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Editorial

Monitoring and Assessment of Environmental Quality in Coastal Environments

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Coastal ecosystems are presently one of the most impacted environments by contamination and human pressures. The continuous increase and settlement of human populations in coastal areas have introduced mostly inadequate uses to these environments, with direct and indirect detrimental impacts. Additionally, global climatic changes, such as the retraction of the coastline caused by the rise of the sea level, are already a threat in several coastal areas of the world. In this complex and unpredictable framework, this Special Issue on "Monitoring and assessment of environmental quality in coastal environments" presents distinct and innovative approaches that can be used to evaluate and monitor the environmental quality of coastal environments, focusing on biotic or abiotic compartments, or even in both. Monitoring and assessing the environmental disturbances in these ecosystems, as well as the responses of its distinct components to such stressors and pressures, is crucial and urgent for the development and implementation of suitable management, restoration and conservation strategies.

Focusing on the abiotic compartment, Cagnazzo et al. [1] presented an application of the ground-based infrared thermography technology in coastal environmental monitoring. This research enabled the development and validation of an empirical equation to calculate the sandy-soil surface temperature by knowing only the air temperature, making it an effective tool to detect the presence of anthropogenic polluting material (plastic, glass, rubber) on sandy shores. In another study, Thomas et al. [2] assessed the ability of the Takagi–Sugeno (TS) fuzzy modelling approach with fuzzy c-means (FCM) clustering to make spatial predictions of lead concentrations in a marine sediment geochemical dataset. The main aim of the study was to test if fuzzy modelling could still produce a suitable pollutant distribution map using fewer sampling points, potentially reducing the cost associated with new remediation projects. The results demonstrated that TS fuzzy modelling, using FCM clustering and constant width Gaussian shaped membership functions, did not outperform the inverse distance weighting (IDW) and the ordinary kriging (OK) methods. Thus, this method appears not to be suitable for use in contaminants remediation projects with sparsely distributed geospatial sampling points.

When biotic compartments are included in the assessment and monitoring approaches to evaluate the environmental quality, the tools used can range between ecological levels of organization, from the individuals to the ecosystem. Distinct types of biological responses can also be assessed (e.g., bioecology, ecotoxicology, physiology, behaviour).

From the ecotoxicological perspective, Cocci et al. [3] used a combined in silico and in vitro approach to evaluate the impact of two aquatic emerging pollutants capable of acting as endocrine disrupting chemicals (EDCs)—perfluorononanoic acid (PFNA) and Enalapril (ENA)—on the grey mullet (*Mugil cephalus*) hepatic estrogen signalling pathway. These EDCs tend to bioaccumulate in aquatic organisms at concentrations that may cause reproductive toxicity. Their results showed that ENA had a weak agonist activity on estrogen receptors α while PFNA showed moderate to high agonist binding to both tested estrogen receptors (α and β). Hepatocytes incubation for 48 h to PFNA caused a concentration-dependent upregulation of the estrogen receptors and vitellogenin gene expression profiles,

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whereas only a small increase was observed in estrogen receptors mRNA levels for the highest ENA concentration, suggesting a structure–activity relationship between hepatic estrogen receptors and these pollutants.

Centred on a different type of marine pollutants, Biswas et al. [4] analysed the radioactivity and trace metal levels in six marine fish and four crustacean species, all edible, of the northern coastal belt of the Bay of Bengal (Bangladesh). Additionally, to assess the environmental quality of the region concerning those pollutants and the health risks to humans from the consumption of those fish and crustaceans, several radiological and health-hazard parameters were calculated. The research findings demonstrate an increase in the pollution by radioactivity and trace metals in this coastal belt of the Bay of Bengal, caused by an increase in human activities in the region. It was also found that consuming the studied species from the Bay of Bengal may cause adverse health impacts if consumption and/or the pollution sources are not controlled.

Suitable assessment and monitoring programmes of the environmental quality at the ecosystem level requires a profound knowledge about the services rendered by the ecosystem under analysis, as well as a recognition of its importance across multiple dimensions (e.g., ecological, socio-cultural and economic). In fact, determining ecosystem service values (ESVs) is extremely relevant, namely, to better communicate the importance of protecting ecologically functional ecosystems and biodiversity to decision-makers. Magalhães Filho et al. [5] used the Ecosystem Service Valuation Database (ESVD) to estimate meta-regression functions for provisioning, regulating and maintenance, and cultural ecosystem services across 12 biomes at a global scale. The research findings demonstrated that among the biomes with highest ESVs are coral reefs, inland wetlands, and coastal wetlands that, among other characteristics, are transitional, aquatic–terrestrial biomes that are scarce and provide a great diversity of services. Additionally, the authors concluded that when considering the characteristics of the study area under analysis, the inclusion of explanatory variables such as income, population density, and protection status, it is possible to determine the value of ecosystem services with greater accuracy.

Conflicts of Interest: The author declares no conflict of interest.

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