



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 13: Integrating land use with river regulation effects on river flows and water quality

3 year fixed- term PhD position.

Host institute: Helmholtz-Centre for Environmental Research - UFZ

Supervisors: Prof. Martin Volk, Prof. Ralf Seppelt (UFZ)

Project Description:

Environmental flow (e-flow), water quality and related ecosystem services such as water provision, ecosystem regulation, etc. in dry regions of Central Europe are already negatively affected by land management practices and water abstraction. It is a challenge to separate the impact of these different drivers in order to develop sustainable land and water management in such vulnerable regions. For instance, the impact of conservation tillage – which is applied in the dry regions of Central Germany - is described mostly as positive for the soil water balance and soil erosion protection, but on the other hand this practice can cause a higher soil water storage (and higher evapotranspiration), and thus less water is available to support environmental flow. Moreover, climate change predictions for this region assume an increase of extreme events, but in general a decrease of rainfall and in consequence also an increasing number of droughts. Environmental flow is also affected by water abstraction for drinking water production and irrigation.

This PhD thesis aims to develop methods and approaches that differentiate the impact of these drivers to solve related land use conflicts, and assist integrated land and water management with the focus on environmental flow (at the meso-scale).

Objectives:

- (1) Analyse trends of land use and management, water abstraction, streamflow and water quality in the case study area(s)
- (2) Quantify the interactive effects of land management and water abstraction on e-flows/water quality (nutrients)
- (3) Develop region-catchment-river scale analysis methods and modelling approaches that allow land use/water abstraction scenarios to be investigated
- (4) Evaluate land and water management strategies for e-flow and water quality management in selected drought prone regions of Europe

Expected outcomes:

- (1) Improved knowledge of links between land-use influences on soil water balance, e-flow, and water quality alongside direct effects of regulation

(2) Model development to support evaluations of hydrological habitat conditions (flow dynamics and water quality) and ecosystem functioning

(3) Design of alternative land and water management practices to sustain e-flow and water quality

Secondments:

One secondment will be with Mathias Weiland at the division of the state's hydrological service (GLD) of the LHW („Landesbetrieb für Hochwasserschutz und Wasserwirtschaft (LHW)“; State Agency for Flood Protection and Water Management) in Halle / Saale (Germany) who is also involved as a scientific and policy collaborator. The first secondment is planned to be in the first year with a duration of three months. The main purpose of the stay is data collation and to gain knowledge of land management policies.

A second secondment is planned to be with Prof. Ferdinando Villa at the Basque Centre for Climate Change in Leioa, Spain. Prof. Villa is also a member of the project's advisory panel. This stay is intended to be in the second year with a duration of three months. The main purpose of the stay is the analysis and development of ecosystem service/ modelling approaches.

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 recruitment¹.

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

* Experience of data analysis and statistics (preferably in R), GIS and hydrological modelling 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 and German skills.

Other requirements:

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 Professor Martin Volk; martin.volk@ufz.de for information on how to apply

Closing date: 30 November 2017

Post start date: February 2018