

# Lakes: The Mirrors of the Earth

BALANCING ECOSYSTEM INTEGRITY AND HUMAN WELLBEING

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Lakes: The Mirrors of the Earth

BALANCING ECOSYSTEM INTEGRITY AND HUMAN WELLBEING

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## **IMPACT OF ANTHROPOGENIC PRESSURES AND LONG-TERM CLIMATE CHANGES ON THE TROPHIC STATE OF LAKE GARDA (NORTHERN ITALY): A MULTIDISCIPLINARY ASSESSMENT**

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Eutrophication still represents the main anthropogenic impact affecting the biological communities and water quality in the group of the large and deep lakes south of the Alps. Nevertheless, through the control of deep mixing dynamics and spring fertilization of surface layers, climate fluctuations further contribute to finely tune the year-to-year variations in phytoplankton structure and development of toxic cyanobacteria. The understanding of the complex functioning mechanisms controlling trophic status and implications for the use of water resources require an integrated approach, with a combination of different expertises linked to the different levels of ecosystem biocomplexity. In Lake Garda, since the 1970s mean annual concentrations of total phosphorus in the whole water column increased from ca. 10 µg/L to 18-20 µg/L. The original oligotrophic status of the lake was confirmed by paleolimnological analyses. On the decadal scale, the increase in trophic status was paralleled by a stronger development of cyanobacteria. At the annual temporal scale, cyanobacteria showed a strong dependence from the surface spring availability of TP. In turn, spring nutrient replenishment was related to deep mixing dynamics and specific large-scale atmospheric circulation patterns in the Mediterranean region. The relationships between teleconnection indices and the thermal characteristics of Lake Garda were evaluated also making use of remote sensing (MODIS and Envisat satellites). Finally, genetic and metabolomic analyses allowed a clear characterization of the dominant species (mainly *Planktothrix rubescens*), as well as the identification, by PCR and Real-Time qPCR, of microcystin and anatoxin producing genotypes.

PRESENTATION TYPE: ORAL