



Euro-FLOW: a European training and research network for environmental FLOW management in river basins. A MARIE SKŁODOWSKA-CURIE ACTIONS Innovative Training Network (ITN) funded under H2020-MSCA-ITN-2017

ESR 7: Basin-region hydromorphological alteration links to biodiversity and ecosystem functioning.

3 year fixed- term PhD position.

Host institute: Universidad de Cantabria – Instituto de Hidráulica Ambiental de Cantabria, Spain

Supervisors: José Barquín, César Álvarez (UC-IHC, Spain), Gabriel Singer (IGB, Berlin, Germany), Ben Gillespie (Yorkshire Water Services LTD, UK)

Project Description:

The influence of the natural flow regime on river processes and functions is well known and research focused on the implications of altered flow regimes has increased rapidly since late 1990s. It is now widely accepted that maintaining some degree of similarity to the various pre-impacted combinations of flow magnitude, timing, duration, frequency and rate of change is required to maintain river ecosystem biodiversity and functions. In this regard, the first step through the adoption of appropriate conservation and recovery measures is identifying the extent to which the flow regime deviates from natural conditions. Reservoirs vary in size, level of impoundment, function and operational rules, so generalizations of their potential hydrologic alteration (HA) and ecological impact are difficult.

This PhD will provide a regional perspective on how different types of natural flow regimes (i.e. different hydrological classes) shape river biological communities and river metabolism and how hydrological alteration (of different types according to reservoir uses) change these natural patterns. The PhD will focus on identifying which are the main hydrological characteristics that maintain or produce changes on river biological communities and processes. The candidate will use different approaches to achieve this main objective from exploring existing regional macroinvertebrate, fish and river metabolism databases, to a selection of control-impact field design surveys for biodiversity and metabolism characterization and also modelling methods.

Objectives:

- (1) Link specific changes of natural hydrological regimes to patterns of biodiversity and ecosystem functioning
- (2) Developing methods and approaches to understand linkages between paired hydrological and ecological data
- (3) Spatial modelling and extrapolation of hydrological alteration to river reaches based on reservoir uses.
- (4) Model biodiversity and ecosystem functioning responses to hydrological alteration.

Expected outcomes:

- (1) Determination of hydrological alteration patterns at large spatial scales

(2) Establishment of main changes on river biodiversity and ecosystem functioning according to different hydrological alteration types

(3) Recommendations for integrated catchment management on e-flow regimes

Secondments:

A 3 month stay at IGB (Berlin, Germany, host: Gabriel Singer) with the purpose of building R-scripts for ecosystem functioning analysis.

A 3 month stay at YW (Yorkshire, UK, host: Ben Gillespie) with the purpose of analyzing the effects of hydrological alteration from reservoir and land use changes.