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Abstract

Dammed Fish: Impact of Structural and Functional River Network Connectivity Losses on Fish Biodiversity—Optimizing Management Solutions †

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Abstract: Rivers have always been linked to society development, as such they are amongst the most impacted ecosystems in the world. One of the most impairing impacts is the one promoted by instream barriers that fragment river network connectivity and impede fish movements. Barriers are especially deleterious to freshwater dependent fish species that see their dispersion ability severely affected with possible consequences for population and species maintenance, altering genetic flow and community balance. With this in mind, the European Biodiversity Strategy has the specific goal of rehabilitating 25,000 km of free-flowing rivers. Additionally, the European Water Framework Directive (WFD) also determines that longitudinal connectivity re-establishment is vital to achieve the goal of good ecological status. To implement adequate measures for river network connectivity enhancement, connectivity has to be quantified at the basin scale accounting for the cumulative impacts of all the dams present in a given system. Dammed Fish is a Europe-wide research project aiming to evaluate and propose solutions and tools to inform river network connectivity management, to improve fish biodiversity and enhance the biotic quality of European rivers. The project is structured into five interconnected tasks to evaluate how dams, by themselves and combined with other pressures, affect river network connectivity, biodiversity loss, species range contraction and species turnover in (riverine) fish. Results will contribute to further research and improved management of river network connectivity by developing three free tools: RivFish—to link fish data and river networks; RivConnect—to calculate basin-wide network connectivity; and RivOpt—to optimize basin-wide connectivity management solutions considering conflicting management goals. Thus, Dammed Fish proposes an overall and integrative approach to connectivity management over large spatial extents.

Keywords: river barriers; graph theory; functional connectivity; software development; Europe

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