



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 6: River food web responses to reservoir outflow manipulation

3 year fixed- term PhD position.

Host institute: University of Leeds, UK

Supervisors: Dr Lee Brown (University of Leeds) and Dr Nikolai Friberg (NIVA, Norway)

Project Description:

River flows play a central role influencing ecosystem diversity by redistributing energy, nutrients, sediment and biota (1,2), but the frequency, magnitude and timing characteristic of extreme events is heavily modified in regulated rivers. In many regions of the world, artificial flows are being modified by managing reservoir releases in attempts to restore river ecosystems, but most ecological studies have focused on the responses of single groups of organisms (3). There is a major need to understand the alteration and re-assembly of aquatic food webs following outflow manipulation events (typically flow peaks) to understand the importance of linkages and feedbacks between different trophic groups influencing biological community responses (4). Some understanding of food web responses to large floods has been generated in response to flushing flows as part of restoration measures in heavily regulated rivers of the USA (e.g. 5) but the transferability to other regions remains to be studied. This PhD will develop new empirical evidence for food web responses to reservoir flow manipulation.

1. Poff 1997 *Journal of the North American Benthological Society* 16 p391
2. Lake 2000 *Journal of the North American Benthological Society* 19 p573
3. Gillespie et al. 2015 *Freshwater Biology* 60 p410
4. Woodward et al. 2016 *Philosophical Transactions of the Royal Society B* 374 p694
5. Cross et al. 2011 *Ecological Applications* 21 p2016.

Objectives:

- (1) Quantify the distribution of biomass across trophic levels in rivers in relation to flow regimes and designed experimental flows using BACI approaches;
- (2) Assess the ways in which flow management alters feeding links between basal resources (detritus, algae), invertebrate consumers and predators (invertebrates, fish, amphibians);
- (3) Quantify flows of energy and matter between species based on estimates of primary and secondary production, and evaluate the use of metabolic theory to predict food web responses to flow manipulation.

Expected outcomes:

- (1) Creation of new, replicated food web datasets with quantified linkages;

(2) Database of information to determine relationships between food web structural/functional properties and hydrological variability;

(3) Food web data at scales ranging from river reach to whole river to catchment

Secondments:

University of Cantabria- Environmental Hydraulics Institute (UC-IHC, Spain, host Jose Barquin) for 3 months in year 2 with the purpose of the collection of food web data and species identification

MWH Global (UK) for 1-2 months in year 3 to understand the business environment and global-scale river regulation developments

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 Ecology, Environmental Science or a related discipline and be highly motivated to work in an international team including frequent travel between the Euro-FLOW beneficiaries and project partners.

* Experience of river ecosystems, including invertebrates, algae and/or fish are also required

* 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.

* Applicants must have excellent written and spoken English skills.

Other requirements:

A full driving license is essential to complete the field-based elements of this PhD.

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 Lee Brown l.e.brown@leeds.ac.uk for information on how to apply

<https://jobs.leeds.ac.uk/vacancy.aspx?ref=ENVGE1065>

Closing date: 30 November 2017

Post start date: February 2018