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Editorial

Special Issue on Contaminants in Coastal Environments: From the Sediment-Water Interface to the Trophic Chain

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Rapid industrialization and urbanization have led to a decline in environmental quality, especially in coastal aquatic environments (i.e., lakes, estuaries, lagoons, bays, and harbors), which are subjected to several various form of pressure (i.e., industrial, agricultural and sewage effluents, shipping, oil spills, nutrient inputs in rivers and atmospheric depositions). In these environments, sediments represent the final sink and the potential secondary sources, for the water column and biota, of several contaminants. Thus, potential toxic elements (PTEs), nutrients, persistent organic pollutants (POPs), and contaminants of emerging concern (CECs) harm aquatic life, endanger human health, and often require expensive mitigation procedures. The solutions to prevent and to mitigate the harmful effects of contaminants upon the aquatic environments cannot ignore relevant investigations, the transport and mobility of contaminants and their interactions with sediments, the water column and biota.

This Special Issue is aimed at examining both the local and large-scale effect interactions and management of potential contaminants in the coastal aquatic environment. Five research articles and one review article were collected which report on various approaches used to assess the bioavailability, fate, and transport of contaminants, along with the risk assessment and management of the contaminated material from various anthropogenic sources.

Pavoni et al. [1] investigated the current fate of mercury (Hg) and methylmercury (MeHg) in the water column of an estuarine environment contaminated by historical mining activity, taking into consideration the changing hydrodynamic-seasonal conditions, and evaluating Hg and MeHg distribution and partitioning behavior between solid and aqueous phases. They found that particulate MeHg prevailed when the river flow was low, most likely due to the resuspension of fine particles promoted by a stronger tidal current. However, strong interactions between MeHg and organic carbon underlined the negligible risk of increased mobility and the potential bioaccumulation of MeHg in the aquatic trophic chain. Millo et al. [2] analyzed metal binding by humic substances (HS) in a subtropical transitional environment affected by past mining activities and maritime traffic, which are thought to be potential sources of trace metals in the system. The results suggested a mixed marine-terrestrial source of HS with copper and chromium as the most abundant trace metals bound to HS. Whereas the terrestrial free humic acids derived from the decay of mangrove organic matter exhibited the lowest binding capacity, conversely marine free humic acids showed the highest binding capacity for trace metals.

Petranich et al. [3] evaluated the cycling of metal(loid)s at the sediment–water interface (SWI) in an active fish farm in a Northern Adriatic lagoon environment by means of in situ experiments using a transparent benthic chamber. Although sediments showed high total metal(loid) concentrations and moderate effluxes at the SWI, the results suggested

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Citation: Covelli, S.; Acquavita, A.; García-Ordiales, E. Special Issue on Contaminants in Coastal Environments: From the Sediment-Water Interface to the Trophic Chain. *Appl. Sci.* **2022**, *12*, 9511. https://doi.org/10.3390/app12199511

Received: 19 September 2022
Accepted: 21 September 2022
Published: 22 September 2022

that they are barely remobilized from the sediments and would not constitute a threat to the aquatic trophic chain in the fish farm. Darricau et al. [4] focused their research on mineralogical-geochemical properties and the reactivity of sediments in a Canadian urban lake, which was partially used as a waste disposal facility for many decades, thus resulting in heavy pollution. Their findings suggest that sediments may cause contaminated acid drainage if exposed to atmospheric conditions. Additionally, contaminated sediments may present a risk for water contamination if they are resuspended or dredged out of the lake without being previously stabilized.

Varenik and Konovalov [5] recognized atmospheric depositions as an important source of nutrients in the Crimean coastal area. They found that high concentrations of phosphorus and silica in dry summer periods are associated with the transport of dust from natural and anthropogenic sources. As a consequence, the atmospheric input of nutrients can lead to the additional production of organic matter, oxygen consumption and possible suboxic conditions in coastal areas. Lastly, coastal zones may also be negatively affected from the ecological and economic points of view by the rotting of macroalgae blooms in sea waters which can cause gas emissions. In order to solve this ecological issue, Kulikova et al. [6] provided an overview of the state of the art about producing fuel from macroalgae through hydrothermal liquefaction (HTL) with the possibility of their joint recovery along with marine debris.

Although submissions for this Special Issue have been closed, current research in the field of the impact of contaminants in the aquatic environments will continue to address new challenges in order to further our understanding of the interactions and processes which will be indelibly affected by the global climate change.

Author Contributions: All authors have contributed equally to all activities related to this article. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: Not applicable.

Acknowledgments: The editors thank all the authors and peer reviewers for their valuable contributions to this Special Issue entitled "Contaminants in coastal environments: from the sediment-water interface to the trophic chain". We also want to express our gratitude to all the staff from MDPI, who were always willing to help with their editorial expertise.

Conflicts of Interest: The authors declare no conflict of interest.

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