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Editorial

Monitoring and Management of Inland Waters

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Inland waters are important ecosystems for both their biodiversity and the services they provide to humans. Monitoring their components is essential to improve the knowledge of the structure and functions of these ecosystems and to assess their health status. Monitoring is also fundamental for evaluating the impact of anthropic pressures (e.g., water use for hydropower, irrigation, or drinking purposes, pollution due to present and past production and use of chemicals, introduction of allochthonous species), besides the effects of current climate changes. Only through reliable information coming from monitoring data, can the management of freshwater resources be planned and improved in order to reduce the environmental impact of multiple anthropic uses and activities.

This Special Issue entitled ***"Monitoring and Management of Inland Waters"*** mainly provides useful information on the methods and indices currently applied for the monitoring of different (both abiotic and biotic) components of freshwater ecosystems and shows the monitoring results with indications for preserving these ecosystems. It includes six studies carried out in different countries around the world, which focus on different aspects related to the monitoring and management of inland waters. Specifically, Ochsenkühn et al. [1] investigated the presence and distribution of harmful bacteria in river, lake, and nearshore sea-water samples of Upolu Island (Samoa) by combining the sensitivity of fecal indicator bacteria testing and next-generation sequencing. A thorough genetic screening of the broodstocks used for the reintroduction of beluga sturgeon (*Huso huso* L.) in the Po River basin (Italy) was performed by Antognazza et al. [2] to assess the success of a captive breeding program. Fenoglio and Doretto [3] used benthic macroinvertebrate communities to investigate the quality of sites in the tropical Río Cangrejal basin (Honduras). Diatomic diversity was instead used by Padula et al. [4] to assess the ecological quality of small temporary high-elevation lakes in the Apennine mountains (Italy). Moreover, Hornbach [5] examined ecosystem metabolism over three years in two branches of a cold-water stream in Minnesota (USA), mainly differing in water temperature. Finally, two methodologies commonly used for the detection of hydrological alterations were coupled by Greco et al. [6] in order to define the ecological flow of the Agri River (Italy). The Special Issue also includes a review summarizing state-of-the-art methods for the assessment of hydropeaking impacts on benthic macroinvertebrate communities [7] and a perspective paper highlighting two main issues affecting inland waters, i.e., lake pollution by old generation pesticides and river development for hydropower [8].

The results presented in this Special Issue should be taken into account for improving both the monitoring and management of freshwater resources: (i) the wide distribution of potential harmful bacteria from river runoff or direct sewage dumping has an impact on human health that should be urgently reduced [1], (ii) a critical requirement for the success of programs for the reintroduction of locally extinct species is the knowledge of the genetic diversity of the selected broodstocks to ensure self-sustainability of the reintroduced populations [2], (iii) taxon richness of benthic macroinvertebrates could be used as a surrogate indicator to assess the water quality when consolidate biomonitoring methods are not available [3], (iv) the presence of endangered diatomic species of particular conservational interest in temporary basins affected by extended drought periods triggers the

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need for conservation strategies for vulnerable and unstable environments strongly threatened by climate changes [4], (v) long-term monitoring of ecosystem metabolism is required to assess alterations in the function of streams affected by hydrological and temperature alterations exacerbated by the climate change [5], (vi) common operative tools should be implemented for ecological flow assessment in order to make water resource management more sustainable [6], (vii) organic farming and biocontrol could be an alternative to diffuse pollution by agrochemicals, while environmental flows and controlled sediment flushing operations could limit the hydropower impact on rivers [8]. Moreover, the review by Salmaso et al. [7] could support the proper design of monitoring plans aimed at assessing the ecological impacts of hydropeaking and the effects of possible mitigation strategies.

Both the monitoring and management of inland waters should be carried out in a comprehensive way, considering both abiotic and biotic components and accounting for the multiple impacts affecting freshwater ecosystems, including those related to the climate change.

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