

Consiglio Nazionale delle Ricerche
Istituto per lo Studio degli Ecosistemi
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In collaborazione con l'Ordine degli Ingegneri della Provincia del V.C.O.

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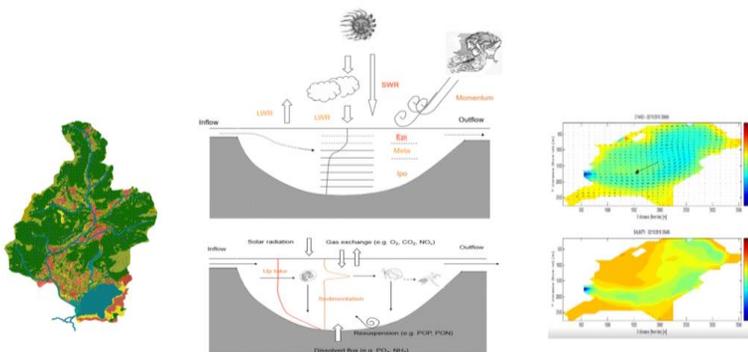


Approci di modello allo studio e alla gestione degli ecosistemi lacustri: esperienze passate e prospettive future della ricerca

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Lake are complex systems characterized by the interplay of physical, chemical and biological processes. The physical forcing in particular determines the degree of mixing of the water masses that in turn influences the distribution of both chemical and biological species. Coupled hydrodynamic-ecological models integrate the description of both physical and chemical-biological processes and they can be thus important tools for the study and the management of lacustrine environments. In recent years, the scientific community also developed open-source lake models, such as the one-dimensional General Lake Model (GLM) implemented within GLEON (Global Lake Ecological Observatory Network) with the main goal to integrate model simulations and real time measurements. One-dimensional models are “economical” computational solutions that simplify the system to the processes occurring on the vertical neglecting those occurring on the horizontal direction. Originally, these models were designed to study the dynamics of small or mid-sized lakes and resulted particularly efficient in long-term simulations (e.g. climate change impact studies). Recent researches demonstrated the applicability of one-dimensional models even to large and deep environments such as the deep south-alpine lakes. Different studies carried out in these environments however underlined a marked spatial heterogeneity induced by different physical features such as: complex morphometry, inflow intrusions and differential wind action. Such a spatial heterogeneity can be captured only using more complex models such as three-dimensional ones. These tools nevertheless present the disadvantages to be much more time consuming and computational demanding. In this seminar previous experiences and current research on the use of coupled hydrodynamic-ecological models to Lake Pusiano and Como case studies will be presented and discussed.