



**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 11: Functional implications of river thermal response to flow dynamics**

**3 year fixed- term PhD position.**

**Host institute:** Leibniz-Institute of Freshwater Ecology and Inland Fisheries (IGB), Berlin, Germany

**Supervisors:** Jörg Lewandowski, Gabriel Singer (IGB, Berlin, Germany), Guido Zolezzi (University of Trento, Italy), José Barquin (University of Cantabria, Spain)

**Project Description:**

The aim of this PhD project is to understand how natural and anthropogenically-impacted flow regimes (water level fluctuations) impact on the thermal conditions of the river water column and the river bed. Temporal variability and spatial heterogeneity of temperatures will be investigated with thermal infrared imaging (TIR), fibre-optic distributed temperature sensing (fo-DTS), temperature lances recording temperature depth profiles in the hyporheic zone and temperature loggers installed in wells. At the local scale, drivers and consequences of observed temperature patterns will be studied: Thermal sediment properties and subsurface flow patterns will be considered to understand the physical processes translating a flow regime into a thermal regime, whose ecological implications will be investigated by measuring microbially driven ecosystem functions. In a later phase of the project, the experimental findings shall be upscaled to understand riverscape patterns of thermal and microbial response to variable flow.

The project will be conducted at different study sites with different flow regimes. The perennial River Erpe in Berlin shows strong regular diurnal fluctuations of flow due to the outlet of a wastewater facility and the River Erpe is heavily impacted by nutrients, carbon and organic micropollutants. The ephemeral sand-bed Stream Demnitzer Mühlenfließ in Brandenburg shows intense flow variations and experiences usually some dry months during summer. Due to intense agriculture in the catchment the water quality is impaired by nutrients. The pristine braided River Tagliamento in Italy shows intense flow variations and its large gravel bed supports great microhabitat diversity including parts that are exposed to air for long periods of time. Consequently there is a huge span of temperature fluctuations in this river. Finally, the sand-bed stream Schlaube in Brandenburg experiences only very small water level fluctuations but the opportunity to cause small floods in this stream allows studying their impacts on subsurface flow patterns and biogeochemical processes.

**Objectives:**

- (1) Understand how natural and anthropogenically-impacted flow regimes (water level fluctuations) impact on the thermal conditions of the river water column and the river bed.
- (2) Test how variability temperature conditions influences microbially driven ecosystem functions at local habitat scale.
- (3) Scale up findings to understand riverscape patterns of thermal and microbial response.

**Expected outcomes:**

- (1) Identification of typical thermal patterns (regimes) of river water and river bed in response to variable flow and with a focus on within-habitat temperature stability versus across-habitat heterogeneity at the riverscape scale.

- (2) Knowledge of how thermal regimes impact local ecosystem functions driven by temperature-sensitive microbes.
- (3) A model-based linkage of flow-regime driven thermal patterns to riverscape ecosystem functioning.

**Secondments:**

A 2-month stay at University of Trento (Italy, host: Guido Zolezzi) in year 1 or 2 with the aim to conduct measurements at the Tagliamento.

A 4-month stay at the University of Cantabria (Spain, host: Jose Barquin) in year 2 with the purpose of modelling.

**Eligibility Criteria:**

- Applicants must not have resided or carried out their main activity in Germany for more than 12 months in the 3 years immediately prior to their recruitment<sup>1</sup>.
- Applicants must hold a first degree and/or Masters degree in Environmental Sciences, Hydrology, Geoecology, Microbiology, Ecohydrology, Civil Engineering and be highly motivated to work in an international team including frequent travel between the Euro-FLOW beneficiaries and project partners.
- Experience in publication of results are advantageous.
- Applicants must not have more than 4 years (full time equivalent) research experience at the date of their recruitment<sup>1</sup>. 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:**

Candidates should have experiences in some of the following fields and be willing to familiarize themselves with the other fields:

- Hydrogeology, hydrology and hydraulics
- Biogeochemistry (focus on nitrogen, phosphorus, carbon)
- Microbiology
- Measurement techniques
- Tracer experiments (including use of temperature as a tracer)
- Hyporheic zone research
- Environmental/ecological modeling and statistics

<sup>1</sup>Date 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.

**Host institute information:**

The Leibniz-Institute of Freshwater Ecology and Inland Fisheries (IGB) ([www.igb-berlin.de](http://www.igb-berlin.de)) is the largest freshwater research institute in Germany with a mission for the generation, dissemination and application of knowledge about freshwater ecosystems. The IGB program is unique in that it combines basic and applied research for the benefit of both. Cooperating intensively with the scientific community (universities, research institutes), government agencies, as well as the private sector, guarantees the development of innovative solutions to the most pressing challenges facing freshwater ecosystems and human societies. The IGB is part of the Forschungsverbund Berlin e.V. (FVB). Within the framework of a legal entity the FVB represents eight research institutes operating in the fields of natural, life, and environmental sciences which pursue common interests while maintaining scientific autonomy. IGB is linked through joint professorship to three universities in Berlin. The advertised position will be hosted by the Department of Ecohydrology.

**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.

In keeping with the IGB's policy regarding gender equality, female applicants are particularly encouraged. Severely disabled applicants with equal qualification and aptitude are given preferential consideration.

Contact Dr. Jörg Lewandowski [lewe@igb-berlin.de](mailto:lewe@igb-berlin.de) for more information, submit your application via IGB's ([www.igb-berlin.de/en/jobs](http://www.igb-berlin.de/en/jobs)) online job-application facility (button "Apply online").

**Closing date: 30 November 2017**

**Post start date: February 2018**