

Ecological River Development and the EU Water Framework Directive

Dipl.-Ing. Stefan Cantré

National Taiwan University, Taipei

Revitalisation – Example



River Birs

Introduction **River Training Concepts until the 1980s Recent Problems** The EU Water Framework Directive **Redevolopment – Goals and Conflicts** Planning **Ecological Development Concepts Ecological Constructions** Conclusion

River Training – River Rhine



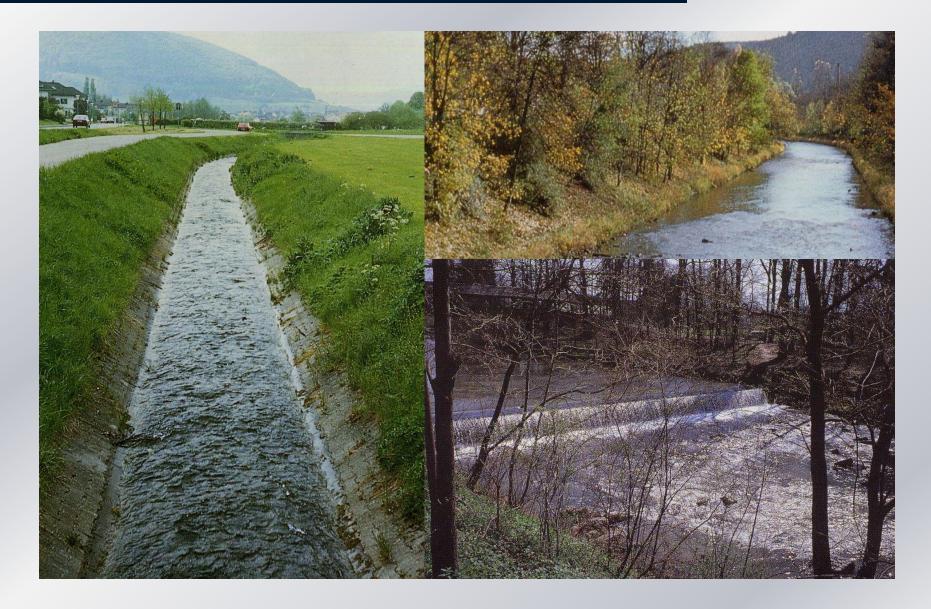
River Rhine (different sources)

River Training - Streams



Emscher River

River Training - Streams



River Training – Torrents



Torrent Control Structure, Weißenbachtal Photo: S. Cantré

Recent Problems

Problems

- Increasing frequency and strength of disasters caused by natural hazards such as floods, storms, mudstreams, and avalanches
- Major financial loss caused by disasters
- Bad structural quality of many waters
- People's wish for more aesthetics at the waters
- New European policies since 2000

Lead to

- A rethinking of earlier strategies
- Development of holistic approaches

EU Water Framework Directive

Aim: All European waters (surface waters, transitional waters, coastal waters, and ground water) need to have a good status until 2015!

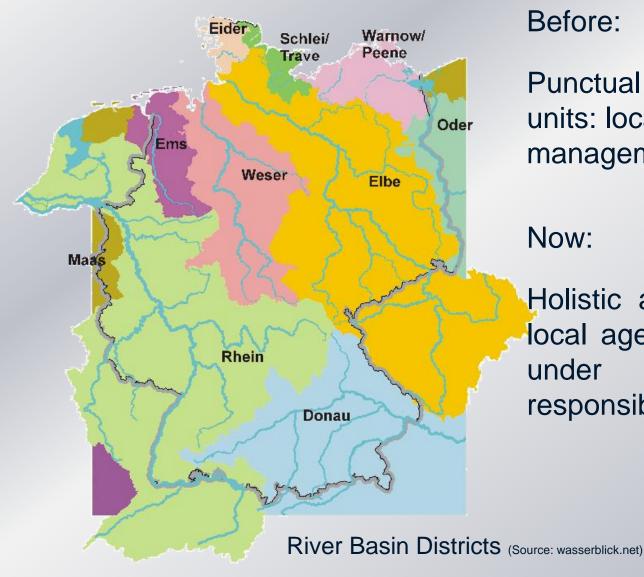
	uropea	<u> </u>			
l (Acts whose publication is obligatory) DIRECTIVE 2000/60/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 23 October 2000 establishing a framework for Community action in the field of water policy					
			THE EUROPEAN PARLIAMENT AND THE COUNCIL OF THE UROPEAN UNION,	(3)	The declaration of the Ministerial Seminar on groundwater held at The Hague in 1991 recognized the need for action to avoid long-term deterioration of freshwater quality and quantity and called for a programme of actions to be implemented by the year 2000 aiming at sustainable management and protection of freshwater resources. In its resolutions of 25 February 1992 (\$\$), and 20 February 1995 (\$\$), the Council requested an action programme for groundwater and a revision of Council Directive 80/68/EEC of registry of the second second second second second register of the second second second second second substances (\$\$), as part of an overall policy on freshwater protection.
			Having regard to the Treaty establishing the European Community, and in particular Article 175(1) thereof, Having regard to the proposal from the Commission (⁴),		
			Having regard to the opinion of the Economic and Social Committee \hat{C}_{j} ,		
			flaving regard to the opinion of the Committee of the legions (∂) , Acting in accordance with the procedure laid down in Article	(4)	Waters in the Community are under increasing pressure from the continuous growth in demand for sufficient quantities of good quality water for all purposes. On 10 November 1995, the European Environment Agency in
251 of the Treaty(^A), and in the light of the joint text approved by the Conciliation Committee on 18 July 2000, Whereas:		its report Taviconment in the European Union ² – 1995' presented an updated state of the environment report, confirming the need for action to protect Community waters in qualitative as well as in quantitative terms.			
 Water is not a commercial product like any other but, rather, a heritage which must be protected, defended and treated as such. 	(5)	On 18 December 1995, the Council adopted conclusions requiring inter alia, the drawing up of a new framework Directive establishing the basic principles of sustainable water poly: in the European Union and inviting the Commission to come forward with a proposal. On 21 February 1996 the Commission adopted a			
(2) The conclusions of the Community Water Policy Ministerial Seminar in Frankfurt in 1988 highlighted the need for Community legislation covering ecological quality. The Council in its resolution of 28 June 1988 (¹) asked the Commission to submit proposals to improve	(6)				
ecological quality in Community surface waters.	(0)	On 21 February 1996 the Commission adopted a communication to the European Parliament and the Council on European Community water policy setting out the principles for a Community water policy.			
 Of C. 184, 17.5.1997, p. 20, Of C. 16, 20.11998, p. 14 and Of C. 16, 20.11998, p. 94, Of C. 35, 20.111,1997, p. 33, Of C. 180, 11.5.1998, p. 38, Of Christian of the Tempone Parliament of 11 Eubrouxy 1889, (N. 	(7)				
[?] Opinion of the European Parliament of 11 February 1999 (OJ C 150, 28, 51999, p. 41%), confirmed on 16 September 1999, and Council Common Position of 22 October 1999 (OJ C 343, 30:11.1999, p. 1). Decision of the European Parliament of 7 September 2000 and Decision of the Council of 14 September	ÖC	proposal for a Decision of the European Parmament and (C 59, 6.3.1992, p. 2. () C 49, 28.2.1995, p. 1. () L 20, 26.11980, p. 43. Directive as amended by Directive			

Features:

- Holistic approach catchment management
- Quality of water body vs. water quality only
- River basins vs. administrative regions
- Cross-border projects
 - Public participation concepts
- Defines quality elements and classification parameters
- Monitoring is obligatory

EU Water Framework Directive

River Basin Districts in Germany



Before:

Punctual planning in small units: local and regional water management agencies

Now:

Holistic approach where the local agencies work together under the aegis Of responsible regional agencies

Goals of River Redevelopment

- Improvement of the ecological state of the waters
- Improvement of the water structure
- Aesthetical and recreational improvement for tourism
- More species (plants and animals)
- **Deconstruction of hard protection constructions**
- Protection from natural hazards (flood protection, etc.) in the whole catchment area
- Also involve the surroundings to the waters: water = stream + banks + meadows
- Implementation of river continuum concepts



Conflicts

There may be conflicts with the users:

Navigation

Industrial use of waters and floodplains (cooling water, factory sites)

Water power plants

Agricultural use of floodplains

Fishery

others



Planning – Strategies and Instruments

Mapping of the structural state and the water quality, including the ground water

Implementation of river information systems e.g. ERN (European River Network)

Participation of the public during the creation of plans and management concepts (solves conflicts)

Buying of the borders between river banks and meadows for the cultivation of the river banks by the state





Steinwurf

Steinschüttung







Böschungsrasen

flaster, Steinsatz





Lebendverbau

wilder Verba

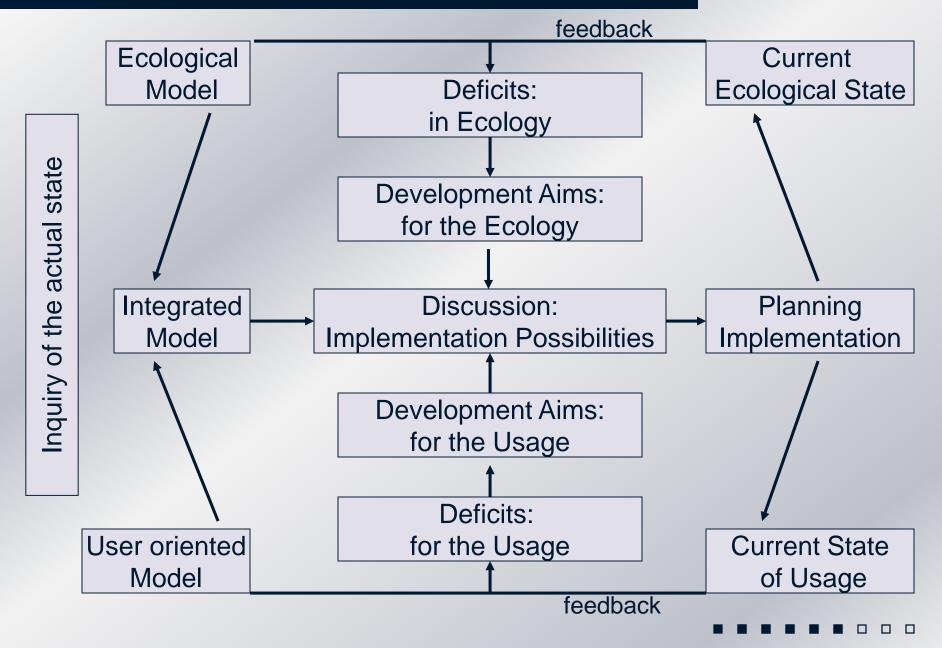




Pflaster, Mauerwerk



Planning for Users & Environment



Planning – Modern Flood Protection

- Only the total of measures may help to revitalise the rivers, lakes and coasts and to assure a good disaster protection also. Measures are:
- Flexible, transportable barrier constructions (aqua dams, geotextile tubes)
- Flood retention basins
- Sealing old dikes with geosynthetic clay liners (space problems)
- Dike construction with steeper, but vegetated slopes (e.g. geotextile reinforced earth, dike cores with geosynthetic containers/tubes)
- Revitalise natural retention areas like oxbows Danger zone plans

Upper section:

Increase interception \rightarrow minimize direct run-off (reforestation)

Erosion control on higher slopes (slope protection through drainage, reforestation, and constructions) \rightarrow minimize the bed-load entry **(bed-load balance concepts \rightarrow bed-load management)**

Assure fast flow (water down the max. water level)

Protection constructions with natural materials (timber, rock, soilbioengineering, vegetated geotextile structures)

Middle section:

Lay out retention areas, revitalise oxbows (abandoned courses)

Lower section:

Protection constructions like dikes, faster flow: negative wave helps to drain the middle section

Ecological Development Concepts

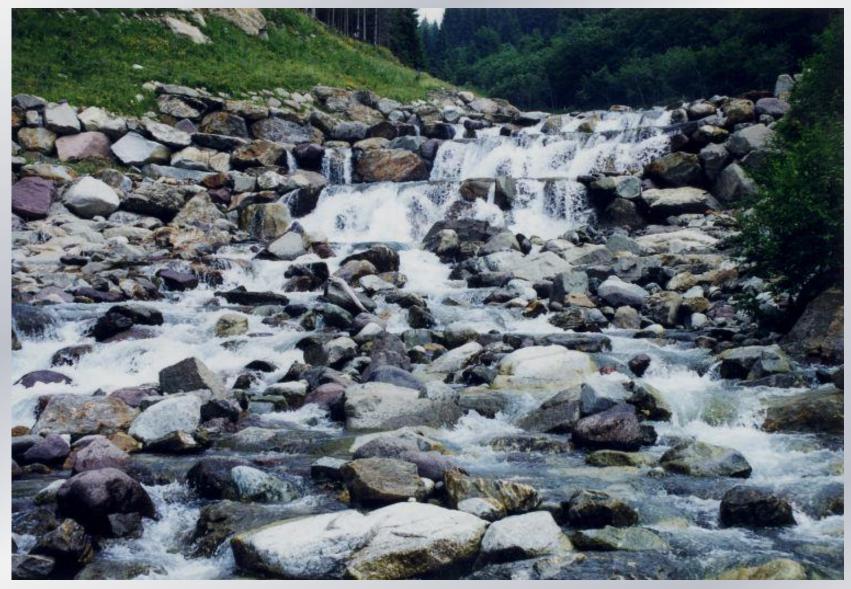
- Meanders \rightarrow construction or initial constructions for succession
- Widening
- Structural diversity
- Oxbows, old waters
- Deconstruction of hard bed and bank constructions
- Deconstructions of drops
- Hard structures only where other measures cannot succeed!!
- IMPORTANT: materials and shape only as the character of the water allows!!

- Grass plantation on the banks/dikes (no navigation)
- Plantations, Biological constructions (trees, bushes)
- Soil-Bioengineering structures, fascines, etc.
- Combined structures
- Natural stone revetments
- Gabions
- Vegetated timber cribs
- Vegetated geotextile structures
- Hard structures (only where other measures cannot succeed)
- Plants have a very high stability and often constructions only need to be temporary!



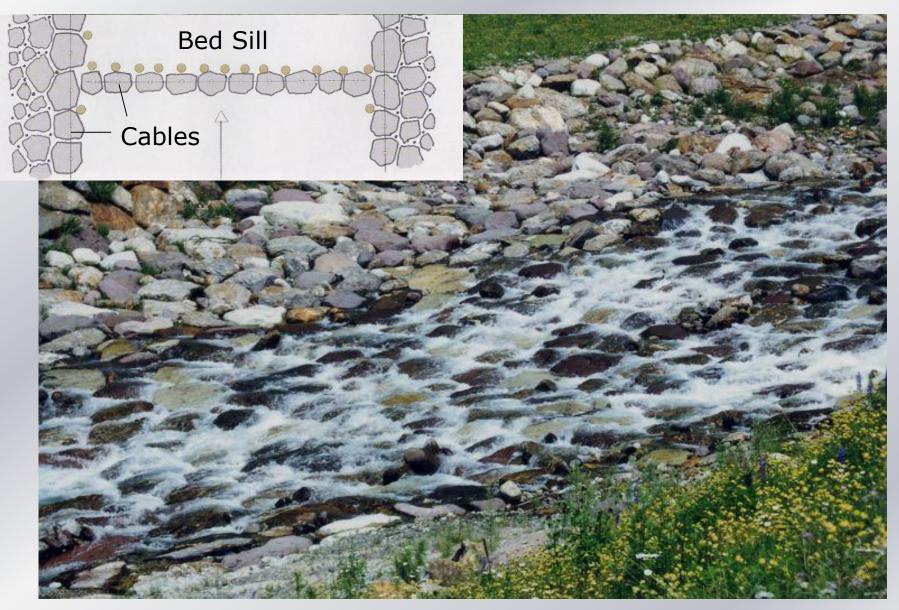
Slope fascine, Austria; Source:





Ecological Torrent Control, Weißenbachtal Photo: S. Cantré





Ecological Torrent Control, Weißenbachtal Photo: S. Cantré

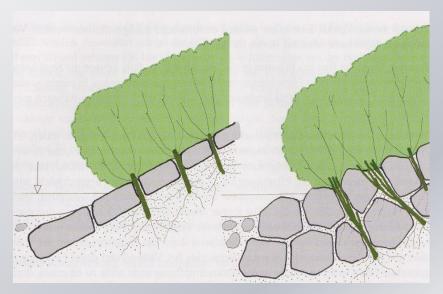
.

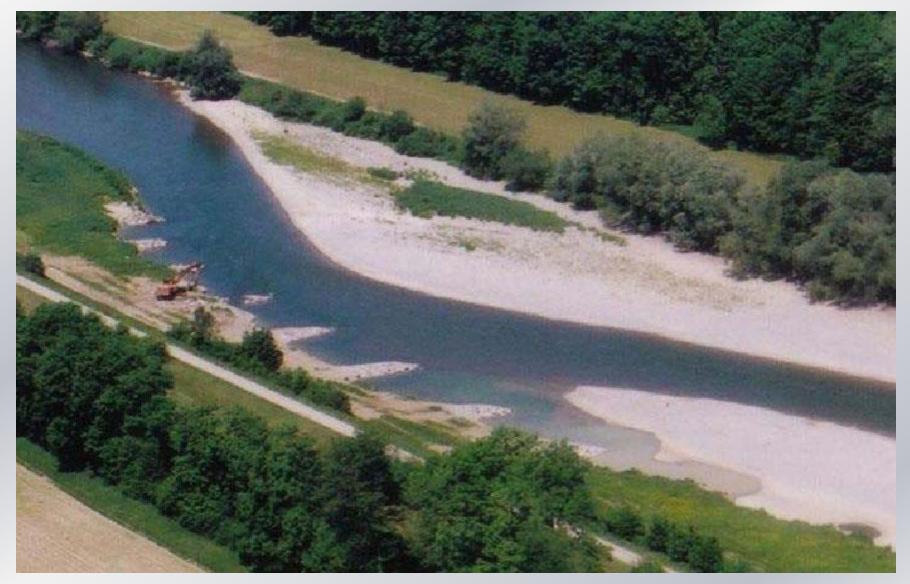




Different examples; Source: Schiechtl, Stern







River widening; Source: EAWAG





Willow berms; Source: Schiechtl, Stern



River Isar, near Munich, before revitalisation; Source: BLK



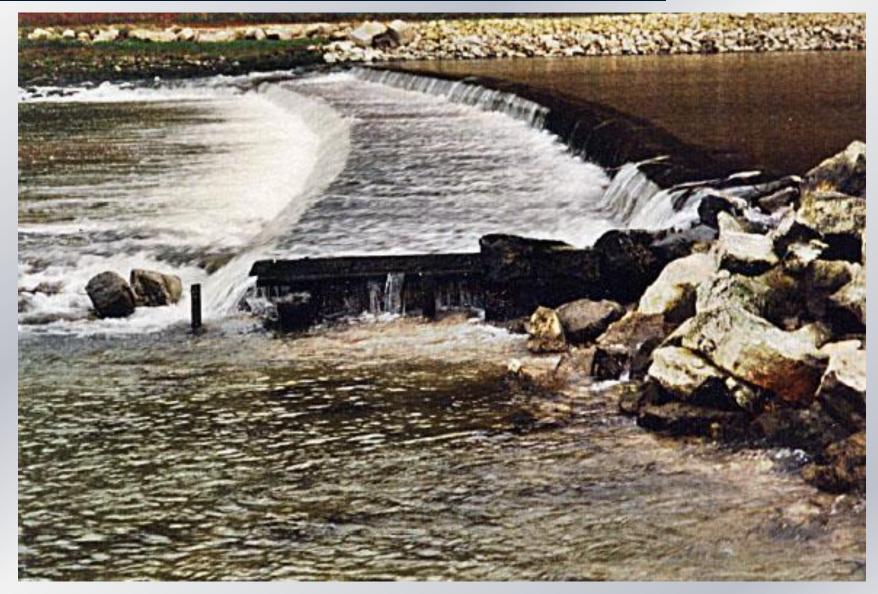


River Isar, near Munich, after revitalisation; Source: BLK



River Isar, near Munich, after revitalisation; Source: BLK





Г

River Isar, near Munich, old drop; Source: BLK



River Isar, near Munich, bed ramp after renaturation; Source: BLK





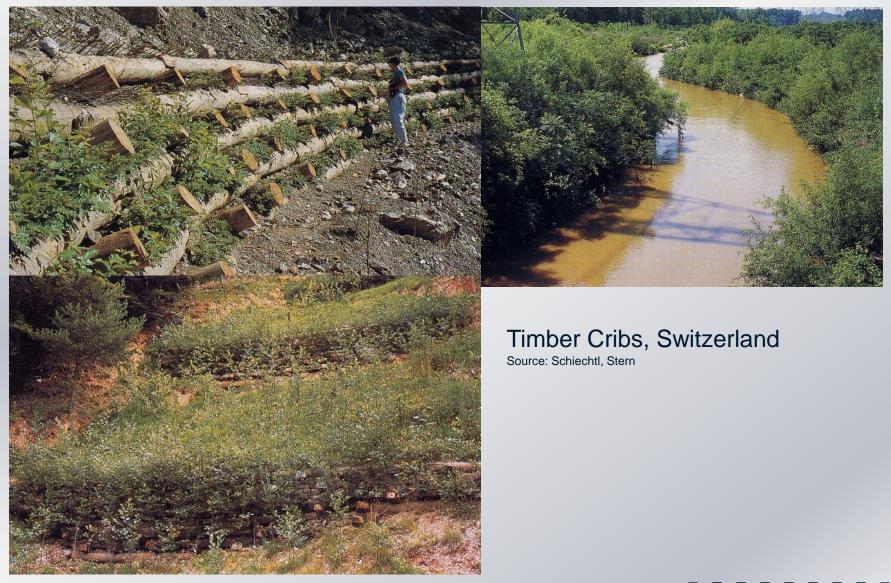
River Drau project: Flood protection through renaturation (widening)





Geosynthetic reinforced river embankment, Worb, Switzerland; Source: Schiechtl, Stern







Geosynthetic Mortar and Sand Matresses; source: Huesker Synthetic





Г



Geosynthetic tubes (here as coastal protection) may be used as urgent measure for flood protection





Geotextile Tube as dike/dune core; Source: C-Horce Construction

- Holistic approaches for river development are very important
- The EU water framework directive is a first international way of rethinking old concepts and to initiate an integrated, holistic way of planning
- The single measures and constructions are not new but the combination is different in each project and needs a good knowledge of all processes in the catchment area
- Many projects of river renaturation in Europe have proved that even with hard rainfall the new systems meet their desired needs (flood protection, ecology, etc.).
- The ecological success of renaturation projects is very good.
- Concrete or steel constructions should only be used if it is prooved that there is no other way of dealing with the problem.