



Workshop 1: Aquatic corridors

Coordinated by Leopold Füreder

Pascal Roche

(ONEMA, France)

raised questions related to the “blue network” and the longitudinal continuity of streams.

Yves Souchon

(Lyon Cemagref)

presented the different geomatics techniques used to characterize the river corridors (riparian forests) at different scales.

Céline Le Pichon

(Antony Cemagref)

demonstrated the applications of landscape-ecology tools in watercourses for fish evaluating “spatially continuity and riverscape heterogeneity”.

Andrea Bou-Vinals

(Univ. Innsbruck)

presented tools for the analysis of connectivity in riverine landscapes, preliminary analysis from Tyrol.



Workshop 1: Aquatic corridors – Introduction

Within this background, the aquatic break-out group will discuss existing knowledge and gaps in

- 1. the identification of barriers being effective in the longitudinal, lateral, vertical and temporal dimensions of river systems,**
 - Agreement on importance of 4-dimensions, ideal model understand structural and functional elements of riverine ecosystems (including aquatic, riparian and catchment elements)**
 - Chemical barriers, temperature, sediment clogging**



Workshop 1: Aquatic corridors – Introduction

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1. the identification of barriers being effective in the longitudinal, lateral, vertical and temporal dimensions of river systems,
- 2. the identification of typical habitats and typical riverine species (brown trout, grayling, bullhead, tamarisk, bird, amphibian and invertebrate species,...),**
 - **Difficulty to define typical habitats, esp. aquatics (micro-habitats)**
 - **To general, needs detailed definitions, physical/spatial and functional aspects**
 - **Blue – Green Veins; aquatic – terrestrial habitats**
 - **Species or species-groups**
 - **Functional guilds**



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- 3. the data availability in the Alps and other mountain regions (within the frame of the implementation of the European-WFD, Natura 2000, fauna-flora-habitat directive)**
- 6. the communication (transfer and exchange of knowledge) with watershed managers and governmental authorities**
 - **WFD – data expected from all Alpine states, delay in F, I, CH equivalent data**
 - **Contact at various levels (EU, national, regional)**
 - **Species/habitat data at Natura 2000 sites**
 - **Difficulty to receive data – intercalibration unit**



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- 4. the identifications of methods for analysis and modelling (indicators, technical questions,...)**
- **Longer discussion on efficiency in the aquatic system (spatial, temporal,...), gaps in availability**
 - **Functional indicators (guilds, biological/ecological traits)**
 - **On regional level: contact to authorities, water managers**



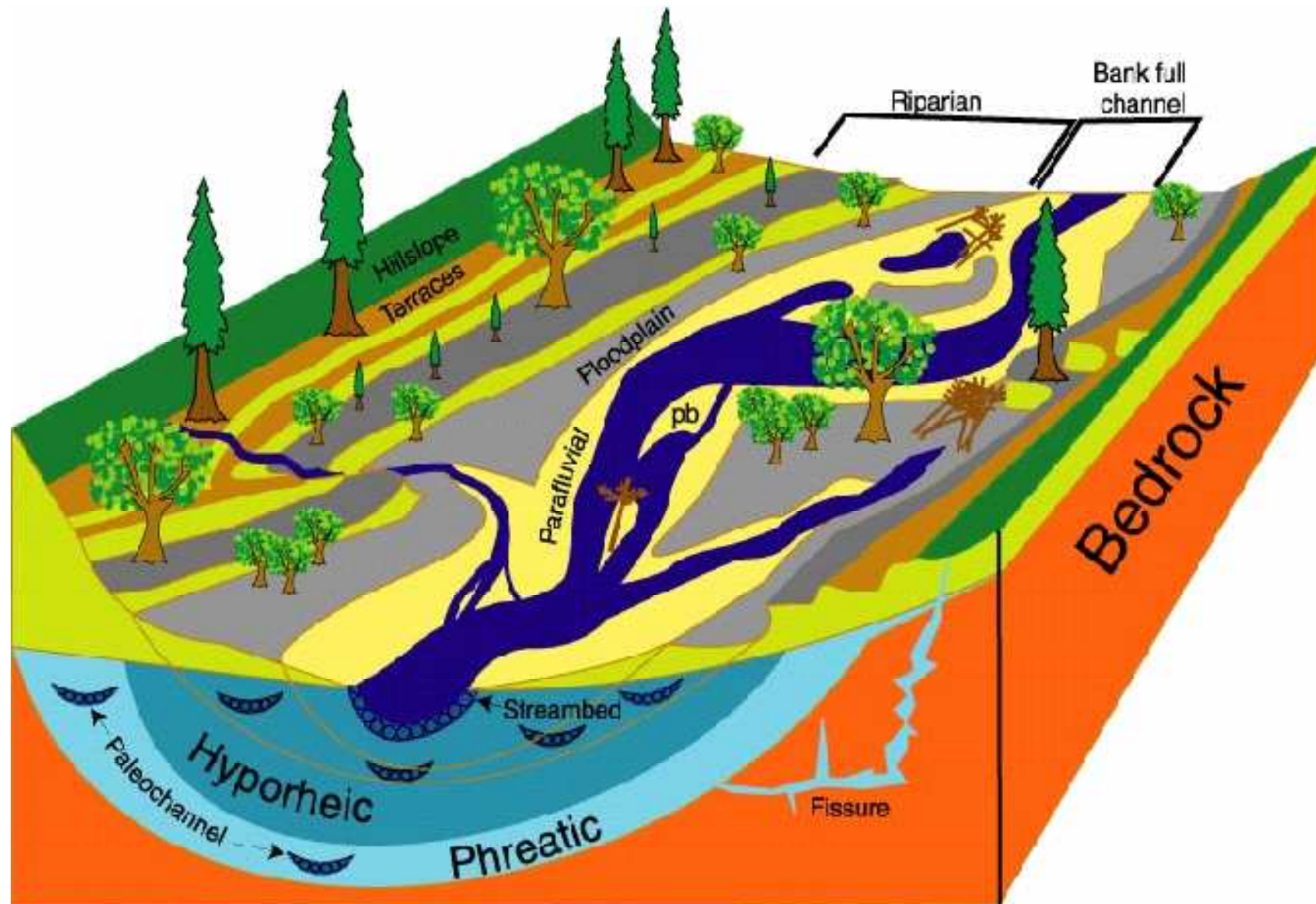
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5. analysis of the potential to increase connectivity and decrease barrier effects and fragmentation

- **Example from Isere, all-level engagement, individual initiatives**

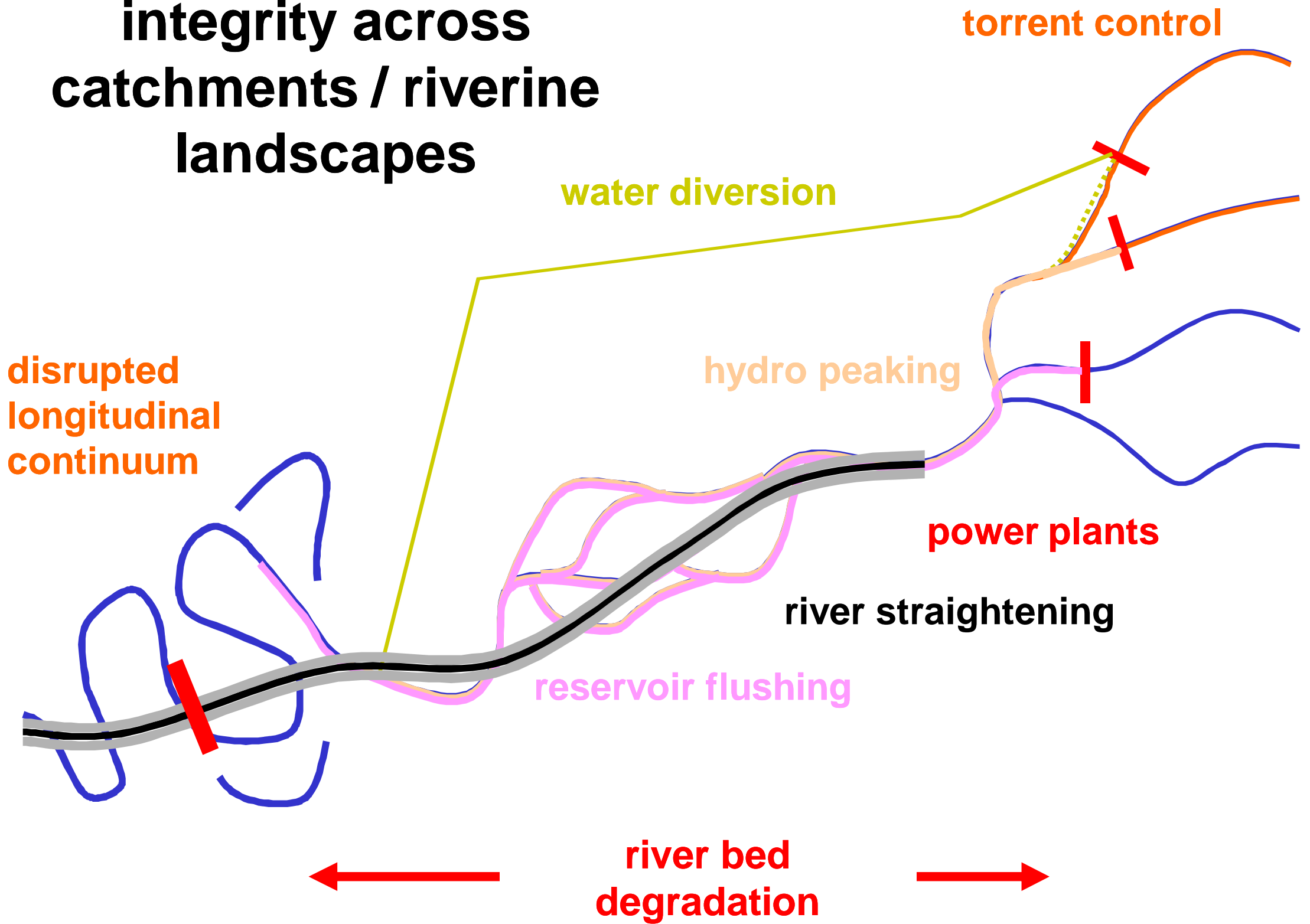


Hauer & Lamberti (2007)

4-dimensional nature of river ecosystems

Running water systems are dynamic systems with **spatial** (1) longitudinal, (2) lateral, (3) vertical and (4) **temporal** dimensions. Depending on the landscape settings these dimensions are of variable/shifting importance. Anthropogenic impacts disrupt the patterns and processes (modified after Stanford, 1998).

Losses of ecological integrity across catchments / riverine landscapes



A winter landscape featuring a snow-covered river winding through a valley. The foreground is dominated by snow-laden evergreen trees and bare branches. The background shows a dense forest of evergreens and distant mountains under a hazy sky.

Riverine landscapes

Riverine landscapes are complex systems with a specific role in connecting aquatic and terrestrial habitats and consequently functioning themselves as habitats, dispersal and migration routes, corridors but also barriers for animals and plants.



In densely populated areas of the Alps and especially in areas surrounding protected areas riverine landscapes were altered intensively, therefore these important features as corridors were degraded in various ways.



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Riverine landscapes and connectivity

- Alpine riverine landscapes (rivers, floodplain area, and catchments) have a key role in the ecological connectivity → Analysis of habitat conditions and degradations and (migration) barriers.
- The decrease of longitudinal and lateral connectivity, habitat fragmentation due to hydropower development, river engineering and flow alterations will be assessed using GIS-methods.





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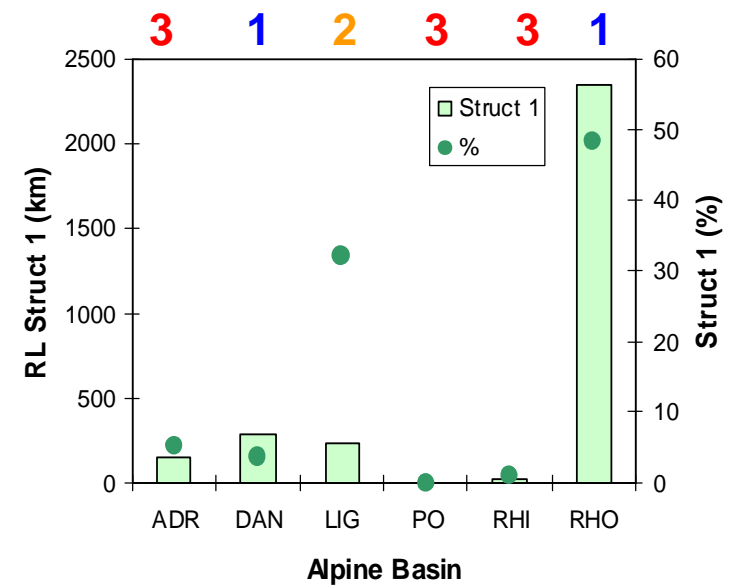
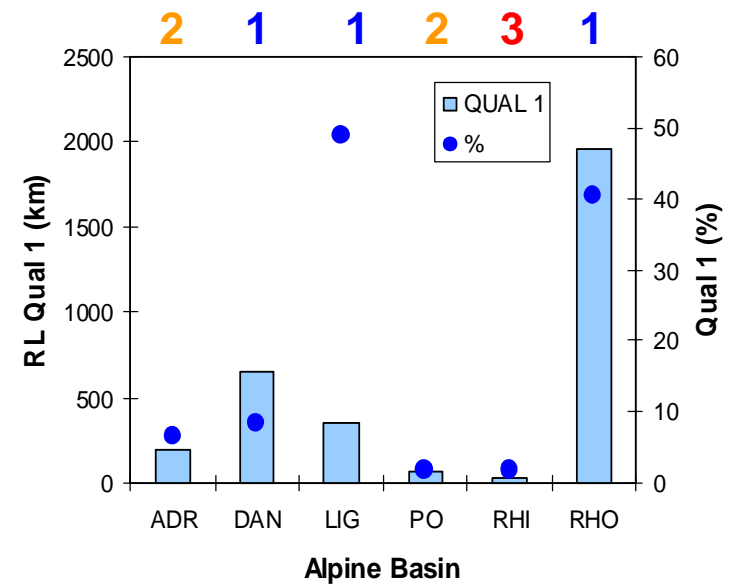
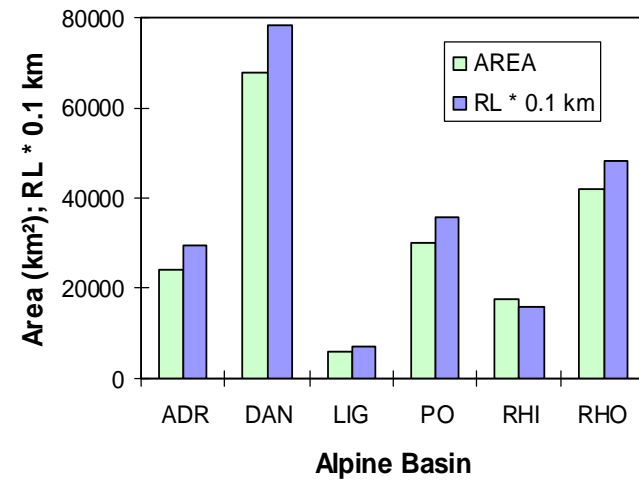
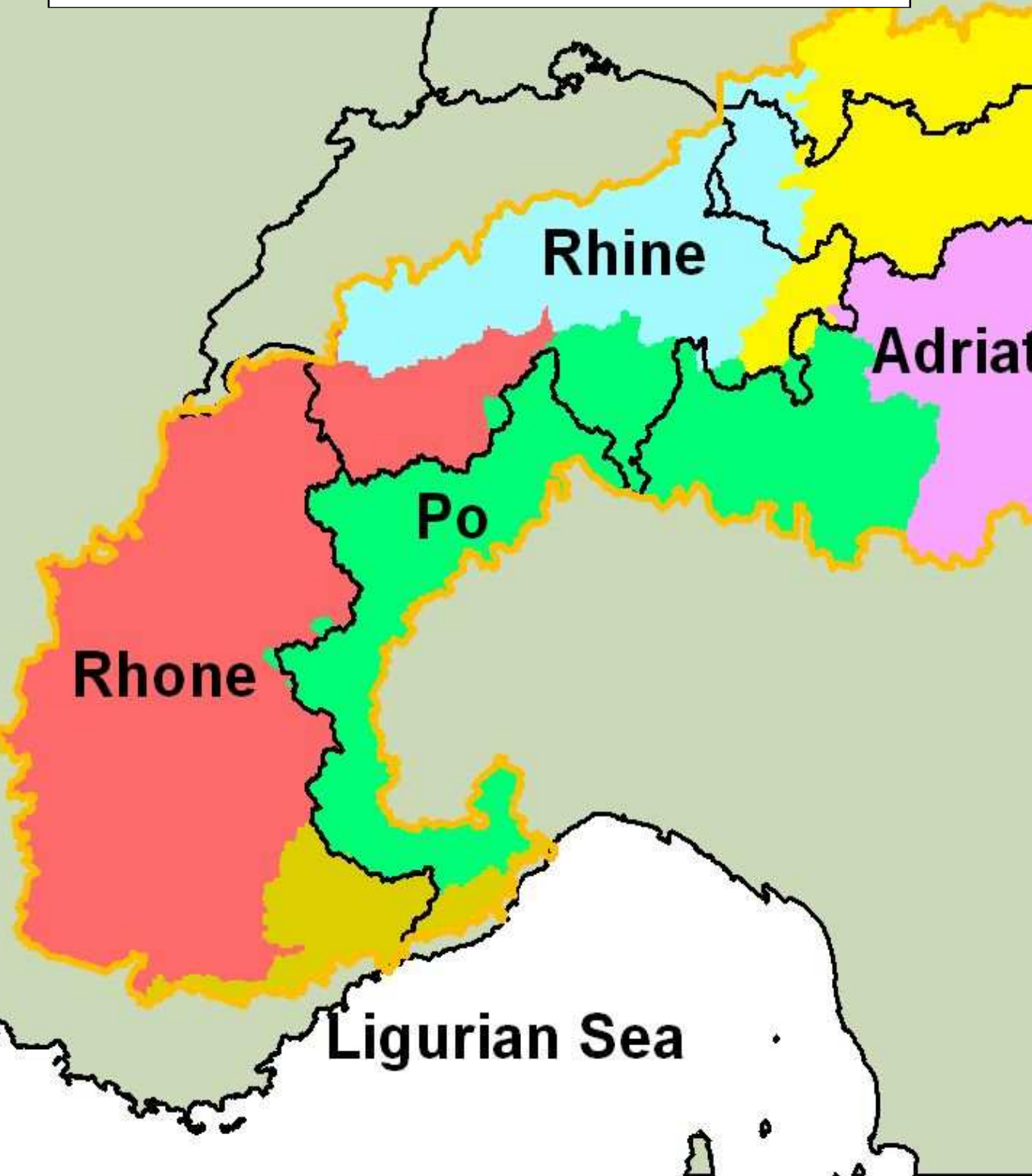
Priority Riverine Landscapes of the Alpine Region

FÜREDER et al. (2003)

supported by



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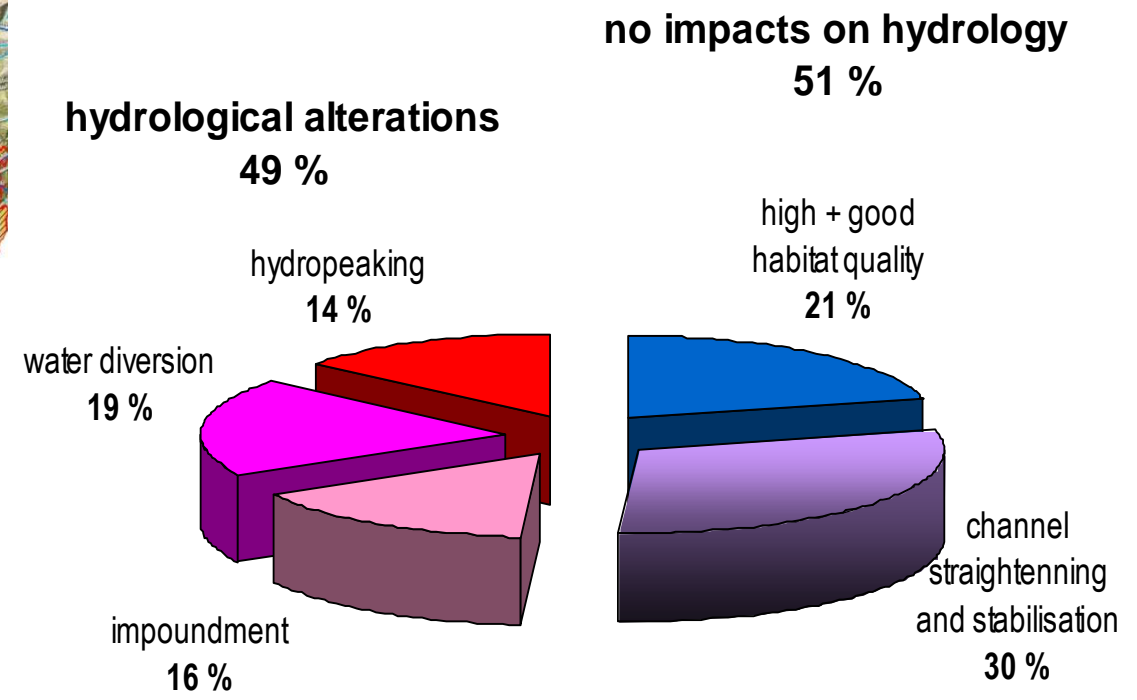
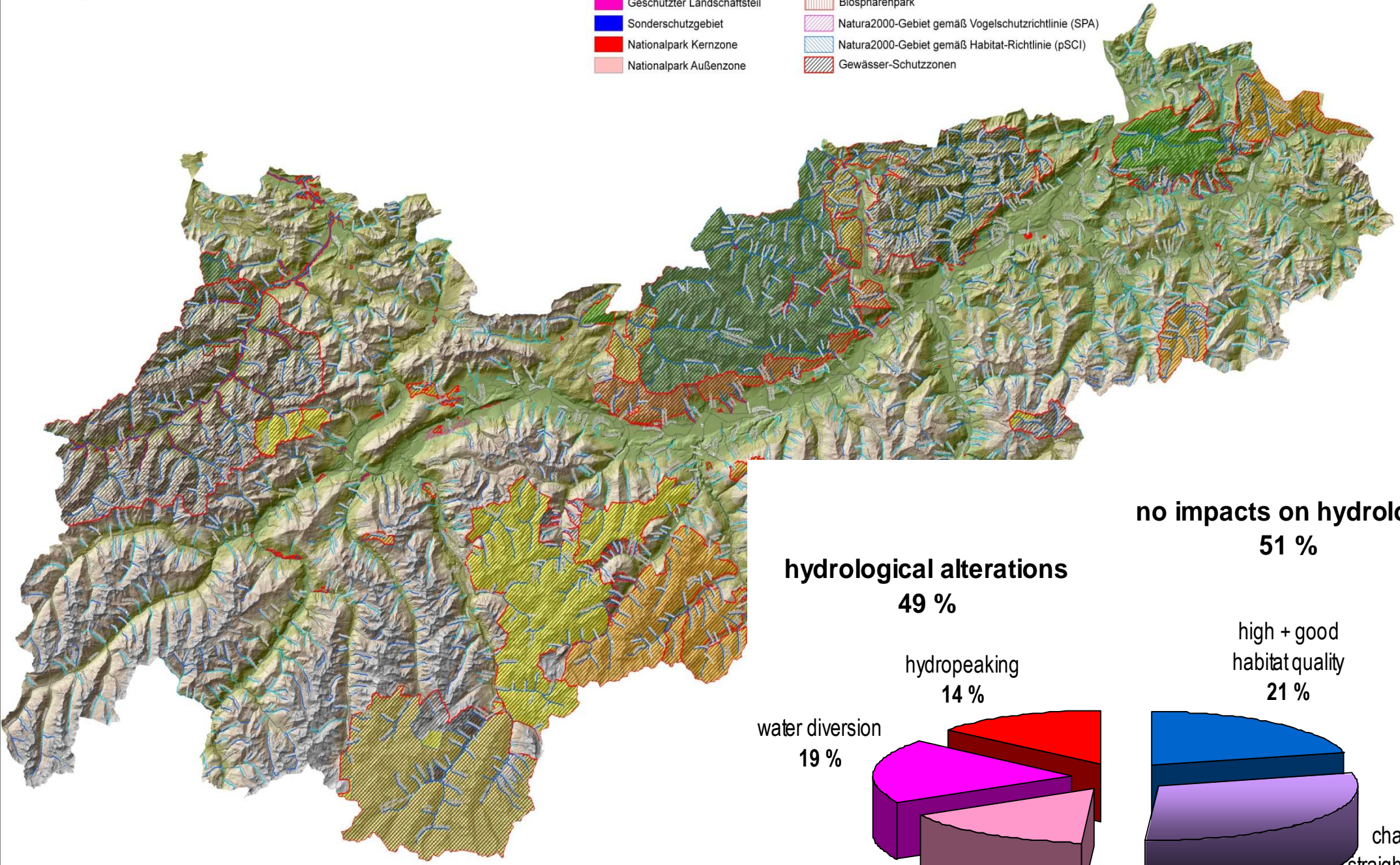


Gewässerstrecken mit "hoher naturschutzfachlicher Wertigkeit"

- Natürliche Abschnitte
- Natürliche oder naturnahe Abschnitte an Gewässer mit einzigartigen oder empfindlichen Abschnitten Gewässer in Schutzzonen
- Naturnahe Abschnitte
- sonstige Abschnitte

Schutzgebiete

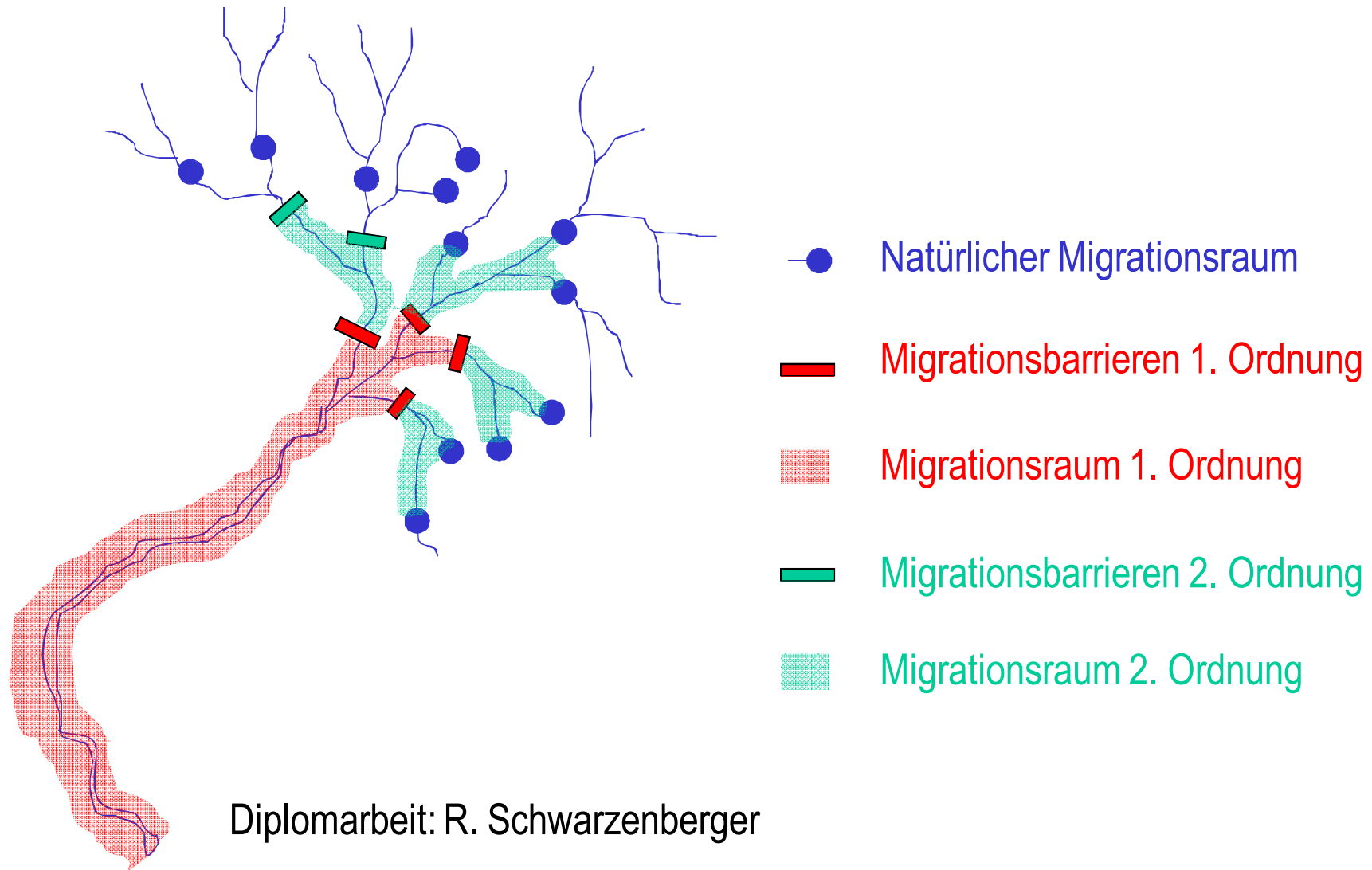
- Naturschutzgebiet
- Naturschutzgebiet alter Prägung
- Landschaftsschutzgebiet
- Ruhegebiet
- Geschützter Landschaftsteil
- Sonderschutzgebiet
- Nationalpark Kernzone
- Nationalpark Außenzone
- ▨ Naturpark
- ▨ Ramsar-Sonderschutzgebiet
- ▨ Biosphärenpark
- ▨ Natura2000-Gebiet gemäß Vogelschutzrichtlinie (SPA)
- ▨ Natura2000-Gebiet gemäß Habitat-Richtlinie (pSCI)
- ▨ Gewässer-Schutzzonen





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Potentieller und realisierter Migrationsraum





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Mammalia	<i>Cervus elaphus</i>	Rothirsch	
	<i>Lutra lutra</i>	Fischotter	
	<i>Myotis daubentonii</i>	Wasserfledermaus	
	<i>Neomys anomalus</i>	Sumpfspitzmaus	
	<i>Neomys fodiens</i>	Wasserspitzmaus	
Pisces	<i>Chondrostoma nasus</i>	Nase, Näsling	
	<i>Phoxinus phoxinus</i>	Elritze, Pfrille	
	<i>Salmo salar</i>	Lachs	
	<i>Salmo trutta fario</i>	Bachforelle	
	<i>Thymallus thymallus</i>	Äsche	
	<i>Salvelinus alpinus salvelinus (L.)</i>	Seesaibling	
	<i>Cottus gobio</i>	Groppe, Koppe	
	<i>Barbus barbus</i>	Barbe	
	Reptilia	<i>Natrix natrix</i>	Ringelnatter
		<i>Emys orbicularis</i>	Europäische Sumpfschildkröte
Amphibia	<i>Bombina variegata</i>	Gelbbauchunke	
	<i>Bufo bufo</i>	Erdkröte	
	<i>Hyla arborea</i>	Laubfrosch	
	<i>Rana temporaria</i>	Grasfrosch	
	<i>Triturus alpestris</i>	Bergmolch	
	<i>Triturus vulgaris</i>	Teichmolch	



Aves

Charadrius dubius

Actitis hypoleucos

Ardea cinerea

Alcedo atthis

Cinclus cinclus

Motacilla alba

Motacilla cinerea

Acrocephalus palustris

Acrocephalus schoenobaenus

Crustacea

Austropotamobius pallipes

Astacus astacus

Austropotamobius torrentium

Insecta

Carabus clathratus

Aeshna caerulea

Cordulegaster boltonii

Flussregenpfeifer

Flussuferläufer

Graureiher

Eisvogel

Wasseramsel

Bachstelze

Gebirgsstelze

Sumpfrohrsänger

Schilfrohrsänger

Dohlenkrebs

Edelkrebs

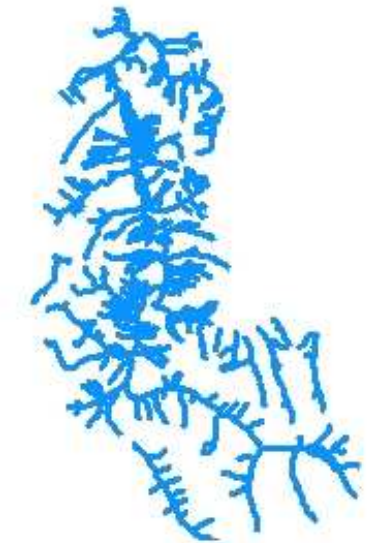
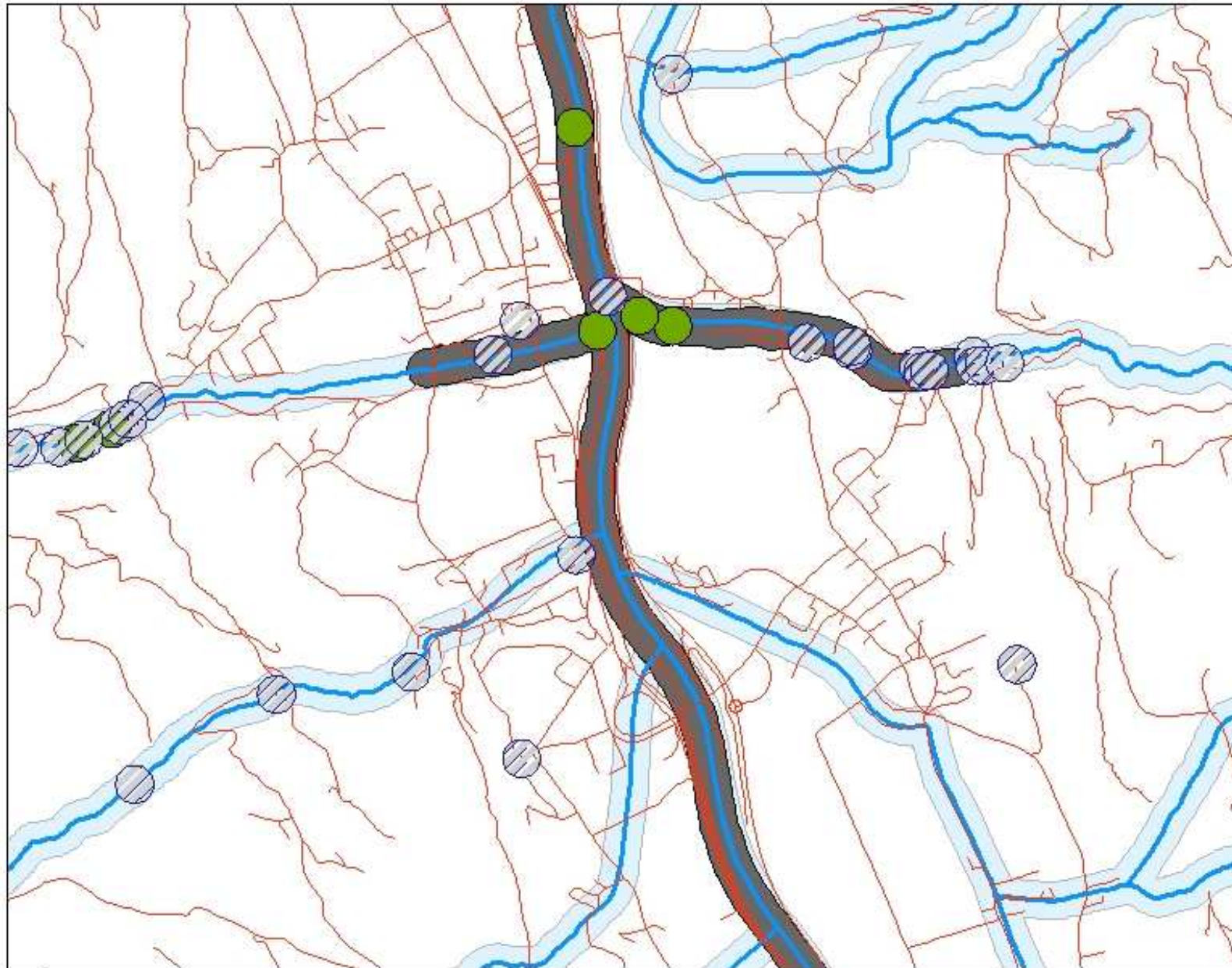
Steinkrebs







Ufer-Laufkäfer

Alpen-Mosaikjungfer

Zweigestreift. Quelljungfer

Map of potential barriers River Ziller, Tyrol, Austria



-  not passable structure
-  fish passable structure
-  streets
-  river
-  obstructed bank
-  riverine landscape (Buffer 100m)

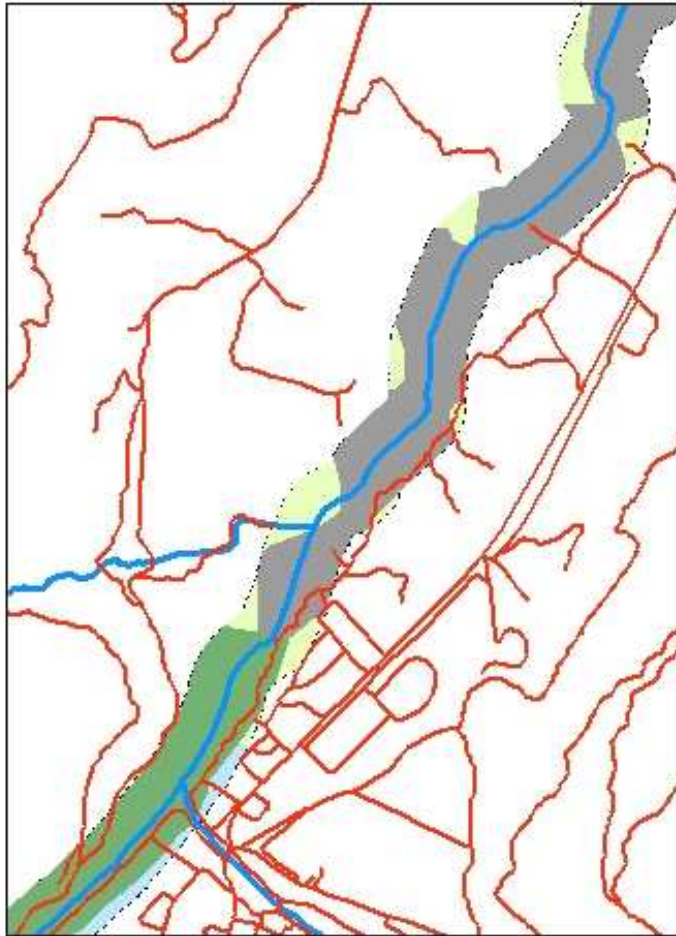
data source: Umweltbundesamt Austria, Tiris
author: andrea.bou-vinals@uibk.ac.at

0 250 500 Meters



Fragmentation of Riverine Landscapes - Lech, Ziller/Tyrol effective mesh-size (km²)

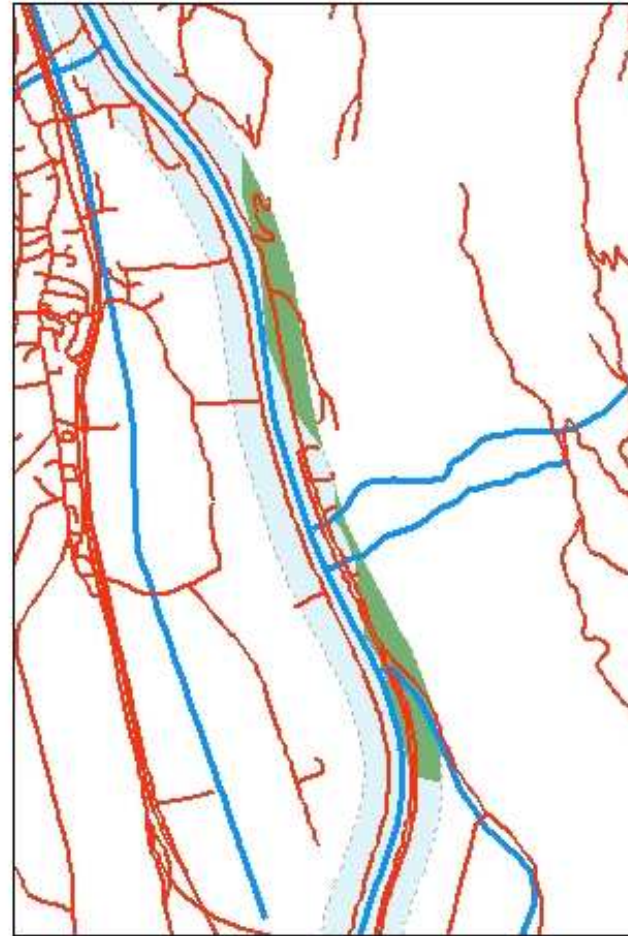
River Lech



Lech

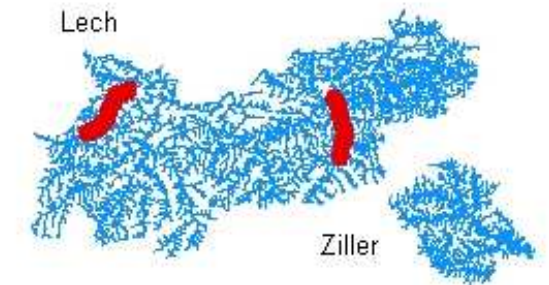
Area riverine landscape (km ²)	6,24
Number of Habitat types	5
Number of Patches	13
Class Area coverage (%)	57,95
Streets (km)	46
Division Index (%)	49
eff. Mesh-size (km ²)	1,85

River Ziller



Ziller

Area riverine landscape (km ²)	6,05
Number of Habitat types	3
Number of Patches	9
Class Area coverage (%)	2,50
Streets (km)	94
Division Index (%)	82
eff. Mesh-size (km ²)	0,03



data source: Tiris, Corine landcover Level3
author: andrea.bou-vinals@uibk.ac.at



Aquatic corridors - presentations

Pascal Roche
(ONEMA, France)

will raise questions related to the
“blue network” and the
longitudinal continuity of streams.

Yves Souchon
(Lyon Cemagref)

will present the different geomatics
techniques used to characterize
the river corridors (riparian forests)
at different scales.

Céline Le Pichon
(Antony Cemagref)

will describe the tools adapted
to landscape ecology and
applied to watercourses considered
to be “spatially continuous
and heterogenous riverscapes”.

Andrea Bou-Vinals
(Univ. Innsbruck)

will present tools for the analysis
of connectivity in riverine landscapes.

