LIFE-Project: Wildflusslandschaft Tiroler Lech

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Introduction

The International Symposium "Riverine landscapes" is one of the individual projects within the framework of the LIFE-Project "LIFE 00NAT/A/7053: Wildflusslandschaft Tiroler Lech" (www.tiroler-lech.at). The following paper summarizes the most important facts of this broader concept of river protection and restoration.

The geographical frame is formed by the 4,138 hectares of the Natura 2000-region of the Tyrolean Lech valley (political district Reutte, county Tyrol, Austria).

The Lech river has influenced the phenotype of the Tyrolean Lech valley right up to the present time. Wide areas of alluvial forest with softwood water meadows (Salici-Myricarietum, Salicion eleagno-daphnoidis), alder and ash water meadows (Alnenion glutinoso-incanae) and dry pine water meadows (Dorycnio-Pinetum) edge the wild river. Large, dynamically changing branches of water are still possible in the parts where the river bed is very wide.

The following details from an old military map (*Franziszeische Landesaufnahme* 1816-1821) show the various types of the pristine river morphology. In the upper reach with a relatively steep gradient the Lech is of an elongated type, whereas with diminishing gradient and enhanced gravel input the Lech changes more and more to the well known and characteristic type of a braided river.

The current state is best characterized by an aerial photo, which depicts the whole spectrum of the actual river morphology. A major part of the Lech is as heavily regulated as most parts of alpine rivers in general (red arrow). In other areas elements of a near-natural river structure are still left, even if human impact has left its very characteristic footprints (here in the form of a "pearl-chain"-pattern, which makes this region easy to spot even on pictures from space-cams; green arrow). And then there are the most famous areas, where the river is still wide enough to allow the formation of a braided river type (blue arrow), although regulation has taken place and is recognizable in the form of a

linear river bank on one side. Up to now the river is still the Lech valley's "most important landowner"

Fig. 1: Where we are.

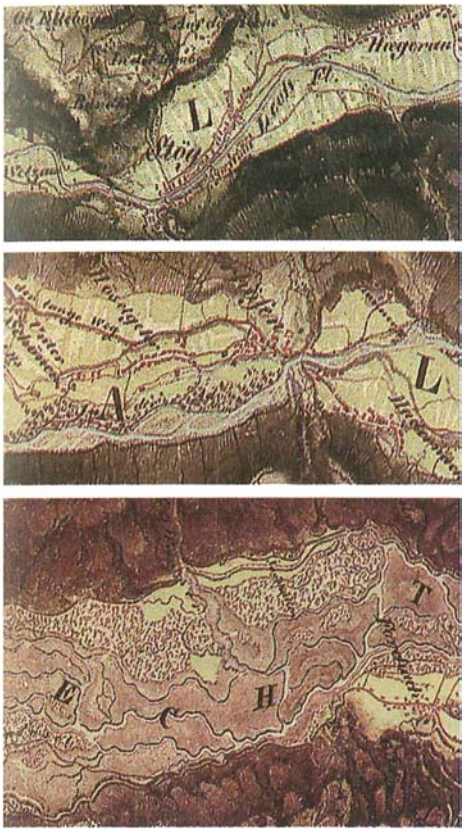

Fig. 2: Various types of river morphology according to an old military map (*Franziszeische Landesaufnahme* 1816-1821; source: Österr. Staatsarchiv)

Fig. 3: Aerial photo with characteristic types of the actual river morphology.

Basic Project Information, Partners, Time Frame

A total of 7.82 million Euros are available in order to carry out the project. The precondition for a 49.5 % EU funding was the declaration of the target region as a Natura 2000 area. The remaining 50.5 % of the costs will be shared between the following national project partners:

Amt der Tiroler Landesregierung, Abteilung Umweltschutz und Abteilung Wasserwirtschaft
Bundesministerium für Land- und Forstwirtschaft, Umwelt und Wasserwirtschaft: Sektion Ländlicher Raum und Sektion Wasserwirtschaft
Forsttechnischer Dienst für Wildbach und Lawinenverbauung, Sektion Tirol
WWF Österreich

A charming aspect of the LIFE-Project is the cooperation of various departments/organisations with rather divergent interests to achieve a common goal.

The project lasts 6 years (2001 – 2007). Originally 5 years were scheduled, but a prolongation for 1year was necessary because of 2 reasons:

1) In August 2005 an extreme flood with a 5000-years probability (according to reports of the Tyrolean government's hydrographic department) took place. Of course this unpredictable event led to restrictions in working capacities, which are still partly bound to repair and flood protection works.
2) One of the larger river restoration measures (widening of the Lech at Martinau) evolved much more expensive in the detailled planning process than originally estimated. So work could only start after the additional fundings from national resources have been secured.

Problems involved

Following flood catastrophes in the beginning of the 20th century and the increasing pressure from exploiting the valley (only about 7% of the district is productive !), structural measures as river regulation or bed load protection in the side valleys became a necessity, but are partly to blame for today's problematic situation.

Apart from losing areas of natural habitats and thus affecting many species of the "Habitats Directive", the problem of riverbed sinking is just one more major problem involved. It was caused by the combination of river channelization, building of debris retention dams in the major tributaries and the increasing

removal of deposits. The sinking did not only lead to further negative impacts on the fluvial system as, for example, separation of the Lech river from its side waters, the fall of the groundwater level and dry-running of floodplain areas, but also caused problems regarding protective structural measures (washout of the riverbank protections, etc.). Thus, not only are the rare plant and animal species endangered but, to a certain extent, the settlement areas too.

Other problems include insufficient control of visitors, endangering sensitive habitats and also typical flora-elements, or the socio-economic justified scepticism of some sections of the population and interest groups against the Natura 2000-area.

Aims of the LIFE-PROJECT

Reacting to the above-mentioned problems, the LIFE-Project aims at following goals:

Conserving and restoring the fairly natural, dynamic fluvial habitats
Stopping the sinking of the riverbed and fall of groundwater level
Improving flood protection in accordance with environmental protection regulations
Preserving animals and plants that are listed by the EU as important, vulnerable or endangered
Improving the ecological awareness of the local people
Carrying out a joint project with organisations from different fields of interest

Measures, special Projects

The LIFE-project includes a total of 53 individual projects. The most important measures and projects to achieve the set goals are as follows:

River extension by removing several building constructions: Lech at the Johannesbridge and at the hamlet Martinau, the river Vils
Step-by-step removal of debris retention dams at the river feeders to ensure unobstructed bed load transport: Hornbach and Schwarzwasserbach brooks
Revitalization of the river's side waters and linking up to their parent river: e.g. well water at Häselgehr
Preservation of target species and their resettlement: e.g. little ringed plover and common sandpiper, the german tamarisk, Lady's slipper, Bilek's azure damselfly, amphibians
PR work (last but not least also the actual Symposium resp. its proceedings)

In the following text the most important measures in **river restoration and engineering** are briefly introduced to give an overall impression of the most obvious improvements in the riverine landscape. Some of the other manifold measures are covered in detail in other parts of the proceedings resp. we refer to the informations on www.tiroler-lech.at.

River restoration and engineering are the main measures to cope with the above-mentioned problems of the loss of river habitats and riverbed sinking. Main mechanisms are the river morphology and bedload budget. To simplify these rather complex matters, the Lech can roughly be divided into 3 parts (see Fig. 4), which are characterized as follows:

Upper Reach (Steeg – Elmen): Straight course; stable river bottom
Middle Reach (Stanzach – Weißenbach): „Braided river"; erosional processes
Lower Reach (Höfen–Reutte–Weißhaus): Unfavourable bed load deposition in the main settlement area; reduction of the sediment transport capacity, effective cross section and freeboard; multiple, ecologically disputed dredgings

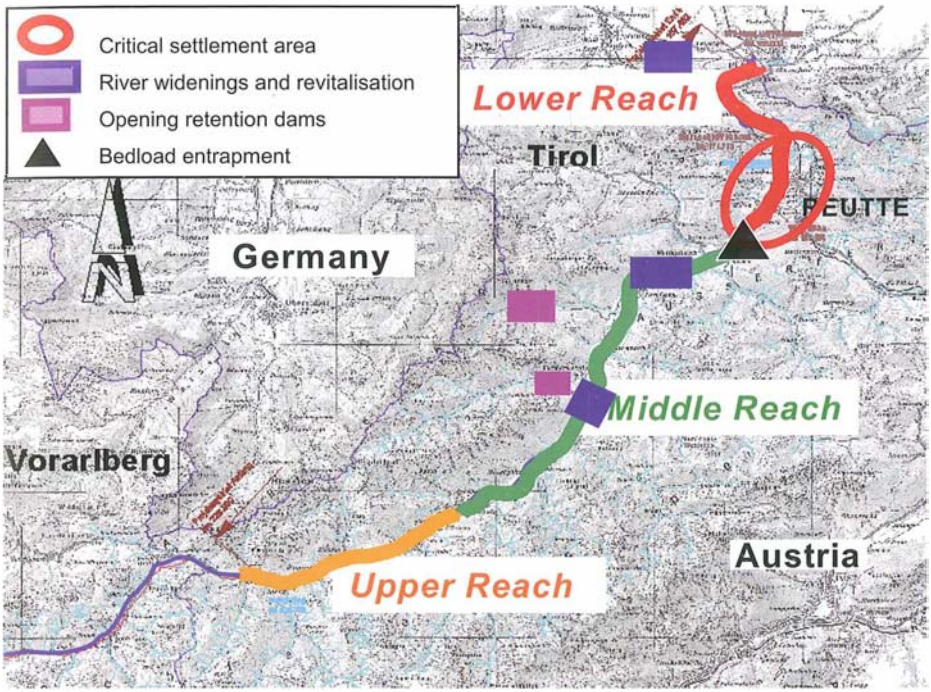

Fig. 4: Location of the largest river engineering/revitalisation measures.

Thus a delicate balance in the bedload management has to be obtained, as in the upper and middle reach gravel is needed to maintain the highly dynamic, braided river type; whereas in the lower reach a bedload surplus would be a severe problem. So a whole **set of well coordinated measures** is needed to fulfill all these requirements (Fig. 4):

Broad river widenings as measures for flood protection and river revitalization at the same time (examples below)
Removal of some large debris dams in big tributaries to improve the gravel-balance (resp. fight the actual gravel deficit) in the main river (example below, see also other parts of the proceedings)
A big bedload-entrapment in the lower reach, which is at the same time improving the ecological situation, as an innovative project to protect the main town in the district from the possible bedload surplus (which is in part also consciously caused by our measures in the upstream reaches). See other articles of the proceedings.

River revitalisation and flood protection Vils

In the 1930's the Vils was forced into a very tight corset, resulting in the sinking of the river bed of appr. 1.5-2 m. By widening and raising the river-bed and rebuilding of smooth banks 2.3 km revitalized river stretch, appr. 10 ha additional alpine river habitat and appr. 5 ha adjacent areas with alluvial forest and reactivated backwater-systems are regained. At the same time this project is also an important measure for the flood-protection of the town Vils.

Special respect was given to measures for enhancing people's environmental awareness and acceptance of the project (Fig. 6). These measures clearly enhanced the project's acceptance, last but not least resulting in approving contributions in local newspapers.

Examples were:

- Webcam at an elevated view-point ("Falkenstein") – www.zeitfluss.at
- School-project
- Support of a local initiative for installing a "woodhenge" (celtic tree-circle)

Fig. 5: River revitalisation Vils.

Fig. 6: Accompanying measures to enhance the public acceptance.

River revitalisation Johannesbrücke

Caused by the restriction of the Johannesbrücke, built in 1936/37, the river bed of the Lech sank for more than 3 m. Adjacent areas were cut off from inundation, the pristine softwood water-meadows with willows and the german tamarisk were displaced by dry pine-forests on high terraces. Flood protection dams and the Johannesbrücke itself were endangered.

By widening up the bridge, the river bed (up to a width of appr. 180 m) and relocationg protection dams in the rear areas on a length of almost 3 km, more than 20 ha of alpine river habitats are resurrected.

Removal of retention dams at Hornbach and Schwarzwasserbach

Large debris dams built in the 50-60ies of the last century are removed at two of the major tributaries, the Hornbach and Schwarzwasserbach. A total of roughly 1.2 mio. m³ of accumulated bed load volume are set free over the next years.

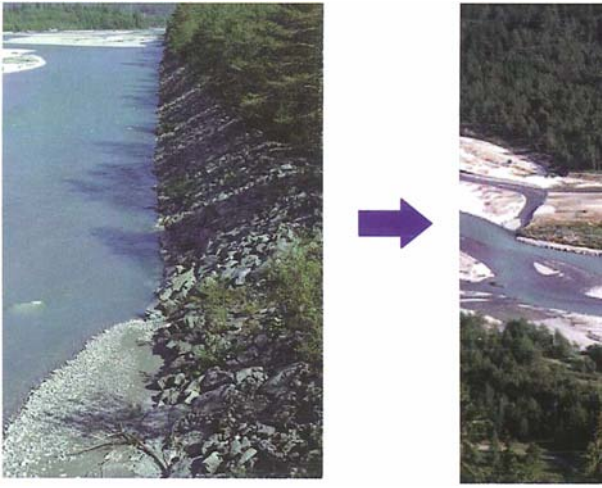

Fig. 7: River revitalisation Johannesbrücke

Fig. 8: Removal of debris dams, example Hornbach.