15. **Surpassing river barriers: Moving Upstream**

Lessons from fish passage monitoring in the Netherlands

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River landscapes worldwide are highly fragmented, with numerous barriers constructed to serve hydropower and water control purposes. River infrastructure not only alters rivers hydrologically and geomorphologically but also prevents the upstream migration of fish. River fragmentation is particularly prevalent in the human-dominated lowland landscape of the Netherlands. Fishways function as means of passage around barriers for fish migrating both upstream and downstream. Increasing knowledge of the functionality of fishways is relevant for future management strategies. We combined fish passage monitoring data with the national fish distribution atlas, conducting the first nationwide study on fish passage use. A total of 82 fish passages were included in our analysis. The fish passages consisted of the following types: Dutch pool and orifice (N=8), Fish lock (N=3), Nature-like (N=10), Rock weirs (N=26), V notch weirs (N=7), V notch weirs with vertical slot (N=12) and Vertical slot (N=16). In total, 35 native species were observed ascending at least one fish passage facility and an average of 10 native species from 18 present in the surroundings were found passing upstream. Moreover, our analysis reveals inadequate monitoring of fish passages in many cases. We advise that fishways should be constructed and monitored in such a way that accounts for the whole native community and not only target species. The obtained information from this study should be considered by water managers for improving monitoring schemes and river connectivity which is demanded by the European Water Framework Directive.