

Improving sustainability of fish populations downstream small hydropower plants

Summary

River fragmentation is the major threat to aquatic biodiversity, including freshwater fish. The construction of man-made structures alters the natural flow regime, obstructs the movement of organisms, and reduces the amount of available habitat for fishes. Small hydropower plants (SHPs) considered as one of the most common obstacles that fragment rivers have received much less attention than dams and are proliferating around the world since the 90s. One of the most detrimental impacts of SHPs on riverine ecosystems, relates to the downstream rapid flow variations produced. Indeed, as a consequence of varying power production with demand, downstream river sections experience drastic daily and sub-daily fluctuations in streamflow and stage, a phenomenon widely known as hydropeaking.

Another main environmental challenge facing SHPs relates to fish passage, as such structures typically block upstream fish movements, who are prevented from reach spawning, feeding and refuge habitats necessary to complete their life-cycles. Despite recent scientific interest in this area, our knowledge of the complex ecological impacts of hydropeaking and river fragmentation by SHPs, and of efficient mitigation strategies is still limited.

This thesis plan aims at understanding the impacts of small hydropower plants on fish populations - especially cyprinids, the most common group of freshwater fish in Europe - downstream these facilities and improving their sustainability, and at developing new mitigation measures to attenuate those impacts.

Keywords

Small hydropower plants, hydropeaking, fish passage, cyprinids, sustainability.



45° flow-refuge configuration (facing downstream) tested at the indoor flume located at the Laboratory of Hydraulics at IST.



PhD student

Renan Siqueira Leite de Andrade

PhD program

River Restoration and Management (IST, University of Lisbon)

Supervisor

José Silva Santos (ISA, University of Lisbon)

Co-supervisors

António Pinheiro (CERIS, IST, University of Lisbon) and Isabel Boavida (CERIS, IST, University of Lisbon)

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