

Case study: Restoration of Mur River: ecological values and hydropower generation aligned, Austria (# 456)

Introduction

The Upper Mur River is considered as one of the ecologically most valuable rivers of Austria, especially because of the natural reproduction for the Danube salmon. The cross-border part of the Mur River with the second largest alluvial forest in Austria comprises one of Europe's most species-rich habitats. Located in the Alpine part of the Mur river valley, the area covers typical river floodplain habitats, such as running and standing water, inland marshes, and wet grassland and floodplain forests. Around 75% of the river can be classified as 'typical riverine landscape' and holds strong ecological value in Austria.

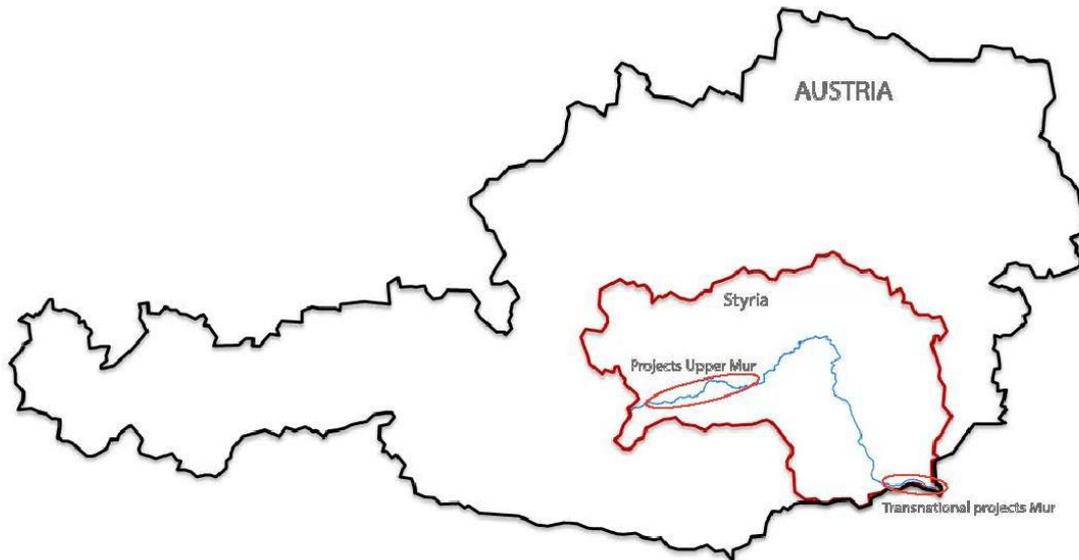
The systematic regulation of the river Mur began at the end of the 19th century, distributaries were cut off and large areas were drained in order to intensify agricultural land use. The alluvial forests were reduced and the channeled river bed led to a reduction of the river dynamic and to a loss of habitats. Also the construction of hydro power stations affected the river-continuum and the sediment transport. Due to river engineering measures (such as flood protection) and intensified farming around the river banks (including silage grassland production systems), parts of the river system show an obvious loss of structure. In such places, natural river dynamics are limited and only narrow strips of riparian vegetation connect the remaining floodplain forest complexes. Continuation of such habitat degradation is considered to threaten the ecological value of surviving riverine habitats.

River restoration after river engineering; a new approach

The main targets of the river management on River Mur are the restoration of the old structures and the recovering of the natural river habitats by reconnecting the last existing ones with the dynamic river-system. Side effect of these measures is the improvement of the passive flood protection and the creation of leisure-time and nature facilities for the residents.

Financed by different programs of the EU, National and Regional funds restoration measures have been started in 1997 in the area of the Upper Mur and the "Grenzmur". Since then various projects facilitated a renaturation of more than 22 km both in the upper course and the Slovenian border section of the river - lots of measures for passive flood protection and dynamic development have been set.

To preserve these ecologically important water sections and to comply with Austria's objectives of the energy economy, a Management Plan for the River Mur was developed in 2014. It aims at regulating the different interests of water management, nature conservation and energy economy and combines the requirements of the EU Water Framework Directive, the EU Flood Directive and the Renewable Energy Directive.



The area of River Restoration projects at the Mur River

Organization of the program

From the early beginning of the Mur River restoration the Office of the Styrian government, Department 14 – Water Management, resources and sustainability, Department 13 - Nature Conservation and a private consulting company “freiland Civil Engineers” LLC worked together in a very constructive way. Jointly, a strategy has been developed which focused at combining the interests of the water protection management, the water management and the protection of endangered habitats, animal and plant species.

Based on this sustainable improvement of the river landscape, the Department of Water Management Planning involved energy economy, nature conservation as well as all relevant environmental NGO's and initiated a regional program to implement water management related measures (German: Wasserwirtschaftliche Ordnung), which secure long free-flowing sections of the River Mur.

The concept development and planning of the individual measures have been carried out in close cooperation with the stakeholders of the respective regions. Thus, the diverse interests of the economic water usage, energy sector, nature conservation, mountain torrent and avalanche control, municipalities, owner of fishing rights and the public were integrated and solutions developed jointly.

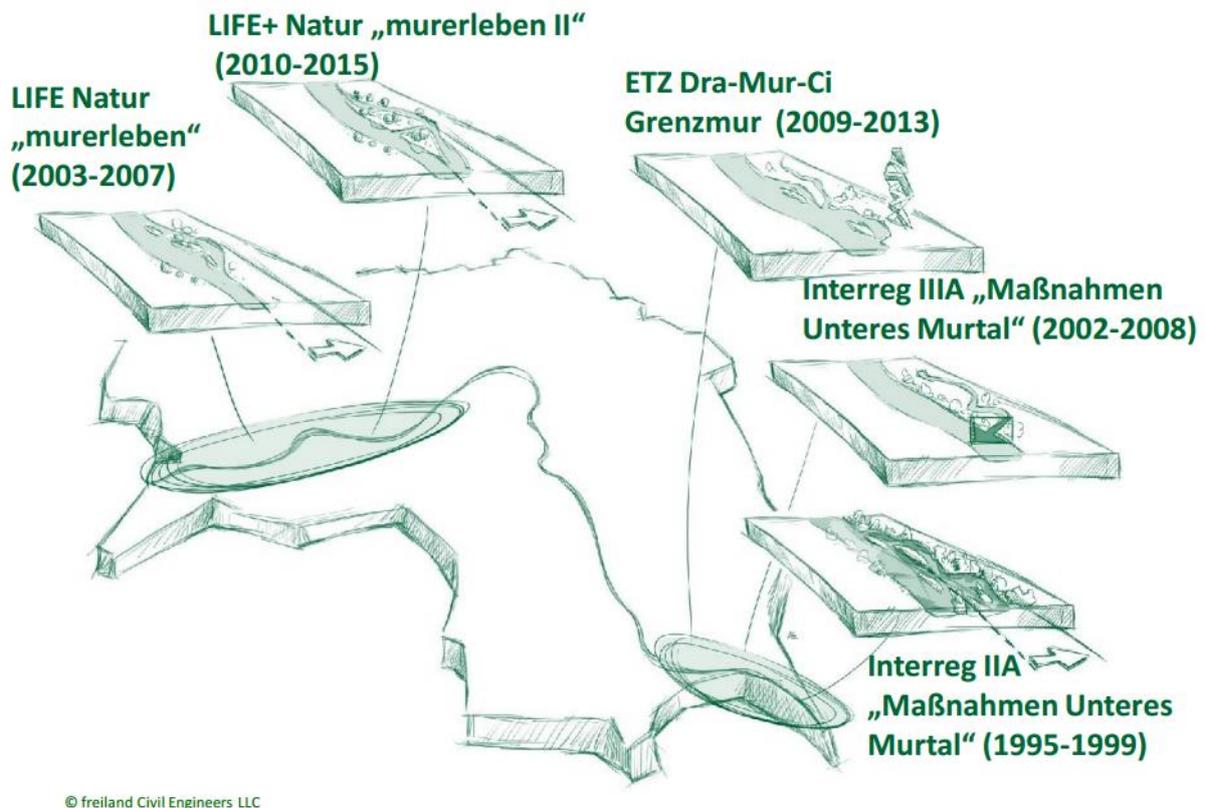
The technical and scientific support of various planners and universities allowed elaborating solutions on the current state of the art and developing further monitoring results which represent an excellent basis for future planning and restoration measures on the river Mur as well as other water bodies with similar morphological and topographical conditions.

Particularly noteworthy is the cross-border cooperation - over a length of 45 km the river Mur forms the national border to Slovenia in the southeast of Austria. All important measures for flood protection as well as for habitat conservation and improvement are coordinated in a bilateral river commission. The countries are in continuous information and know-how transfer to improve the condition of the river Mur.

Measures

The Upper Mur and the cross border section became the EU Natura2000 status and the measures, elaborated in the policy concept, have been implemented in the recent years in a number of projects co-financed by the EU. River restoration began especially in the reaches with nature protection sites and the hydropower influence is low. Along the Upper Mur a 90 km stretch and along the „Grenzmur“ a 32km stretch became special attention.

EU -funded river restoration projects



The general objective of all the projects on the river Mur is the restoration, the improvement and the long-term protection of the characteristic river landscape.

This is an important requirement for maintaining rare and endangered species of fauna and flora, listed in the Fauna Flora Habitat directive.

The individual restoration measures enabled the reconstruction of lost habitats in some areas, the reactivation of flooding areas, the stabilization of the bed-load balance and the crowing of public awareness.

The summary of the measures is displayed at the following table.

Location	Purpose	Measures
----------	---------	----------

Mauthof	Ecological measures for amphibians and forests	Development of ponds at the upstream
Sauerbrunn-Pöls	River widening	<ul style="list-style-type: none"> - Construction of a 250 m long distributary - 390 m opening of the bank protection - Building of amphibian basins in dimension of 2,000 m² - Initiation of floodplain forest development of 1ha - Improvement of a tributary-mouth - Lowering of the ground in a dimension of 4,635 m² - Enlargement of the Natura2000 Area of 2ha
Thalheim-St. Peter	River widening	<ul style="list-style-type: none"> - Construction of 840 m long distributaries - 700 m opening of the bank protection - Building of amphibian basins - Initiation of floodplain forest development of 3.5 ha - Protection of stands of floodplain forest of 0.6ha - Enlargement of the Natura2000 Area of 2ha
Apfelberg	Wetland, river widening	<ul style="list-style-type: none"> - Opening of the bank revetment in a length of about 270 m - Lowering of the area in the size of 2,200 m² - Preparation of a 310 m long branch - Initiation of the development of wetlands in a size of 0.5 ha - Protection of the stand of the wetlands of 1ha - Structuring in a length of about 2000 m
Lässer-Au	River widening	<ul style="list-style-type: none"> - Construction of 900 m long distributary with a partial lowering soil - 900 m opening of the bank protection - Building of amphibian basins of 4,000 m² - Initiation of floodplain forest development of 3.5 ha - Protection of stands of floodplain forest of 4.5 ha - Enlargement of the Natura2000 Area of 4.1 ha
Feistritz St. Lorenzen	Management of wetland	<ul style="list-style-type: none"> - Opening of the bank revetment in a length of 850m - Preparation of a 760 m long branch - Building of ponds in the size of 2,000m² - Initiation of the development of wetlands in a size of 1 ha - Protection of the stand of the wetlands of 1.4ha - Lowering of the area in the size of 3,000m²
Preg	Structuring	<ul style="list-style-type: none"> - clearance cairns and fixed dead wood built

Strategic River Management

To overcome the conflict between hydropower expansion and nature protection or recreation/tourism, a management plan has been established for the River Mur. This plan has been aligned between energy providers and river experts. The core objective of this plan is to balance the interests of the energy sector and those of river protection and restoration, here mainly river-ecological aspects.

When setting up this plan, hydropower potentials have been assessed with ecological goals that considered potentially affected protected species and areas, their ecological state as well as water management aspects. Certain stretches of river were disclosed where the use of hydropower is possible under defined circumstances. Thus, the requirements to fulfill the hydropower expansion goals are given.

River stretches, where ecological measures for conservation and/or improvement of river-bound habitats have already been implemented, are excluded from any future hydropower use. Hence, already restored areas along River Mur that have been supported via EU-programs are disclosed as ecological priority zones.

Apart from the aforementioned designations, measures for poor ecological stretches have been defined. Special focus is given to the concept of “stepping stones” with it’s up- and downstream effects. Stepping stones bridge hardly restorable stretches and therewith provide an efficient and cost-saving concept for mitigation-measures. The measures focus mainly on biological qualities, the primary criteria of the ecological status assessment.

The management plans provide a binding planning framework until 2022 and a regulation framework for hydropower projects at the mentioned rivers. Likewise, ecological interests are safeguarded for the long-term. Precious and pristine stretches of rivers are protected from encroachments and the perspective of further river restorations is enabled.

The management plan for the River Mur is a basis for the enactment of a so called “regional program” of the Austrian Water Management Authority valid until 2022.

Classification of river sections



Ecological priority zones	Trade-off zones	Zones of no particular designation
<ul style="list-style-type: none"> — Environmentally sensitive water bodies — Preservation and improvement of the ecological state has priority — No hydropower development 	<ul style="list-style-type: none"> ☐ Stretches of good ecological value ☐ High hydropower potential ☐ Hydropower plants only possible if environmental compatible ☐ Hydropower development only possible if no ecological deterioration is caused 	<ul style="list-style-type: none"> ☐ No ecological sensitivity ☐ Low hydropower potential ☐ Mostly affecting river stretches already used for hydropower purposes (often “Heavily modified water bodies”)

Long term vision

The general objective of all the projects on the river Mur is the restoration, improvement and long-term protection of the characteristic river landscape of the river Mur. This is a key prerequisite for maintaining rare and endangered species of fauna and flora, listed in the 92/43/EEC Fauna Flora Habitat directive.

The individual restoration measures enabled the reconstruction of lost habitats in some areas, the reactivation of retention areas for flood drainage and the ensuring of the ecological status. Well considered sediment management aims at compensating the bed load deficit and at stabilizing the river bed while maintaining the long-term river dynamics.

Another goal is to unite the different interests of the EU Water Framework Directive, the EU Flood Directive and the Renewable Energy Directive and to pursue a jointly prepared approach. The management plan essentially contributes to the resolution of conflicting public interests (environmental, water management and energy-economic interests in the specific case) by encouraging the interaction between all stakeholders. The classification of river stretches (e.g. ecological priority zones, trade-off zones, zones of no particular designation) laid the foundations for Styria to comply with the mandatory energy targets for the expansion of hydropower as a renewable energy source, while maintaining/improving the ecological status and creating opportunities to improve the Mur-habitat. The management plan for the river Mur and the related designations are to become legally binding for ten years in form of a regional programme.

The awareness of the ecological importance of the Mur as a living-, leisure- and recreation space has been promoted by involving and informing the population in the affected areas. Thus, another long-term objective is to enhance public relations in terms of dissemination of know-how and information, environmental education and rising of environmental awareness among the local population.

In order to keep up the growing awareness for environmental aspects in the public, the main vision is to invest in public information provision and partaking planning processes. It is of special importance to promote environmental awareness for the youngest among us. The children of today participate less in our environment and nature, because their playgrounds are often not even outdoors and therefore they are kept from gaining knowledge about nature and their interrelationships.

Target EU Legislation

Water

- Directive 2000/60/EC - "Framework for Community action in the field of water policy" (23.10.00)

Nature protection and Biodiversity

- Directive 92/43/EEC - "Conservation of natural habitats and of wild fauna and flora" (21.05.92)
- Council Decision 93/626/EEC - "Conclusion of the Convention on Biological Diversity" (25.10.93)
- COM (98) 42 final - "Communication on a European Community Biodiversity Strategy" (05.02.98)

Coordinator

Amt der Steiermärkischen Landesregierung- Department 14 – Water Management

Partners

Murauer Stadtwerke, Austria Fürstlich, Schwarzenbergische Familienstiftung, Austria, Gemeinschaft der Murfischereiberechtigten, Thalheim-Knittelfeld, Austria, Fischereiberechtigte Elisabeth von Pezold, Austria Grazer Sportanglerverein, Austria, Pranck'sche Forst- und Gutsverwaltung, Austria