



Sustainable co-evolution of society, ecology and hydrology: forward-looking modelling and prediction of the ecosystem and hydrology of the Lake of Monate - Italy

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The catchment of the Lake of Monate, in Northern Italy, is a unique example of sustainable and long-term co-evolution of society, exploitation of environmental resources, ecology and hydrology. The catchment is intensively managed since Roman times for the extraction of limestone and the whole basin area was intensively urbanized in recent times, so that the lake is now placed within a profoundly impacted environment. Notwithstanding the above relevant anthropogenic activity, the ecosystem of the lake is still very close to pristine conditions, therefore offering unique research opportunities. Sustainable co-evolution was ensured by the absence of significant surface inflows to the lake, which is mainly alimanted by groundwater flows, and a wise and forward looking land use planning and management since ancient times.

Today, the increasing pace of limestone extraction, and consequent land recovery, as well as urbanization, poses the need for an improved understanding of sustainability, to support long term prediction and planning. The target is to ensure that the ecosystemic value of the lake is preserved for the benefit of future generations and societal development. The above need calls for improved modelling tools where the co-evolution of society, ecology and hydrology is modelled by focusing on the time scales of the related interactions and the planning horizon. A theoretical framework will be presented to identify the above relevant scales and to properly incorporate the feedbacks between human activity and natural systems.