Integrated river management- longitudinal connectivity:

Patterns of fish diversity and distribution along the Brenno river and within the Brenno floodplain

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LCH Laboratoire de constructions hydrauliques

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WSL

eawag aquatic research

Why are fish present or not?

Factors that influence fish distribution patterns can act on different scales:

Watershed scale:
land-use features, agriculture, urbanization…

Reach scale:
hydrology, geomorphology, slope, nutrients…

Subunit scale:
mesohabitats, current velocity, O_2, substrat…

Which environmental gradients influence local assemblage composition?

Reach scale - subunit scale:
Hydrophysical and geomorphic habitat parameters:

- Gradient
- Channel morphology
- Habitat type
- Fish cover
- Substrat composition
- Water temperature
- Current velocity
- Water chemistry

Migration barriers-
disruption of longitudinal connectivity

- Culverts, channels
- Bed drops
- Weirs, dams

Aim: identification of longitudinal patterns of distribution and diversity

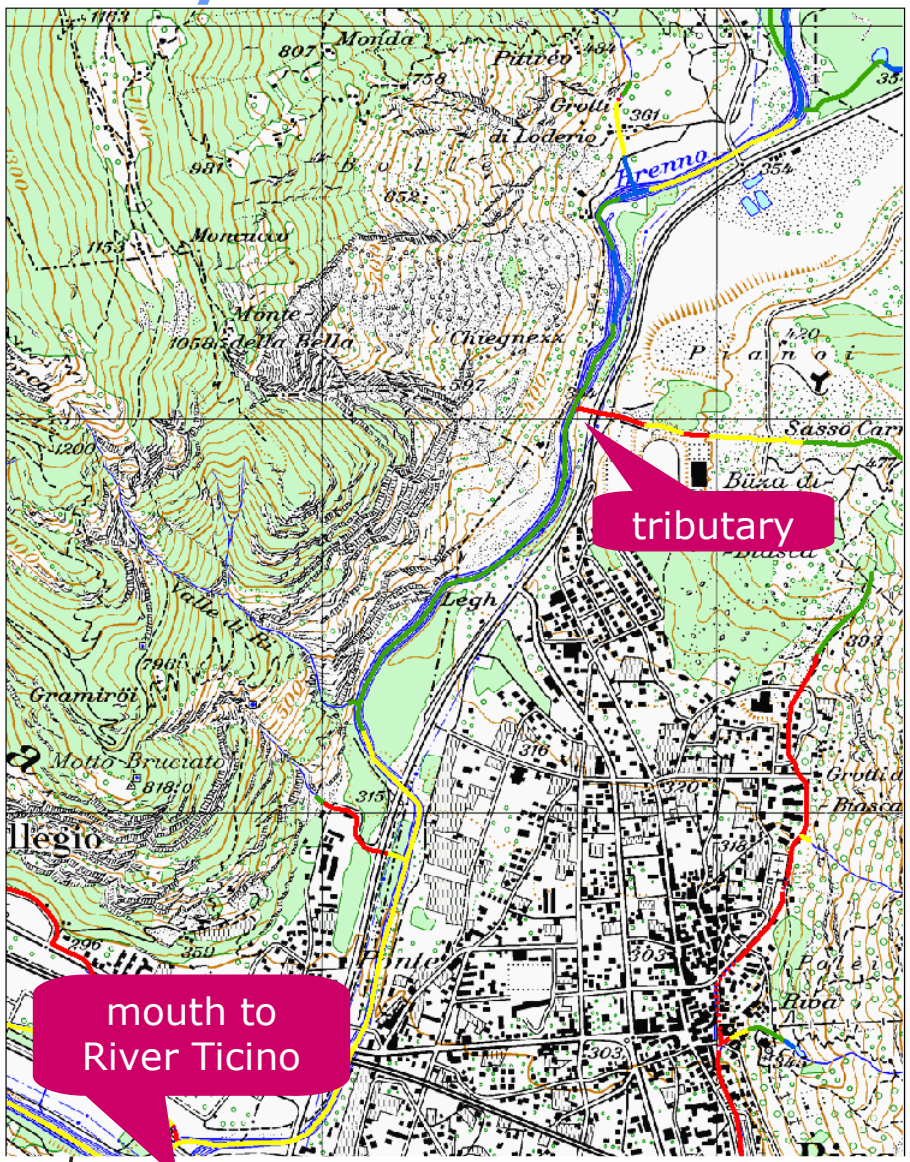
Questions	Target parameters
Habitat **key variables** associated with species (species/ecological guild-specific habitat use)	Habitat features (cover, substrat, temperature…)
Role of **longitudinal connectivity** for species diversity?	Water chemistry, channel morphology, flood plain, distance to mouth, tributaries
Factors causing **gradual or abrupt changes** in assemblage composition and structure (diversity, abundance, age-classes); diversity hotspots	below/above barriers

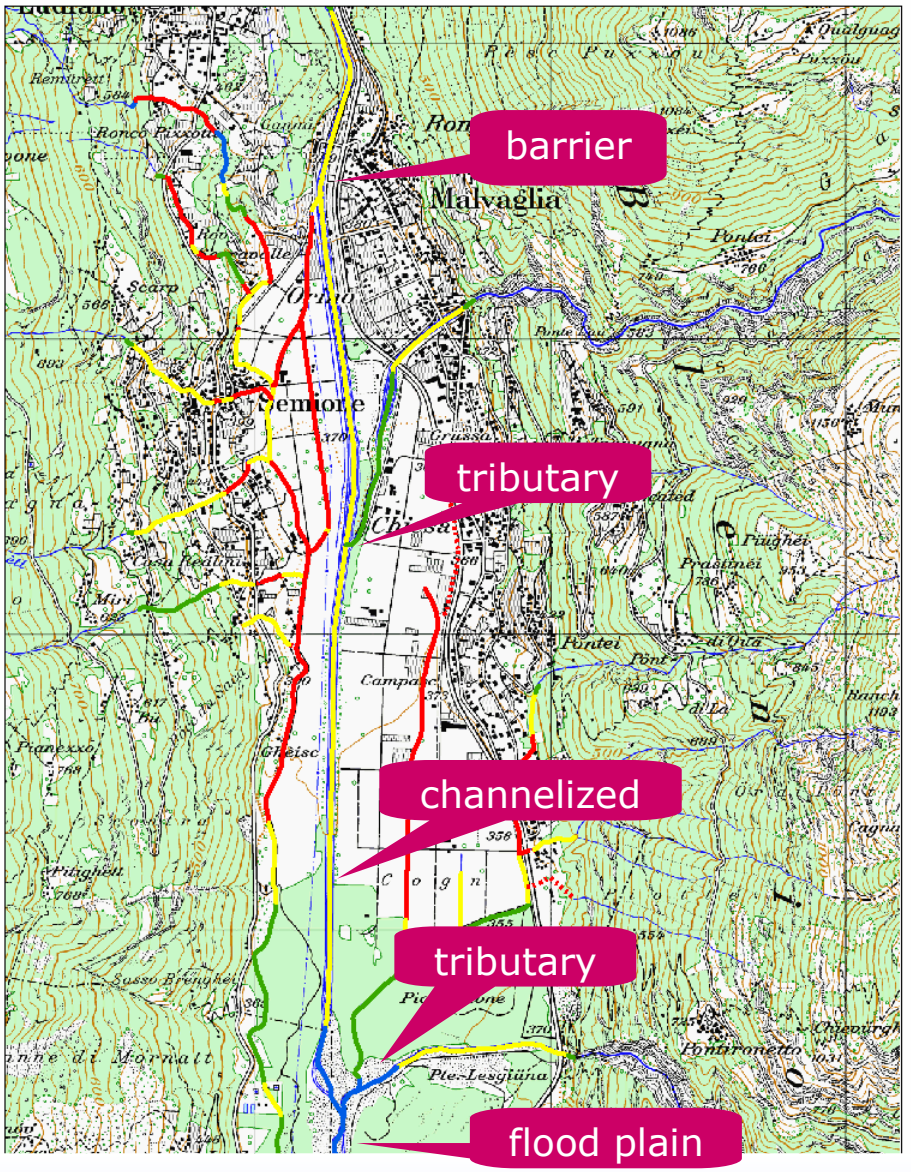
River Brenno, Blenio Valley TI

•River Sense unsuitable
•Mülibach NW (Lake Lucerne)
Chlausenbach SZ (Lake Lauerz)

• Relatively large alpine river with a natural floodplain
• 11 fish species
• Mean discharge 2009: 4m3/s
• Artificial barrier(s)
• Fieldwork March/April (before snowmelt)

Study area


tributary
mouth to
River Ticino


barrier
tributary
channelized
tributary
flood plain

Sampling method: stripe-fishing

•Morphological sections (floodplain vs. channelized vs. natural)

•Within morphological homogenous sections:
100m stretches in a regular interval
small channel-> total area
large channel-> **shoreline-stripe**
(left/right alternatively),
midchannel-stripe

•1 pass with backpack-device, no block-net

•Additional stretches below/above barriers and confluences

Morphological sections, barrier, confluence

Within floodplain: separated units

Hydrosystem channel types

- main stem
- surface connected channels
- alluvial channels (no surface-upstream source)
- isolated pools
- tributary streams

Thanks to

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Assemblage changes Mülibach

Mülibach	Fischartenspektrum
TS1	Bachforelle, Groppe, Hasel, Trüsche
TS2	Bachforelle, Barbe, Groppe, Regenbogenforelle, Trüsche
TS3	Bachforelle, Groppe, Hasel, Trüsche
TS4	Bachforelle, Groppe, Hasel, Trüsche
TS5	Bachforelle, Groppe, Hecht
TS6	Bachforelle, Groppe
TS7	Bachforelle, Groppe
TS8	Bachforelle, Groppe
TS9	Bachforelle, Groppe
TSZufluss	Bachforelle

Assemblage changes Chlausenbach SZ (inflow Lake Lauerz)

Chlausenbach	Fischartenspektrum
TS1	Alet, Bachforelle, Egli, Groppe, Sonnenbarsch
TS2	Alet, Bachforelle, Groppe
TS3	Bachforelle, Groppe, Gründling
TS4	Bachforelle, Groppe
TS5	Bachforelle, Groppe
TS6	Bachforelle, Groppe
TS7	Bachforelle
TS8	Bachforelle