

Effects of water level management on lake littorals and downstream river areas

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The Interreg “Parks Verbano Ticino” (PVT) project was conceived within the technical committee dedicated to the “Experimentation of the regulation of the Lake Maggiore levels” following the requests of the water manager to raise the spring-summer maximum levels of the lake compared to the levels normally held in the same period to respond to the industrial, agricultural, touristic, and environmental needs.

Maintaining high spring-summer lake water levels, in a period naturally characterized by heavy rains and thawing in the headwater catchment, may increase the risk of floods with repercussions on the safety of the local community, the tourism, and the environment. This period is also critical for the development of biocoenoses which would require quite low levels to develop at their best.

Therefore, to verify the effects of an up-rise of the Lake Maggiore levels, the PVT project was launched under the Italy-Switzerland Cross-Border Cooperation Program (Interreg V-A: 2014-2020). This project allowed the collection of data for the period covered by the project

(2019-2023) characterized by different hydrological conditions, providing robust scientific evidence about the effects of water level changes on different environmental aspects of Lake Maggiore, its outlet River Ticino and related ecosystems and protected areas.

The PVT project and the present Special Issue of the *Journal of Limnology*, which collects the main results of the project itself (Fig. 1), have thus given a concrete contribution to the definition of achievable, sustainable, and shared water management strategies, which can be exported to the other lakes of the subalpine district and to other managed lakes. Only a shared and eco-sustainable management of water resources such as Lake Maggiore, the downstream River Ticino and the surrounding environments (Bolle di Magadino Nature Reserve, Fondo Toce Nature Reserve, and other natural Parks), can bring benefits to the aquatic ecosystems and to the ecosystem services they provide.

The papers collected in the present Special Issue include the characterisation of the study area and its geomorphological genesis along with the description of the case study (Scapozza and Patocchi, 2022), and present the main environmental critical issues on which the provisions and guidelines emerging from the project can have a positive impact: the alteration of the riparian naturalness (Elzi *et al.*, 2022) and of the hydrological regimes (Ciampittiello *et al.*, 2022), impacting on lake and river biodiversity and inducing its loss (Boggero *et al.*, 2022a, 2022b; Quadroni *et al.*, 2022; Antognazza *et al.*, 2022). Moreover, since the study area represents also an important ecological corridor and a rest area for numerous migratory birds, special emphasis is given to this crucial aspect of the lake ecosystem structure and functioning (Giuntini *et al.*, 2022a).

Part of the Special Issue is also dedicated to the collection and sharing of the main data of the PVT project that allowed important conclusions to be reached (lake meiofauna: Tabilio Di Camillo *et al.*, 2022; lake macrofauna: Zaupa *et al.*, 2022; birds: Giuntini *et al.*, 2022b). All the above contributions follow the principles of Findability, Accessibility, Interoperability, and Reusability (FAIR) to maximize reuse of existing data/resources and interoperability.

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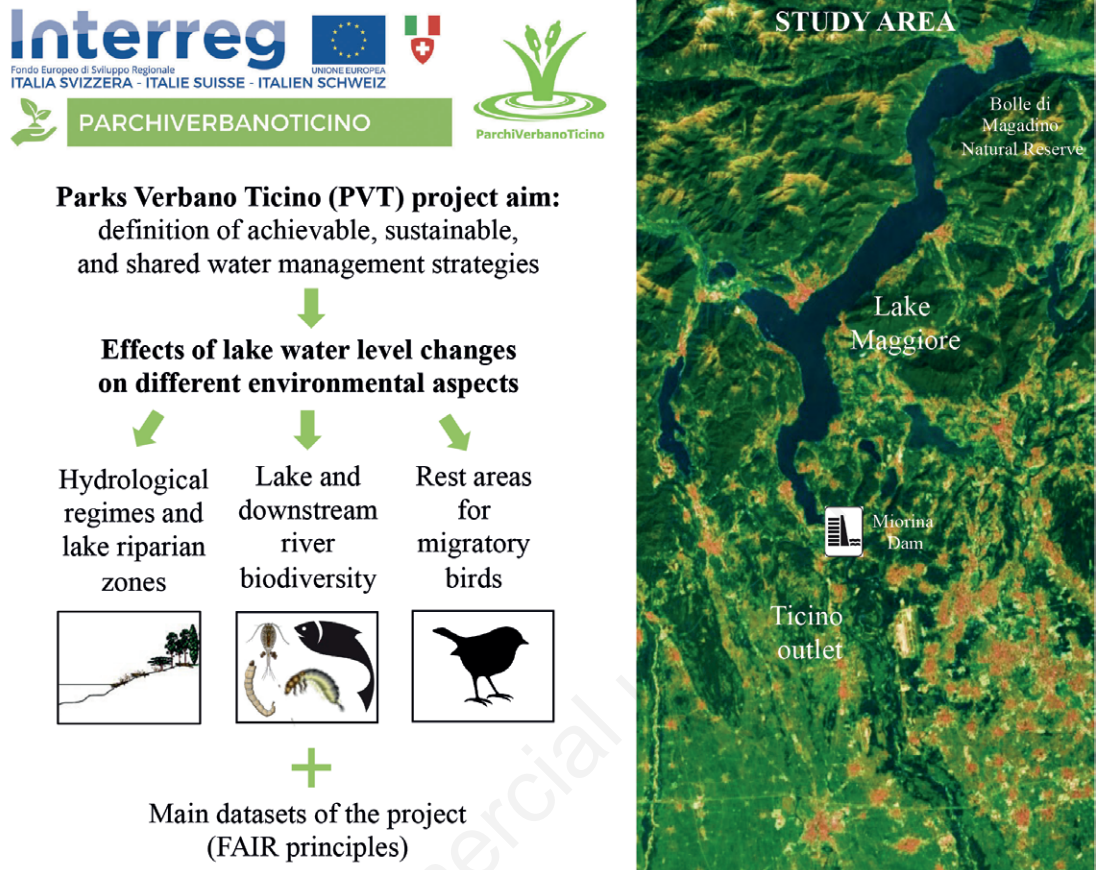


Fig. 1. Study area and topics covered by the Special Issue “Effects of water level management on lake littorals and downstream river areas” conceived within the Interreg “Parks Verbano Ticino” (PVT) project.

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