



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 1: Designing the ideal river flow regime: designer flows for delivering good ecological potential in regulated rivers

3 year fixed- term PhD position.

Host institute: University of Leeds, UK

Supervisors: Dr Megan Klaar, Dr Jonathan Carrivick (University of Leeds)
Joanne Baxter (Yorkshire Water) and Dr Judy England (Environment Agency)

Project Description:

Rivers downstream of man-made structures such as dams and reservoirs are significantly altered from their natural state, and as such, environmental objectives must reflect this modified condition. One way of managing heavily modified water bodies (HMWBs) is the use of artificial flow regimes which are designed to provide the requirements of both the river ecosystem (e.g. flood and low flows, *sensu* the natural flow paradigm) and meet the consumptive duties placed on the river. The regulated release of water to mimic natural flow elements such as floods, freshets, low flows, and aspects of flow variability are predicted to maintain the hydrogeomorphic integrity of river habitats, ensuring that they reach good ecological potential as required by UK and EU law. Environmental flow standards provide guidance to optimise flow releases from water storage reservoirs. However, there is little empirical evidence to say how successful these standards are in establishing and maintaining ecological potential, the geomorphological impacts of the flow regimes and how we can deal with the complexity of the competing needs of species (e.g. fish and vegetation) and water use (e.g. agriculture vs public water supply, implications for flooding) which further constrict management objectives.

Yorkshire Water (YW) owns and operates a number of reservoirs in the Yorkshire area which, supplies water throughout its region and is committed to improving the environmental condition of rivers. YW is able to manage the release of water from a number of its reservoirs in the Pennine area of Yorkshire, enabling the set-up of a controlled experiment in which the timing, magnitude and frequency of flow events can be managed in order to assess how designed flow events affect instream habitat, biota and ecosystem processes. The successful ESR candidate will test the existing environmental flow standards, design and implement a number of designer flows and, examine how altered flow regimes can be implemented to provide the dual needs of both the environment and society. They will work with other Euro-FLOW ESRs to determine the future of designer flows in the management of regulated rivers.

Objectives:

- (1) Set up experiments to assess how the timing/ magnitude/ frequency of flows affect geomorphological processes and habitat quality for instream biota.
- (2) Monitor geomorphological changes and the ecological consequences of habitat quality and quantity changes.

(3) Use the concept of 'designer flows' as a template for providing hydromorphological integrity to rivers downstream of reservoirs.

Expected outcomes:

(1) An understanding of geomorphological response of Pennine rivers to reservoir flow manipulation which can be used to develop a geomorphological risk assessment to aid in the management of flows.

(2) New spatio-temporal understanding of geomorphological drivers of whole river ecosystem processes (e.g. production/ respiration).

(3) Information on flow-habitat-functional process linkages to underpin design of reservoir outflow regimes.

Secondments:

Yorkshire Water, total of 6 months over years 1-3 for planning and implementation of flow trials, data collection and dissemination.

Environment Agency, 3 months in year 3 to develop evidence links to back up policy guidance.

Eligibility Criteria:

* Applicants must not have resided or carried out their main activity in the UK for more than 12 months in the 3 years immediately prior to their recruitment¹.

* Applicants must hold a first degree and/or Masters degree in an environmental sciences subject (e.g. hydrology, ecology, environmental management etc), and be highly motivated to work in an international team including frequent travel between the Euro-FLOW beneficiaries and project partners.

* Applicants must not have more than 4 years (full time equivalent) research experience at the date of their recruitment¹. This is counted from the date they obtain the degree that would let them start work on a doctorate. They must not have been awarded a doctoral degree.

* Some experience in freshwater ecology is required. Skills in geomorphological monitoring, invertebrate taxonomy and/ or statistical analysis using R would be advantageous.

* Applicants must have excellent written and spoken English skills.

Other requirements: Full driving license (UK/EU)

¹Date of recruitment is defined as the first day of the applicant's employment i.e. the start date indicated in their employment contract.

EuroFLOW Information:

The regulation of river flows is one of the biggest stressors affecting river ecosystems across the world. In many countries, major legislative efforts are therefore underpinning the development of new approaches to mitigate the impacts of river flow regulation. These approaches are based on optimising the management of river flows to maintain services to humans (e.g. water supply, hydropower) whilst protecting and/or rejuvenating the aquatic environment with water of adequate quantity and quality in space and time (i.e. environmental flows). In this context, a field of applied aquatic science has developed to generate the evidence base for identifying the best ways to manage the quantity, quality and patterns of environmental flows to sustain river ecosystems, Euro-FLOW will train a new cohort of researchers to be future leaders in this field. Within Euro-FLOW, 15 early-stage researchers will develop new theoretical and

empirical insights via ground-breaking experimental manipulations, large-scale field surveys and development of cutting-edge models to inform the management of water flows and aquatic ecosystems in river basins. Future research leaders will be developed through advanced training in: (i) river ecosystem science in relation to environmental flows; (ii) transferable scientific and life skills; (iii) collaborative working with international and inter-sectoral networking. Euro-FLOW will produce scientists with the ability to span subject boundaries, e.g. hydrology, geomorphology, geochemistry, ecology, microbiology, modelling and environmental management. The strong involvement of the non-academic sector will provide the PhD students with a holistic perspective on career opportunities.

Application details

The application should contain a cover letter that states your motivation, a CV and supporting documents about your education and studies (i.e. transcripts, certificates) and professional experience where applicable and two references. If you are applying for more than one EuroFLOW position, please rank your preferred projects.

Contact Dr Megan Klaar; m.j.klaar@leeds.ac.uk for information on how to apply

<https://jobs.leeds.ac.uk/vacancy.aspx?ref=ENVGE1064>

Closing date: 30 November 2017

Post start date: February 2018