COASTAL LANDSCAPE AND "DISAPPEARING" TERRITORIES

Antonietta Ivona, Donatella Privitera

Abstract: The relationship between climate and tourism is very close, and this connection is even more evident for tourism in coastal areas. The various impacts of climate change have long been obvious in many destinations. In addition, like all sectors, also tourism contributes to the production and emission of greenhouse gases, with devastating consequences for certain areas. Through a case study, this contribution aims to reflect on territories that are disappearing due to climate change combined with excessive tourism. A new form of tourism, known as last chance tourism, has emerged as a result. In recent decades, warming in the Mediterranean has been much faster than in the rest of the world, causing serious territorial and economic consequences. Entire areas traditionally dedicated to tourism today have to deal with a drastic decrease in the number of tourists or, in some cases, an excessive increase in them to visit places with an uncertain future.

Keywords: Last chance tourism, case study, global warming, coastal erosion.

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1. Introduction

The climate has always been a fundamental factor for tourism. The close relationship between climate and tourism is particularly evident in coastal tourism, mountain tourism, and nature tourism. Tourism is considered a highly climate-dependent activity, much like other essential economic sectors such as agriculture and transportation, to name a few. Additionally, tourism contributes to the production and emission of greenhouse gases through its various activities and requirements. Environmental conditions are a crucial resource for tourism. Changes and transformations resulting from environmental change generate a range of effects on tourist destinations. Direct effects are noticeable in the increase or decrease in tourist flows, depending on favourable climatic conditions. These changes can impact the availability of water, loss of biodiversity, modification of landscapes, and alterations in agricultural production, which, in turn, affect aspects like food and wine tourism.

Indirect impacts of climate on tourism include the exacerbation of erosion phenomena, leading to the disappearance of coastal areas and critical infrastructures related to tourist activities. There is also the threat of desertification, decreased water resources (resulting in a higher risk of fires), growing competition for alternative energy resources (resulting in increased costs for tourist services), and demographic surges of organisms like algae and jellyfish, which are difficult to reconcile with tourism. Moreover, the rising incidence of extreme events has an impact on tourist flows in the most affected areas. Out of growing concerns about issues such as global warming, loss of biodiversity, and the melting of glaciers, which threaten some of the planet's natural wonders, a form of tourism known as "Last Chance Tourism" (LCT) has gained popularity. This phenomenon involves travellers who visit threatened or vulnerable destinations, eager to experience unique and precious places before they are irreparably damaged or "disappear" due to climate change, environmental degradation, or other factors, such as disasters [15].

This study aims to critically examine the implications of climate change for tourism in coastal areas. In the context of this discussion, the study's purpose is to explore LCT in detail in the literature in the global warming and climate changes, discussing it with the help of appropriate case study related to mediterranean territories. To achieve this, we conducted thorough literature searches and utilized online search tools with keywords such as "threatened places", "disappearance destinations" and "coastal erosion".

It has been in-depth a case study in the cost of the Mediterranean area. Specially the phenomenon of the coastal erosion on *Rotondella*, a coastal place in *Basilicata* region, Italy. The rise of last chance tourism in this area is causing a dispute between those who highlight the devastation to the environment and those who rely on tourist income to survive as hunting becomes increasingly difficult. The paper wraps up by highlighting the main findings from the investigation and proposes new directions for future research.

2. Global warming and climate changes

There is no longer any doubt about the influence of human actions on the warming of the atmosphere, ocean and earth. Widespread and rapid changes have occurred in the atmosphere, ocean, cryosphere, and biosphere. The scale of recent changes in the entire climate system has been unprecedented since the remote past. It is very likely that greenhouse gas emissions were the primary driver of tropospheric warming, and it is extremely likely that human-caused stratospheric ozone depletion was the primary driver of stratospheric cooling between 1979 and the mid-1990s. It is virtually certain that the upper part of the global ocean (0÷700 m) has warmed since the 1970s.

Ocean warming accounted for 91 % of climate system warming, while land warming, ice loss, and atmospheric warming accounted for about 5 %, 3 %, and 1 %, respectively. The global average sea level rose by 0.20 m between 1901 and 2018. The average rate of sea level rise was 1.3 mm per year between 1901 and 1971, increasing at 1.9 mm per year between 1971 and 2006, and further increasing to 3.7 mm per year between 2006 and 2018. Human influenza has most likely been the main driver of these increases since at least 1971. Human influence is most likely the main driver of the global retreat of glaciers since the 1990s and the decline in Arctic Sea ice area between 1979-1988 and 2010-2019. Human influence also most likely contributed to the decline in Northern Hemisphere Spring snow cover and the surface melting of the Greenland ice sheet [11].

As warming increases, adaptation options will become more limited and less effective. At higher levels of warming, losses and damage will increase and additional human and natural systems will likely fail to adapt to the changing conditions. It will therefore be necessary to find transversal and integrated solutions that can help living systems in their ability to adapt. The risk of "maladaptation" can be avoided or at least reduced through long-term planning and the implementation of flexible, multisectoral and inclusive adaptation actions. (Figure 1). Further global warming in the coming years will be driven by future emissions and will affect all major components of the climate system, as each region will experience multiple, concurrent changes. Many climate-related risks are considered higher than previous assessments, and the expected long-term impacts are significantly higher than those currently observed. Multiple climate and non-climate risks will interact, resulting in overall and cascading risks across all sectors and regions.

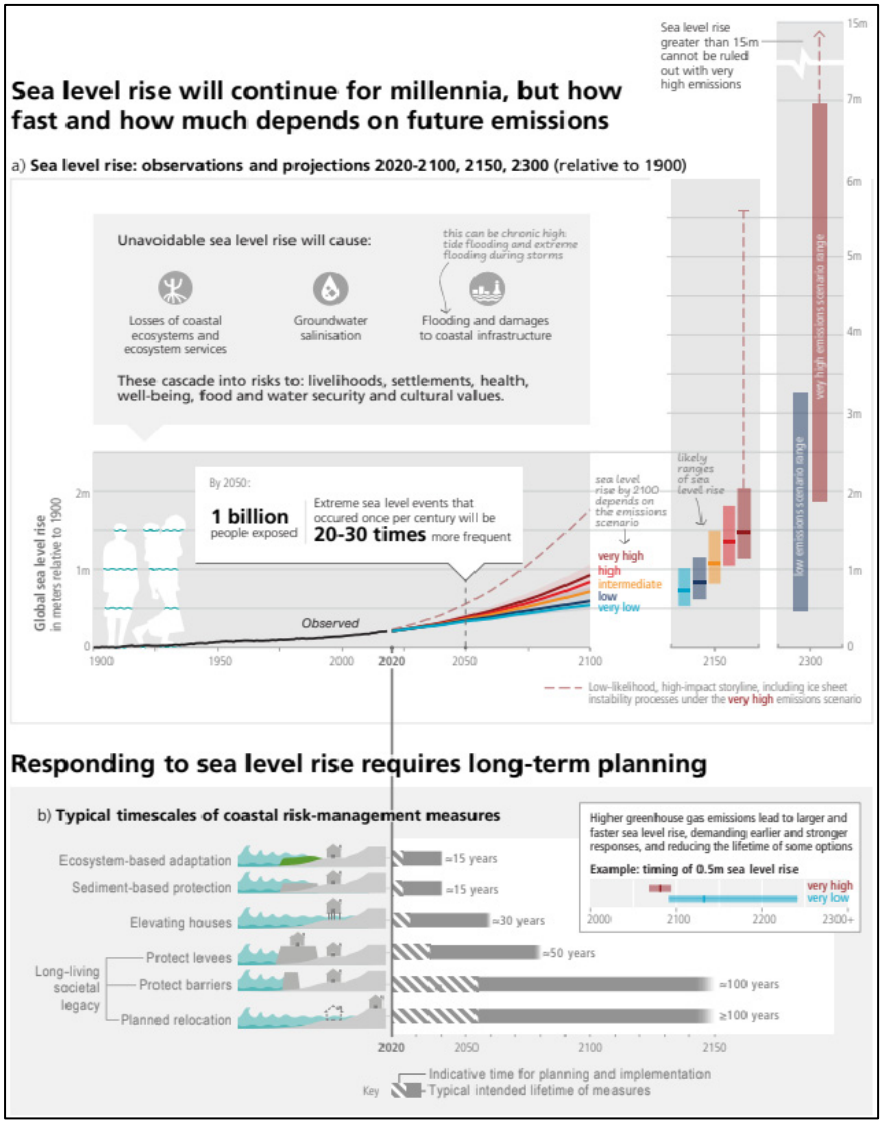

Figure 1 – Observed and projected global mean sea level change and its impacts, and time scales of coastal risk management. Source: [11].

Sea level rise, like other irreversible changes, will continue for thousands of years, at rates dependent on future emissions (Figure 2).

The consequences of climate change vary depending on the regions observed; although no part of the Earth is immune, scientists agree that Southern Europe is witnessing, and will continue to witness, more heatwaves, droughts, fires, coastal floods and windstorms, as well as periods of intense rainfall. In particular, most of

these events occur during the summer, the most popular tourist season in the Mediterranean, with economic, social and, unfortunately, also disastrous outcomes on human health as dramatically happened in the summers of 2022 and 2023. In such a context, tourists' choices, which have always been linked to Mediterranean destinations, are starting to change.

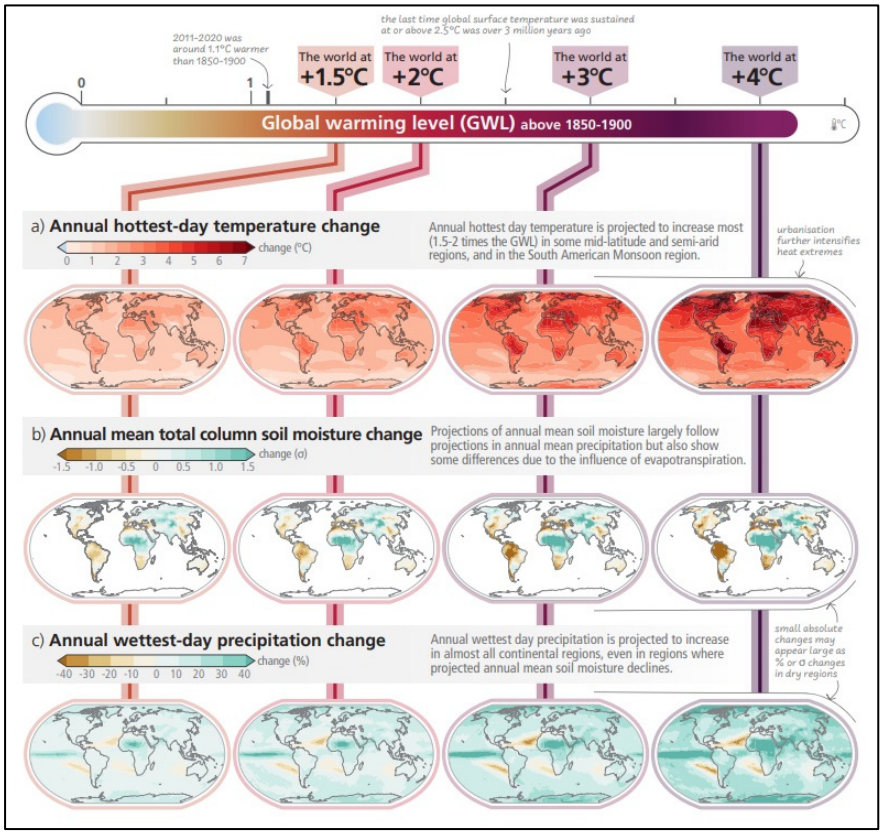

Figure 2 – Increase in global warming and regional changes in average climate. Source: [11].

3. Last Chance Tourism: current debates

In recent years, the surge in tourism driven by social media emphasizes that travel choices are increasingly shaped by the images of destinations shared on platforms like Instagram. This trend has enhanced the visibility of various places and their attractions, but it has also resulted in the creation of “must-see places” lists. Consequently, this can lead to an increase in visitors and potentially to overtourism, a situation where an excessive number of tourists negatively impact the destinations and the lives of local residents. Simultaneously, among the must-visit spots are those that might face extinction.

Last chance tourism (LCT), also referred to as extinction tourism [15], is a rapidly expanding niche market where tourists seek non-consumptive experiences with endangered animals and disappearing landscapes or seascapes. This type of tourism could significantly influence pro-environmental behaviour [16]. LCT is described as "tourism driven by the belief that certain places, people, or objects may soon cease to exist or be inaccessible, leading to a sense of impending loss" [5, p. 517]. To date, most LCT research has focused on recognizing it as a motivator for travel [2]. For instance, the primary motivation for most tourists visiting Churchill, Canada, to see polar bears was the species' noted vulnerability and "before they are gone", without understanding about how tourism and travel together to global climate changes contribute to this disappearing [3].

Two recent studies [7, 16] have confirmed the connection between last chance tourism (LCT) and tourists' pro-environmental behaviour in arctic regions. [16] examined boat-based polar bear viewing, and found that education and "environmental epiphany" were key predictors of tourists' intentions to engage in pro-environmental behaviour. Additional research is needed to apply these findings to non-polar LCT experiences to validate LCT as a strategy for preserving endangered destinations or species that could go extinct [8]. Moreover, comparing LCT destinations with other international and domestic locations is necessary to provide greater context and legitimacy to the findings [7].

Studies in Uluru-Kata Tjuta National Park, which hosts the renowned natural landmarks Uluru and Kata Tjuta - sacred sites for the local Indigenous people with distinctive geology - demonstrated that the less time available to visit a place, the stronger the motivation to travel there [17]. The decision, made in 2017 and finalized at the end of October 2019, to close the climb at Uluru, was also influenced by concerns about overtourism, safety, and the environmental impact of the activity. This indicates that the effects of last chance tourism often mirror those of overtourism, both increasing pressure on destinations due to higher visitor numbers. The issue of overtourism, which includes problems such as overcrowding, environmental damage, and cultural disruption, has been a significant concern for many destinations worldwide, leading to their closure or restricted access for tourists [19].

Last chance tourism often highlights the need for sustainable and responsible travel practices. Efforts to mitigate the threats to these coastal landscapes include implementing conservation measures, regulating tourist numbers, and encouraging eco-friendly tourism practices. It's crucial to balance the desire to experience these endangered destinations with the need to protect and preserve them for future generations.

A recent report by the European Travel Commission [4] confirms that Mediterranean countries remain the most popular destination for Europeans during the summer period. However, the number of European tourists has dropped by 10 % because many travelers, meanwhile, are shifting preferences to less hot periods. In fact, nearly 8 % of travelers specifically mentioned "extreme weather events" as their top concern. This decrease can be substantial in many areas, potentially becoming unsuitable for tourism under stringent warming.

4. The case-study: coastal erosion and Rotondella (Italy)

In the future, the way we travel will inevitably have to adapt to the consequences of climate change, as will the tourism sector: floods, heat waves, loss of biodiversity and coastal erosion are just some of the most impactful phenomena we are already witnessing today. The phenomenon of coastal erosion is a widespread process along the 8100 km of the Italian coast. In many Italian coastal municipalities, the retreat has affected more than 50% of the coastline in the last decade [10]. The southern coastal territory is most at risk; in particular Calabria with 60.9 %, Abruzzo 63%, Basilicata 57.7 %, Puglia 55 %, Campania 54.1 %, Molise 52.8 % (Figure 3).

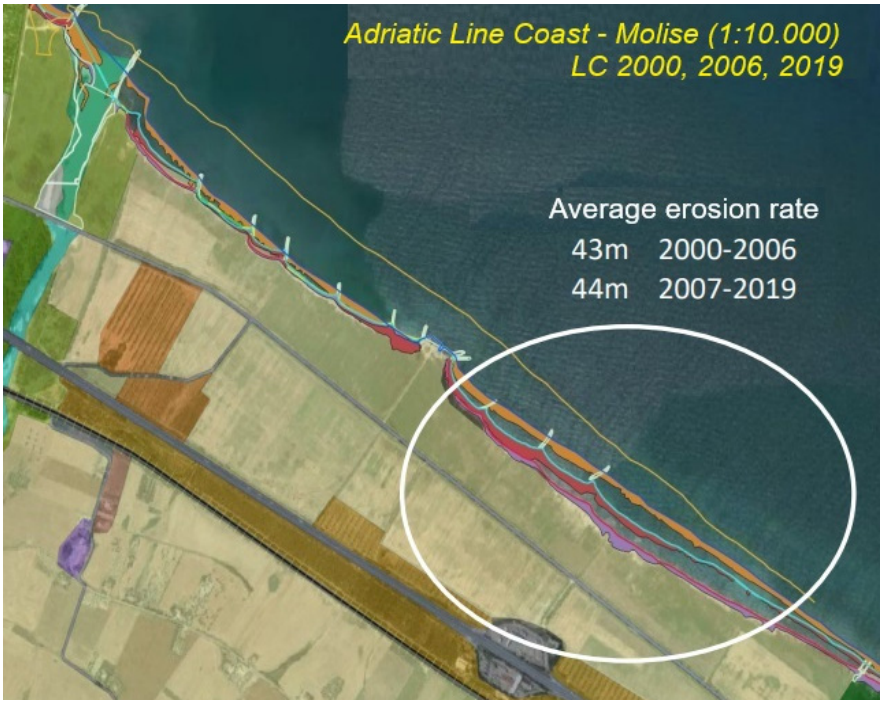

Figure 3 – Molise, example of a coastal area in severe retreat with the beach completely receding into the hinterland. Source: [9].

From 1970 to today, the stretches of Italian coastline subject to erosion have tripled with the disappearance of at least 40 million square meters of beaches. Effects linked in particular to the artificialization of the coastline and the use of land for port works and for various rigid protection structures such as the so-called breakwaters. *Basilicata* (and in particular the territory of *Rotondella*) is in first place as a percentage of eroding beach on the Ionian coast, but in Italy strong erosive processes are observed on the Tyrrhenian coasts (*Calabria*, *Campania*,

Liguria, Tuscany and *Lazio*) and Adriatic coasts (*Emilia-Romagna*, *Molise*, *Puglia* and *Veneto*). Even in Sicily and Sardinia intense erosive processes affect large stretches of coastline. (Figure 4).

Figure 4 – Evidence of erosion processes on the Italian coasts. Source: [1].

According to the ISPRA report [9], coastal erosion is favored by a multitude of causes: geological, biological, anthropic and weather-climatic factors. Climate, in particular, is generally one of the main causes, but other factors can manifest themselves in each stretch of coast.

Climate change plays an important role in the erosion process due to the rise in sea levels globally and the intensification of extreme phenomena. The fact that the

sea level is therefore already higher than in the past favors coastal flooding and further erosion of the coast. Among the 644 Italian coastal municipalities, those with high erosion rates are 54 that to date have seen their stretch of coast retreat by more than 50 % of the entire stretch of competence; there are 22 municipalities that have an exceedance of between 50 % and 60 % of the coast; there are 16 between 60 % and 70%, 8 between 70 % and 80 % and 7 between 80 % and 90 %.

An interesting case study is the coast in the municipality of *Rotondella* (on the Ionian Sea, in *Basilicata*) where this phenomenon is particularly marked. It is the only municipality characterized by widespread erosion along the entire coastal stretch.

Basilicata has a coastline of 70.4 km, divided between the Ionian and Tyrrhenian coasts (43 km and 27.4 km respectively), of which 27 % has been transformed by urban and infrastructural uses. 7.4 km have been transformed by port infrastructures, while 12.3 km are occupied by sparsely populated urban areas; 45 km of coast are natural, and 5.7 km can be considered agricultural landscapes. A characteristic of the Basilicata coast is that, unlike many other regions, there are no significant urban centers, which instead are historically found at a certain distance from the coast. With regard to the morphology of the coastline, there are 44 km of beach, 19 km of rocky coast, while 7.4 km of coast have been occupied by docks and fillings related to port uses [20].

From the data obtained from the Study of the *De Marchi* Commission, dated 1968, this stretch of low coast was not substantially eroded and, in many sections, there was an advancement of the shoreline. Twenty years later, of the 38 km of the Ionian coast, 28 were eroded (about 70 %). What happened is that between the end of the 1950s and the 1970s of the last centuries, artificial basins were built on 4 of the 5 rivers that affect the area (*Sinni, Agri*, *Basento* and *Bradano*), which retain an average of 5 million cubic meters/year of inert materials. Furthermore, in the period 1965-1977, at least 35 million cubic meters of aggregates were officially extracted from the alluvial areas of the aforementioned rivers, including a lot of sand.

There is no doubt that a sedimentary deficit of sand was created in the coastal area, with consequent strong retreat of the shoreline, which in long stretches retreated even 100-150 meters in front of the sea, affecting the coastal dunes and the forested areas behind them. In the province of *Matera*, the areas between *Policoro* and *Nova Siri* (to the south, where the municipality of *Rotondella* is located) and between *Scanzano Ionico* and *Lido di Metaponto* (to the north), are the most affected by erosion, with a retreat of up to 3 meters per year recorded over the last decade. In particular, in the *Lido di Metaponto* area, storm surges have caused a further retreat of the shoreline and caused significant structural damage as well as secondary effects of pollution of the freshwater aquifers serving a large area with a strong agricultural vocation [12, 13, 14].

Due to the physical nature of the two coastal stretches, the low coast of Metaponto is the most sensitive to possible erosion problems. From the data obtained from the De Marchi Commission Study, dated 1968, this stretch of low coast was not substantially eroded, and in many stretches, there was an advancement of the shoreline. Twenty years later, 28 of the 38 km of the Ionian coast were eroded (about 70 %). Between the end of the 1950s and the 1970s of the last centuries, artificial reservoirs were built on 4 of the 5 rivers that affect the

area (*Sinni*, *Agri*, *Basento* and *Bradano*), which retain an average of 5 million cubic meters/year of inert materials. Furthermore, in the period 1965-1977, inert materials were officially extracted from the alluvial areas of the aforementioned rivers for at least 35 million cubic meters, including a lot of sand.

There is no doubt that a sedimentary deficit of sand has been created in the coastal area, with a consequent strong retreat of the shoreline, which in long stretches has retreated even 100-150 meters in front of the sea, affecting the coastal dunes and the forested areas behind them. In the province of Matera, the areas between *Policoro* and *Nova Siri* (to the south, where the municipality of *Rotondella* is located) and between *Scanzano Ionico* and *Lido di Metaponto* (to the north) are the most affected by erosion, with a retreat of up to 3 meters per year recorded over the last decade. In particular, in the *Lido di Metaponto* area, storm surges have caused a further retreat of the shoreline and caused significant structural damage as well as secondary effects of pollution of the freshwater aquifers serving a large area with a strong agricultural vocation [12, 13, 14].

Last chance tourism is able to attract tourists from all parts of the world, helping to accelerate these changes. Yet, last-chance tourism could represent a resource: visiting places subject to climate change could make people more aware of the situation and raise awareness of more sustainable lifestyles and behaviours. It is still early to establish whether the phenomenon of last chance tourism can really represent a resource in the fight against climate change or whether it will lead to an acceleration of the consequences. However, the rush to places at risk has now established itself on the world stage and attracts an ever-increasing number of tourists.

5. Conclusions

Post-Pandemic “revenge tourism” has been widely blamed for the surge, but the role of social media and tour operators cannot be denied. Ninety percent of tourists visit just ten percent of the world’s 100 top destinations creating overtourism in famous destinations in contributing to the decline of these destinations. In numerous instances, the tourism industry seeks to increase visitor numbers and expand business opportunities before the destinations disappear [18].

Moreover, with the worsening conditions of climate change, certain destinations could certainly disappear, and this is undeniably a process that is getting worse. The problem is that visiting these “at-risk” places can hasten their demise. Since these destinations are damaged not only by tourism but also by other factors, it seems that the best way to protect them is to stop tourism. In this context, protests against tourism, especially overtourism, which have recently erupted at numerous European destinations, should be seen as promoting the preservation of these destinations. Peaceful ways of protesting should be directed more towards the authorities than towards tourists, who, although numerous, are not solely to blame. In addition to educational campaigns aimed at raising awareness about the environmental and cultural vulnerabilities of destinations, which should lead to more respectful tourist behaviors, destination management and marketing

organizations will also need to take the lead in supporting initiatives such as the active demarketing of certain attractions [6].

Seeing to the case study, if the number of municipalities with high erosion rates appears limited, compared to a total number of 644 coastal municipalities, it should be considered that the percentages reported concern the entire coast of each municipality, also occupied by stretches that are not beaches and therefore cannot erode, such as stretches of rocky coast, river mouths and all human works. Furthermore, the percentages do not show a "natural" trend in coastal dynamics, but downstream of all the coastal defence works and nourishment carried out [10]. Currently, countries around the world have not fully developed a low-carbon tourism strategy, leaving it up to the sector to find ways to address climate change despite significant uncertainties. Furthermore, it is necessary to develop an effective strategy for the Integrated Planning and Management of coastal zones and the Blue Economy, which also includes adaptation and retreat programs, in order to be ready for the new scenarios induced by the ongoing climate changes. Additionally, the sector will not be affected uniformly; for instance, urban tourism will be less vulnerable compared to coastal tourism. Similarly, some parts of the world will be more sensitive to climate changes than others. Climate change also presents opportunities, as new regions and types of tourism become and have become attractive to tourists. However, these opportunities might be short-lived and overshadowed by negative impacts.

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