

www.wetwin.eu

An urban wetland close to Vienna

The Danube River Basin (DRB) is the second largest river basin in Europe, covering 801,463 square kilometres (km²) in 19 countries. It can be subdivided into three sections, the Upper Danube (from the source to the Austrian-Slovakian border), the Middle Danube (to the Iron Gate downstream of Drobeta-Turnu Severin) and the Lower Danube. The DRB is characterized by large regional differences in climate, landscape, socioeconomic development and wastewater treatment standards. The Austrian part of the DRB is 80,600 km².

After the main regulation of the Danube in the 19th century, the Lobau was partly severed from the main channel via lateral embankments, altering the geomorphic and hydrologic dynamics and impeding the natural sequence of erosion and sedimentation. During the last decades, incision in the main riverbed, in concert with the ongoing aggradation of the floodplain, have further decoupled the wetland from the Danube, both hydrologically and ecologically.

Today, the Lobau represents a groundwater-fed and



The Lobau is a large, urban wetland that is important for biodiversity, drinking water and recreation

The Lobau is a 22-km² large urban wetland at the eastern border of the city of Vienna in the Upper Danube River Basin (Figure 1).

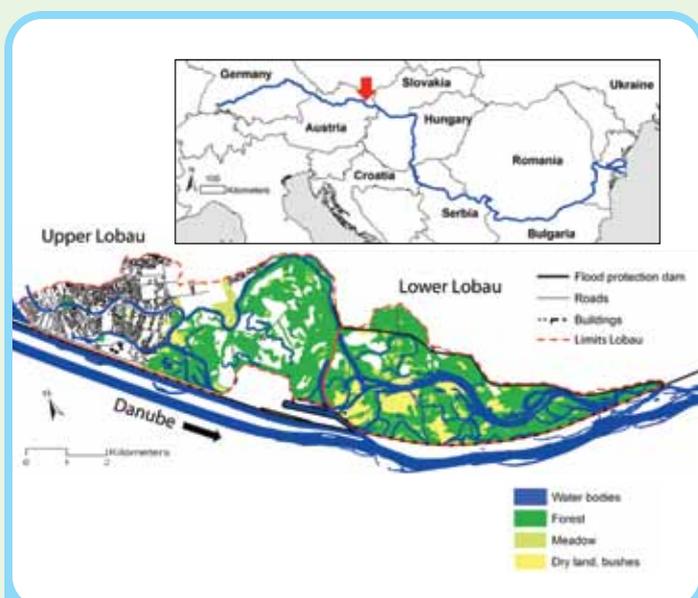


Figure 1: Location of the Lobau wetland and Danube River Basin

back-flooded floodplain lake system, where sedimentation and terrestrialization prevail. Specific soil conditions and hydrologic deficits favor rare elements of dry meadows. Thus, the Lobau harbors a diverse and complex mosaic of aquatic, semi-aquatic and terrestrial habitats. The floodplain is a nature protection area, an United Nations Educational, Scientific and Cultural Organization (UNESCO) biosphere reserve, a wetland under the Ramsar Convention on Wetlands, and a part of the Alluvial Zone National Park.

Management issues and uses

At the Danube River Basin scale, the International Commission for the Protection of the Danube River (ICPDR) coordinates implementation of the Danube River Protection Convention for a sustainable use of surface waters and groundwater in the DRB. All Danube countries with territories of more than 2,000 km², and the European Community, are Contracting Parties. They cooperate on fundamental water management issues and work on the development of a basin-wide Danube River Basin Management Plan. The major implementation level is the

national level. For the Austrian River Basin, the Federal Ministries for Environment and Traffic are responsible for issues of nature conservation, navigation and flood protection.

At the wetland scale, the key stakeholders are the respective authorities of the Governments of Vienna and Lower Austria for (i) Hydrology and Flood Protection, (ii) Nature Conservation, (iii) Drinking Water and Sanitation, and (iv) Forestry. Together with the National Park Authority, they are responsible for developing and implementing management plans for sustainable use of the wetland in line with the National Park regulations.

Other interested communities are the local governments of adjacent municipalities, the associations for Hunting and Fishing, the Chamber of Commerce, as well as various nongovernmental organizations (NGOs) (e.g., World Wide Fund for Nature (WWF), BirdLife International) and research institutes (e.g., University of Vienna, University of Natural Resources and Life Sciences, WasserCluster Lunz).

A vital provider of ecosystem services

The Lobau plays a central role in the regional water balance and provides many ecosystem services for surrounding communities (Figure 2). The wetland has long been of interest for an integrative flood protection scheme for Vienna. It also serves as an important drinking water reservoir. Due to the large number of plant and animal species, many of them endangered, the Lobau is considered a biodiversity hot spot for the region and plays an

important part in the Danube River Corridor. Riverine wetlands in the DRB, including the Lobau, have a high share of protected areas and are important migration routes along the Danube for a range of species. The Lobau is also an important wilderness for recreation. More than 600,000 visitors per year use the infrastructure of the floodplain for recreational and educational purposes. Hiking, biking, swimming and fishing are the most common activities.

Environmental health is important

Establishing and protecting the good ecological state of all surface and subsurface waters in the catchment area, and



The Danube's wetlands provide important migration routes for a variety of species

preventing a further loss of biodiversity and wetlands along the River Danube, are key issues at national and international level. Managing floods and maintaining navigation in line with the Danube's role as an international waterway are main objectives.

On the wetland scale, the key management issue is how to restore the floodplain area to pre-regulation conditions to increase hydraulic connectivity, and to protect aquatic and semi-aquatic habitats. Concurrently, the present status of the wetland services must be maintained, particularly the drinking water supply and recreational facility, along with the health of valuable terrestrial habitats. Evaluation criteria for different management issues include the condition of aquatic and terrestrial habitats, the drinking water production, recreational use, flood reduction, agriculture, fishery and costs.

Proposed management options

A set of six hydraulic options have been developed for the Lobau, representing a gradient from complete isolation to full reconnection with the Danube River channel. These options include different degrees of reconnection, including scenarios with and without siltation. While complete isolation would increase drinking water production and favor development of terrestrial habitats in the wetland, full reconnection would favor aquatic habitats and associated species.

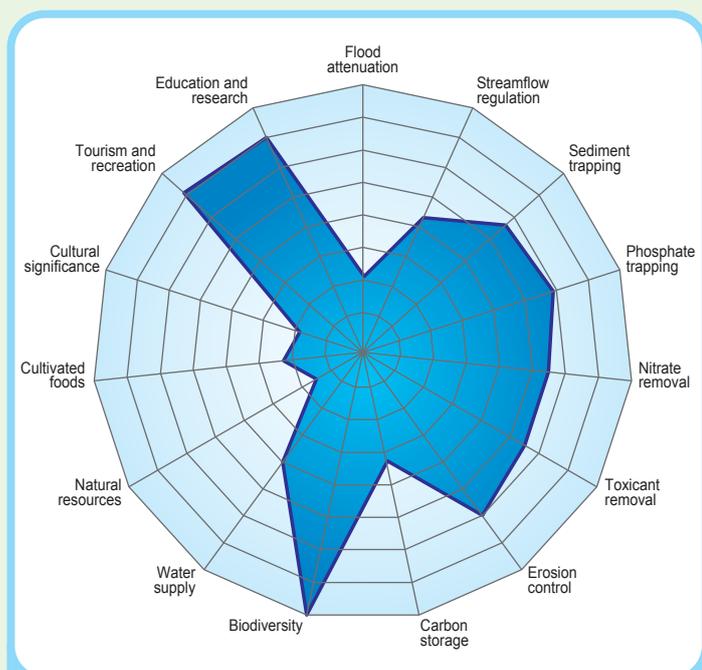


Figure 2:

Ecosystem services provided by the Lobau wetland

Each option incorporates future-use scenarios favoring different dominating uses of the Lobau Floodplain. These are: (1) the ecological development of the floodplain; (2) the drinking water production; (3) recreation; (4) agriculture; and (5) fishery. Options (4) and (5) are the least important.

Analysing trade-offs

A multi-criteria decision analysis on the alternative management options for the Lobau was performed with the mDSS4 software to analyse trade-offs between criteria and find a best-compromise solution. Substantial trade-offs occurred between those criteria maximized under increasing connectivity (development of aquatic habitats, fishery and flood reduction) and those which are optimal under the current hydrologic conditions (drinking water production, condition of terrestrial habitats and costs) (Figure 3).

Lessons for the future

At the DRB scale, the ICPDR promotes restoring protected wetlands like the Lobau, in line with other issues such as improved flood protection. However, in the case of the Lobau, the multiple uses of the wetland established over the last 100 years may be in conflict with restoration aims to increase connectivity.

The current isolated condition of the wetland provides a different set of ecosystem services than its 'natural dynamic' state, e.g., recreation or habitat availability for endangered terrestrial species. Thus, current uses and values need to be included in future management schemes. In addition, changed hydro-morphological conditions and land use in the catchment need to be considered in any restoration scheme, as they will affect the response of the wetland to restoration measures.

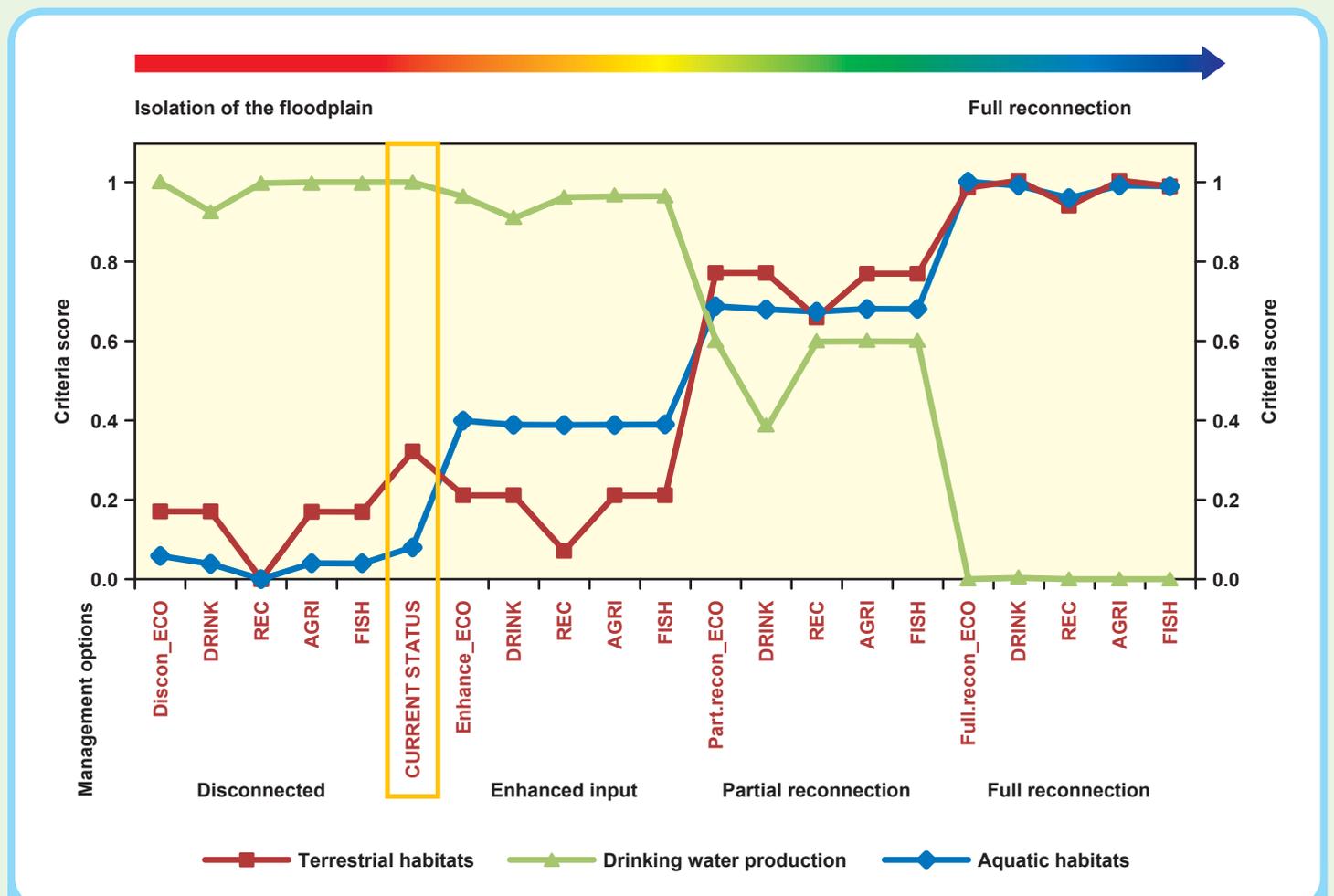


Figure 3: The estimated trade-offs between conditions of aquatic and terrestrial habitats and drinking water production, under different levels of reconnection of the river to the floodplain

The best-compromise solution found by the analysis was partial reconnection of the wetland with the Danube. Regarding use-scenarios, those of less importance to the stakeholders scored highest (e.g., fishery, agriculture and recreation), mainly due to them having the smallest trade-offs with others.

An important step in future management will be to quantify trade-offs among different social, ecological and economic demands, and to consider these alongside the status of ecosystem services. The 'catchment-wide'

perspective should be incorporated in local planning efforts.

Authors: Gabriele Weigelhofer, Thomas Hein, Andrea Funk, Samai Sanon, Stefan Preiner and Peter Winkler

Further Reading

Andrea, F.; Gschöpf, C.; Blaschke, A.P.; Weigelhofer, G.; Reckendorfer, W. Forthcoming. Ecological niche models for the evaluation of management options in an urban floodplain - conservation vs. restoration purposes. *Environmental Science & Policy*. In press. Available online October 15, 2012. doi: <http://dx.doi.org/10.1016/j.envsci.2012.08.011>.

Baart, I.; Hohensinner, S.; Zsuffa I.; Hein, T. Forthcoming. Supporting analysis of floodplain restoration options by historical analysis. *Environmental Science & Policy*. In press. Available online November 5, 2012. doi: <http://dx.doi.org/10.1016/j.envsci.2012.10.003>

Rebelo, L-M.; Johnston, R.; Hein, T.; Weigelhofer, G.; DHaeyer, T.; Kone, B.; Cools, J. Forthcoming. Challenges to the integration of wetlands into IWRM: The case of the Inner Niger Delta (Mali) and the Lobau Floodplain (Austria). *Environmental Science & Policy*. In press. Available online December 22, 2012. doi: <http://dx.doi.org/10.1016/j.envsci.2012.11.002>.

Reckendorfer, W.; Funk, A.; Gschöpf, C.; Hein, T.; Schiemer, F. 2012. Aquatic ecosystem functions of an isolated floodplain and their implications for flood retention and management. *Journal of Applied Ecology*. doi: 10.1111/1365-2664.12029

Sanon, S.; Hein, T.; Douven, W.; Winkler, P. 2012. Quantifying ecosystem service trade-offs: The case of an urban floodplain in Vienna, Austria. *Journal of Environmental Management* 111: 159-172.

About WETwin

The WETwin project aims to enhance the role of wetlands in integrated water resources management for twinned river basins in the European Union (EU), Africa and South America in support of EU water initiatives. The objective is to improve community service functions while conserving good ecological status.

Partners

VITUKI Environmental and Water Management Research Institute, Hungary (coordinating partner)
Wetlands International, Mali
Antea Group, Belgium
Potsdam Institute for Climate Impact Research, Germany
WasserCluster Lunz, Austria
UNESCO-IHE Institute for Water Education, the Netherlands
National Water and Sewerage Corporation, Uganda
International Water Management Institute, South Africa
Escuela Superior Politécnica del Litoral, Ecuador

Funding



WETwin is a collaborative project funded under the European Commission's Seventh Framework Programme Grant agreement number 212300.

Factsheet topics

- 1: Lessons learned from a comparative assessment
- 2: Enhancing governance in wetland management
- 3: Devising a Decision Support Framework
- 4: Balancing ecology with human needs in wetlands
- 5: Creating an effective Spatial Data Infrastructure
- 6: Wetlands in a catchment context
- 7: Assessing vulnerability of wetlands to change
- 8: Integrating health, urban planning and wetland management
- 9: Case study: Lobau wetland, Austria
- 10: Case study: Ga-Mampa wetland, South Africa
- 11: Case study: Abras de Mantequilla wetland, Ecuador
- 12: Case study: Gemenc floodplain, Hungary

Contacts

For further information, email:

István Zsuffa: info@wetwin.eu

Tom D'Haeyer: tom.dhaeyer@anteagroup.com

The contents of this factsheet are the sole responsibility of the WETwin project. The European Commission is not liable for any use that may be made of the information contained herein.

