Alpine riverine landscapes: connectivity, barriers and fragmentation

Riverine landscapes are complex systems with a specific role in connecting aquatic and terrestrial habitats and therefore functioning as habitats, dispersal and migration routs and corridors 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 were degraded in various ways. As a consequence, the natural distribution, movements and migration of aquatic and water-bound organisms is highly disturbed or inhibited. Our analysis within Work Package 5 aims at

- the identification of barriers being effective in the longitudinal, lateral, vertical and temporal dimensions of river systems
- the identification of typical habitats and typical riverine species (brown trout, grayling, bullhead, tamarisk, …)
- analysis of the potential to increase connectivity and decrease barrier effects and fragmentation

Methodological approach: The work load concentrates on 3 main foci:

1. Riverine landscape fragmentation

We define rivers as 4-dimensional systems and analyse barriers being effective in these dimensions (rivers, surrounding habitats including type-specific buffer zones). Fragmentation indices are applied for the visualisation of fragmentation. Connectivity and fragmention is identified by calculating "effective Mesh size" (m_{eff}) and "degree of landscape division" (D) in GIS based software packages. The 4-dimensional nature of Alpine riverine landscapes will be presented as calculated potential habitat connectivity (e.g. gravel banks, braided river sections, floodplain forests, riparian buffer strip fragmentation, natural channel reaches and fragmentation)

2. Barrier analysis

For a number of focal taxa we identify and create maps of potential barriers in ArcGis and analyse the potential impacts from barriers on habitat fragmentation (habitat dynamics) and distribution/dispersal and/or migration of focal species or taxa

3. Connectivity and corridors

We overlay and intersect results of fragmentation and barrier analysis as well as distribution maps and movement and migration routes of focal species. For a quantitative analysis of habitat connectivity we apply representative indices (e.g. class coincidence probability, proximity index, contagion index). At the same time we can define potential corridors for each focal species and/or taxon.

In the present project period, we focus within WP7 on specific pilot regions. Effective barriers and obstacles within the riverine landscapes will be identified and contacts to regional watershed authorities established for the reduction of barrier impacts and restoration.

Leopold Füreder, Andrea Bou-Vinals
River Ecology and Invertebrate Biology
Institute of Ecology, University of Innsbruck, Austria

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