

# FLORA AND FAUNA OF THE LITTORAL SYSTEM: DYNAMICS AND PROTECTION

Coasts are ecotones between sea and land. These environments, characterized by being the transition point between water (with high salinity contents) and land are highly dynamic and subjected to disturbance factors due to both cyclic phenomena (tides) and unpredictable phenomena (sea and coastal storms), and to human pressure. All these features make up an extremely vulnerable system, so that its flora and fauna show particular morpho-physiological, ecological and behavioral adaptations.

A total of 17 papers coming from six different countries have been published in the Proceeding of the Session *Flora and Fauna of the littoral system: dynamics and protection* of the Eighth Symposium *Monitoring of Mediterranean coastal areas: problems and measurement techniques*.

The thematic areas covered by these papers refer basically to two main issues: the assessment of the quality status of waters in coastal ecosystems, including the use of new technologies for such purposes, and actions carried out to improve management, conservation, monitoring, and control of coastal habitats. Here follows a short introduction to the contents of the papers.

Macroalgal communities are proposed by the Water Framework Directive (WFD, 2000/60/EC) as one of the biological quality elements to be used for the assessment of the ecological quality status of coastal waters bodies. *Posidonia oceanica* (L.) Delile (Magnoliophyta) is sensitive to anthropogenic effects and it is considered an effective biological indicator for predicting the status of coastal marine ecosystems.

Bellissimo et al. used the *Posidonia oceanica* Rapid Easy Index (PREI) method to assess for the first time the ecological status of the Sicilian water bodies (Italy).

Stocco et al. used well known acquisition systems integrated with advanced methodologies for multiscale mapping of *Posidonia oceanica* and *Cymodocea nodosa* grasslands in pilot sites of the Calabria Region (Italy).

In the context of the Integrated Marine Pollution Monitoring Programme of Turkey, Akçalı et al. reports the baseline results and the status of *Posidonia oceanica* for two stations, which were monitored between 2018 and 2019.

The work of Bedini et al. reports an interesting transplanting method of *Posidonia oceanica*, which is proposed to overcome the problems of replanting *Posidonia oceanica* plant by plant. The transplanting method was applied in the Gulf of Follonica (Italy). The results show that a high percentage of transplanted plants survived, and that many new plants sprung up from most of the clods, indicating that *Posidonia oceanica* clods adapted well to the new settlement ground.

The macroalgae based index CARTography of LITtoral and upper-sublittoral rocky-shore communities (CARLIT), which is based on widely distributed communities whose response to anthropogenic pressure is well-known, allows to provide a rapid assessment of water quality. Such index was used to assess the ecological status along the Sicilian (Bellissimo et al.) and the Calabrian (Stocco et al.) coasts (Italy).

The Marine Floristic Ecological Index (MARFEI) was tested to assess the ecological status of the coastal and transitional waters in the Marmara Sea (Turkey) using

marine benthic macrophytes (macroalgae and angiosperms) (Taşkın et al.)

The work of Humeniuk et al. reports the results of a study carried out in Ukraine to analyze the qualitative and quantitative composition of toxicants (Cd, Pb) in the waters of the rivers Pripyat and Turiya.

Idmoussi et al. reports the results of a study aimed to assess the composition, abundance, and diversity of phytoplankton assemblage along the Moroccan Mediterranean coast.

New technologies provide useful data to study and monitor marine waters and coastal environments. For instance, remote sensing techniques have been widely used to measure the qualitative parameters of waterbodies (i.e., suspended sediments, chlorophyll-a, and pollutants). A large number of different sensors on board various platforms, such as satellite, airplanes and drones are currently used to measure the amount of radiation at different wavelengths reflected from the water's surface. In the Session Flora and Fauna three papers used new technologies for marine waters applications and for conservation of coastal landscapes.

Bellia et al. used a drone to obtain high-altitude photos in four bays in Malta to map shallow-water benthic assemblages using automatic and manual techniques. The results of this study show that the automated drone method was more efficient and more accurate than the manual approach.

Ippoliti et al. estimated the chlorophyll-a and dispersion of sediments in the sea using Sentinel-2 images. The estimates were compared with in situ data collected in monitoring stations in Abruzzo (Italy), providing encouraging results.

Romano et al. used precision agriculture techniques in the coastal area of Metapontino (Italy) in order to evaluate the performance of such techniques to obtain economic benefits and to reduce the pressure on the environment.

Regarding the papers describing actions carried out to improve management, conservation, monitoring, and control of coastal habitats the study of Beccarisi describes the monitoring activity carried out on habitats and plant species in a protected area in Puglia (Italy). The study identifies the pressure and threat factors that negatively affect the conservation of habitats and provides management indications.

The work of de Francesco et al. presents a study aimed at describing and mapping the marine-coastal habitats of conservation concern (according with Habitat Directive) in the Abruzzo coast (Italy). The results of the study provide supporting information for the proposal of new Natura 2000 sites.

The work of Rugge et al. describes the objectives and the activities of a project aimed to improve the ecological continuity between natural wetlands of the Adriatic coast in Puglia (Italy).

The work of Sgambati et al. describes a management model for marine protected area consisting of three interconnected actions: monitoring, conservation, and information. The management model aims to reduce illegal activities and to promote environmental awareness.

Littoral ecosystems are under a variety of threats including overexploitation of fishery resources. In this context, Simeone et al. reports the results of 5 years of monitoring and control of illegal fishing inside the Gaiola Underwater Park, a marine protected area located in Naples (Italy). The study of Morel et al. describes the characteristics of the Small-Scale Fisheries in the Gulf of Lion Marine Natural Park (France) based on data collected through questionnaires compiled by local fishers.

Concluding this short introduction, I'd like to thank all the Authors for their valuable work, and I wish all of you a pleasure read of the papers published in the Session "Flora and Fauna of the littoral system: dynamics and protection".

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