. However, in order to gain better resistance against earthquakes, these models

use lightweight materials for roofs and walls, such as sandwich panels and corrugated steel sheets.
- Reinforced masonry: There are two foreign institutes; Auroville (India) and Peace-Winds (Japan), who have proposed masonry-based construction techniques.

In these methods there are three essential elements responsible for consolidating the building, thereby increasing its resistance to earthquakes. These three components are horizontal reinforcement elements (ring beams), vertical reinforcements (steel bars), and buttresses alongside the openings. Horizontal reinforcements consist of reinforced concrete beams placed around the building wherever the load-bearing walls are located, usually at four levels: plinth, sill, lintel, and roof height. Vertical reinforcements are steel bars placed within the walls, and must go from the foundation to the upper ring beam at the roof level.

Among the aforementioned institutes, Peace-Winds has taught its proposed method to four local masons during the implementation of the first two buildings in order to disseminate the knowledge of such reinforcing method among the locals.

Advantages and Disadvantages of Proposed Techniques. Two factors – quick and easy installation, and resistance to earthquakes – are the main elements of the idea behind the HFIR structural system, which well addresses these concerns. The construction cost, however, remains a major obstacle. In addition to the high price of the prefabricated steel components that are imported from long distances, some parts of the structure are over-designed, which wastes money and materials. For instance, the X and V bracings employed are unnecessarily thick. The 9x9 sq. cm hollow-section steel bars employed for these bracings can be simply replaced with tiny steel rods or cables, or even a well-done brick wall can do the job. A rough estimation indicates that these bracings constitute around 30 percent of the total steel used in the proposed structure. Moreover, earthquake forces rarely affect one-story buildings if properly constructed. In the case of one-story buildings such as those that HFIR proposes, the placement of thick walls between the steel frames to consolidate the structure against earthquakes would obviate the need for bracings.

Another problem that still exists is the lack of knowledge of constructing with concrete, which is a problem for all methods that use concrete because the local masons are not educated for making a proper suitable mix. Although the HFIR's structural system does not need skilled masons/labours for the skeleton (i.e. posts and beams), the roofing system remains of a great potential risk during earthquakes if it is to be built by local masons. The problem is that while HFIR recommends flat concrete decking roofs for its proposed structure, locals normally use block-joist roofs, consisting of prefabricated reinforced concrete joists with hollow blocks on which 5-7 cm concrete is poured. This system is more affordable and cheaper than HFIR's proposed steel-deck concrete-slab. The main problem with a block-joist roof is the poor bond it makes with steel beams, to which it is connected by means of only a few welding points. Clearly, such a bond would break easily during strong earthquakes.

Overall, it can be said that the construction method and structure proposed by HFIR is earthquake-resistant to some extent, yet unnecessarily expensive, and employs a technique that is overly sophisticated for the local builders. This method, however, would not resist long enough in earthquake if not properly supervised by an educated inspector of some kind in the roofing stage.

As for other proposed building methods, all the pros and cons enumerated for the HFIR method hold true for the methods employing HFIR's structure. In addition, drywall is a very expensive construction material in Iran. Wholly prefab systems are expensive and too sophisticated to be successfully adopted by the locals, resulting in an unsustainable reconstruction program. The proposals that use corrugated steel sheets for roofing do not pay any attention to the climatic and vernacular aspects of the local context. As is usually the case with almost all of top-down reconstruction programs, such methods lack "sensitivity in the urban and landscape design," and are practically incapable of yielding long-term solutions for the housing market (Lizarralde, 2001b). The only promising approach is that of Peace-Winds, which focuses on educating local masons and improving local know-how.

Gonzalo Lizarralde and Colin Davidson highlight the major defects of top-down (imported technology-based) approaches: "the use of designs that are too far from traditional typologies and indigenous distribution of spaces, the use of materials foreign to the local building practices and extremely high costs of logistics and transportation of materials" (Lizarralde, 2001b). A close look at the building practices in Bam before the earthquake attests to the fact that technology itself cannot solve the problem of making better earthquake-resistant houses; rather, it is necessary that the construction knowledge of the locals is improved.

Conclusion

There are a number of proposals for reconstructing houses in the city of Bam, all of which consider the earthquake-resistance of the building in one way or another. However, the lack of construction knowledge among the local masons seems to be the main obstacle to the implementation of these sophisticated methods in Bam. Moreover, the closed nature of the reconstruction program, along with the inflexible design of housing units, fails to address the needs of the inhabitants for adapting their homes to their individual desires or making changes or extensions in the future if needed. In conclusion, the reconstruction program in Bam fails to address some essential features needed for a project of this nature to be successful and sustainable. These flaws can be rectified by adhering to the following recommendations:

- The program must be balanced in such a way that it "meets a variety of related needs" such as providing "training in improved construction techniques, job opportunities for local builders and craftsmen" and so forth. All the reconstruction methods proposed in Bam, with the exception of Peace-Winds' program, simply offer earthquake-resistant "replacement" units for the destroyed houses as their ultimate goal, which does not lead to the construction of a sustainable environment and city (Cuny et al., 1983).
- The reconstruction should "involve fully the local people" and resources. The reconstruction program has thus far underestimated the importance of local community participation. The majority of materials, supplies, labourers, and expertise have been imported to the city for the reconstruction project, which definitely reduces the likelihood of the program succeeding (Cuny et al., 1983).
- Similarly, solutions should be developed by employing local capabilities rather than importing sophisticated methods. Earthquake-resistant construction techniques imported to the city immediately after the earthquake are unlikely to be adopted by the locals, due to their unfamiliarity with them. In order for a reconstruction program to be sustainable, it must provide construction techniques that are easy to be learnt be the local builders/masons so that they can adopt it to their knowledge.
- The future needs of inhabitants must be taken into consideration. Many families will be adding an extension to their new houses. Since the locals, including masons and labourers, are not fully involved in the reconstruction process, and since the majority of construction techniques employed in the reconstruction are fairly sophisticated for the locals, extending houses will be a great challenge for citizens in near future.

Based on the experience and knowledge gained from previous post-disaster reconstruction projects, it seems apparent that the Bam Reconstruction Program will fail to achieve its expected objectives due to the complexity and lack of flexibility in housing designs, the underestimation of local resources, and ignorance of the future needs of the inhabitants. However, future research will fully reveal the outcome of this reconstruction program and its long-term influence on housing and building practices in Bam.

References

Aysan, Yasemin, and Paul Oliver (1987). Housing and Culture After Earthquakes. Oxford Polytechnic

Cuny, Freserick C. (1983). Disasters and Development. Oxford: Oxford University Press

Hosseini Hashemi, B., and M. Jafari S. (2004). "Performance of Batten Columns in Steel Buildings During the Bam Earthquake of 26 December 2003" *Journal of Seismology and Earthquake Engineering*. Vol. 5,6

Hosseinzadeh, N.A. (2004). "Lessons Learned from Steel Braced Buildings Damaged by the Bam Earthquake of 26 December 2003" *Journal of Seismology and Earthquake Engineering*. Vol. 5,6

Lizarralde, Gonzalo and Colin Davidson (2001a). *Industrialization for post-disaster housing: An approach to 'open' component systems*, i-Rec, (electronic article on the internet)

Lizarralde, Gonzalo and Colin Davidson (2001b). *Models of Reconstruction Projects,* i-Rec, (electronic article on the internet)

Lizarralde, Gonzalo and Colin Davidson (2001c). *Towards a pluralist approach in post-disaster housing reconstruction in developing countries*, i-Rec, (electronic article on the internet)

Maheri, M.R. (2004). "Performance of Roofs and Floor Slabs During Bam, Earthquake of 26 December 2003" *Journal of Seismology and Earthquake Engineering*. Vol. 5,6

Scholl, Roger E. (1982). EERI Delegation to the People's Republic of China; an Information Exchange in Earthquake Engineering and Practice, EERI Publication

Solo, Tova-Maria (1991). "Rebuilding the Tenements: Issues in El Salvador's Earthquake Reconstruction Program" *Journal of the American Planning Association*, Vol. 57.