



Fluvial restoration strategies in the Oglio River: an overview of main results from a participated project



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Summary

This project aims at improving the overall environmental quality of the Oglio River through a participated approach in which, with the help of a technical part, a number of stakeholder are invited to put in evidence problems, discuss on possible solutions and decide priorities for future restoration plans. Target elements in this project are the Oglio basin, with its anthropogenic pressures and opportunities, the recovery of biodiversity and pristine functions as the river self depuration, which are dependent on the lateral interactions between the river and its flood plain, the at least partial recover of the natural evolution of the river, with the associated sediment transport and deposition. These targets are summarised in four topics, main themes of the Forum: **1) Water quality; 2) River ecosystem; 3) Hydraulic risk and geomorphology; 4) Water resource, tourism and social economic development.**

Products of the project are: 1) A new and integrated "state of the art" including a literature review, recent and transparent data and a list of detailed environmental problems; 2) An Action Plan, realised on the basis of scientific outputs, shared with the stakeholders and basement for a future River Contract; 3) Pilot restoration projects.

Partners of this project, mainly funded by CARIPO, are: the Regional Parks Oglio South and North, CIRF, Mantova Province, Cremona Province, ARPA Lombardia, four "Consorti di Bonifica", plus 16 Communal Authorities within the Oglio South Park.

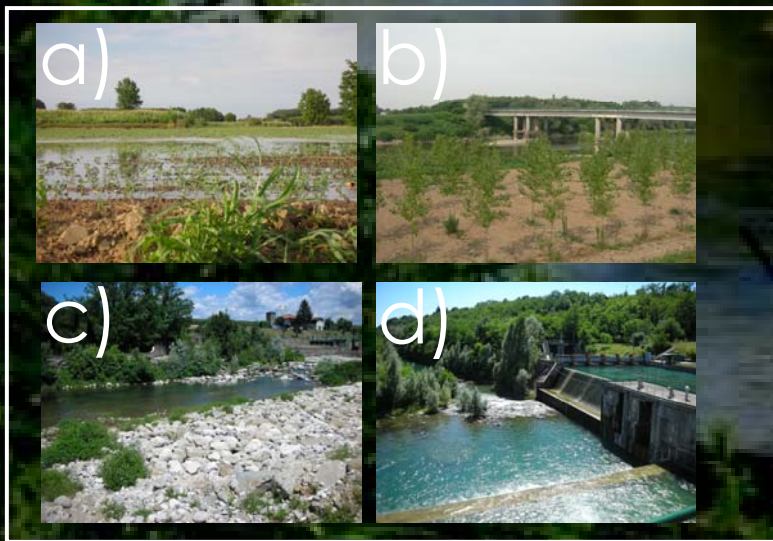
The project deals with a large area comprising the River Oglio basin, from the Iseo Lake to the Po River and involves two Regional Parks, fifty Communal Authorities and four Provinces.

The outcome of technical part, a synthesis

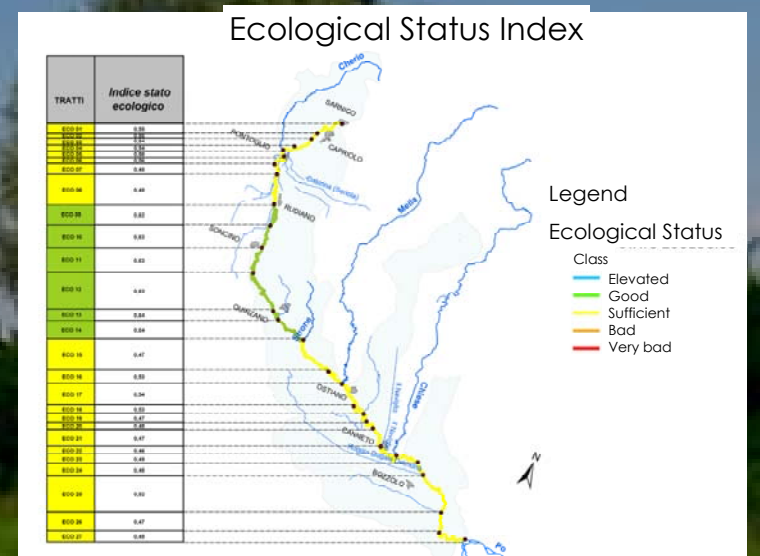
The Oglio River and its basin, a simplified natural environment

A review of available data allowed to highlight how, in many areas within the Oglio River basin, zootechny and agriculture are uncoupled, with a large excess of pig and cow manure compared to available cultivated surfaces. Estimated crop uptake of nitrogen represents a little fraction of generated N, which is likely to be transported with runoff and pollute surface and groundwater. Depuration plants, and in particular those directly discharging effluents in the River, have a strong local impact but their overall loads are small. The agricultural landscape is monotonous, vegetated buffer strips are rare elements and the vulnerability of the system to NO₃⁻ is generally high, in particular when in permeable substrates watering is performed by means of flooding (a).

The Oglio River runs mostly within artificial banks, strongly limiting lateral movements and interactions. The floodplain, where in large areas poplar cultivation has substituted natural vegetation (b), is generally not connected with the River as most of perfluvial wetlands. This results in limited functionality of self depuration processes but also in strong loss of biodiversity.

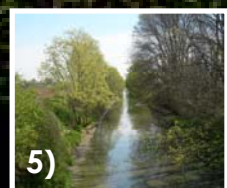


Denitrification potential, measured in a number of wetlands, was very high but the process removed significant amounts of nitrate only in those shallow areas connected to the Oglio River. Fish communities face the problem of the introduction of exotic species (*Silurus glanis*) but also of extremely variable intra-annual water flow and River interruptions (i.e. hydroelectric plants)(c and d). Water flow, and in particular the minimum water flow for the Oglio River, represents a great problem during summer months. The Oglio River in fact is a regulated river, fed by the Iseo Lake and the policy behind the water management is to minimize the release during winter months (in order to keep the water in the lake) and to release water during the summer, to feed mostly artificial channels for agriculture requirements and hydroelectric plants. As a consequence of excess water withdrawal, the total interruption of the River occurs, somewhere in the northern section. Flow data, if measured, are difficult to obtain and share with all the stakeholders. To our knowledge the only long term record of water flow data comes from the Paratico dam, that regulates the release from the Iseo Lake.



The output of the Forum: an exhaustive list of actions

- 1) Realization of fishways, which are structures on or around artificial barriers to facilitate fishes natural migration. Thought for the northern segments of the Oglio River, longitudinally interrupted by a sequence of hydroelectric plants.
- 2) Reforestation of public domains to improve biodiversity, natural corridors, ecological functions.
- 3) Digging and vegetation of floodplains, in order to improve lateral interactions between river and adjacent areas.
- 4) Digging and connection of isolated oxbow lakes with the Oglio River, in order to slow their rapid evolution into terrestrial environments with positive effects for fish, insects, macrofauna, macrophytes, and water quality.



- 5) Control of diffuse nutrients, in particular of nitrate, through the realisation of buffer strips along minor channels.
- 6) Integrated riqualification of tributaries of the Oglio River characterized by strong links with local communities, traces of residual naturality or well recognized for their load of pollutants.
- 7) Strong support towards natural depuration of waste water from small villages (i.e. <2000 E.I.). Phytotreatment and constructed wetlands are less expensive, more sustainable and probably more efficient compared to traditional plants.
- 8) Diversion, when possible, of water treatment plants effluents into artificial channels to improve the Oglio water quality.
- 9) Improve the network of monitoring stations for water quality and quantity, share data of water use.
- 10) Support for a more sustainable agriculture, taking care of the natural environment
- 11) Enhancement of communication and environmental education, for a more responsible way of living
- 12) Enhancement of the touristy offer, through the valorization of the natural and cultural patrimony.
- 13) Realisation of a Greenway, connecting the Alps to the Po River through a network of bike trails, bed and breakfast, youth hostel and agritourism within the Oglio River basin.

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