Applications are invited for a PhD fellowship/scholarship at Environmental Geosciences, University of Basel, Switzerland within the PhD Program Environmental Sciences. The position is available from 1 June 2026 or later.

Title:

Quantifying the of role soil erosion on phosphorus loads and eutrophication in European freshwaters

Research area and project description:

Soil erosion by water is a critical factor contributing to eutrophication in water bodies, acting as a significant source of phosphorus from land. Many models predict soil erosion and sediment transport into lakes and rivers, and the connection between soil erosion triggering eutrophication is considered textbook knowledge. However, limited scientific evidence or quantitative assessments exists of a direct link of eutrophication to soil erosion through data at small or large scale. Development of research on the improvement of soil health in order to reduce soil losses and decrease eutrophication requires to advance the understanding of interaction between farming systems and water sources. In addition, the knowledge gaps on hotspots of eutrophication in the EU should be addressed in order to mitigate solutions for water pollution due to sediment input.

The PhD programme will develop integrated innovative and reproducible approaches to prevent, minimise and remediate soil and water pollution from sediment input causing excess nutrients (especially phosphorus) in the landscape-river catchment. The project will quantify the role of soil erosion and land management on the eutrophication of and phosphorus loads in European freshwaters. Monitoring data documented within the Water Framework Directive of the EU will be used for calibrating and validating modelling approaches. The innovation should also include the advancement in sediment routing modelling and better estimates of sediment fluxes for all EU Catchments.

The overall PhD project is also relevant to EU policies such as the Common Agricultural Policy (CAP), Soil Monitoring Law and Nitrates Directive. The outcomes will contribute to the knowledge base being developed by the JRC's EU Soil Observatory and relevant policy areas addressing soil health, water quality and climate change under the European Green Transition.

The PhD student will:

1. Make a literature review of existing data both from Sediments datasets and point source data on phosphorus, *chlorophyll* and sediment data in European freshwaters (e.g. EUROHARP, Water Framework Directive)

2. Analyse the datasets of phosphorus losses in EU freshwaters with focus on agricultural EU Catchments. In addition, explain the main hotspots of phosphorus losses and the main drivers (climate, management, soil properties, land cover, cropping systems, topography etc). Develop a scalable model/method to identify hotspots of phosphorus losses in different EU Regions.

3. Scale up the methodology at European scale using LUCAS topsoil survey, national inventories, COPERNICUS high resolution layers, and data from EU Member States and bilateral contributions from other EU research institutes.

4. Design and implement a European-scale turbidity and sediment monitoring framework, combining when available in situ river turbidity observations with satellite-based remote sensing products. This framework will be used to detect and characterize high-turbidity events, link them to extreme rainfall and erosion episodes, and assess their relationship with hillslope soil erosion processes simulated by dynamic soil erosion models (developed by JRC). The resulting system will provide a basis for long-term monitoring of sediment dynamics, support early warning of erosion-driven water quality degradation, and inform EU policies on soil protection, water quality, and climate adaptation.

5. Develop relationships between sediment yields and indicators of eutrophication. In addition, the PhD candidate will model the Floating Algae Index (FAI) and quantify bloom occurrence (BO), the frequency of detected algal blooms, the maximum bloom extent (MBE) and the total area affected by blooms.

6. Integrate the findings within the existing policy framework, addressing the urgent issues of Water Resilience, Zero Pollution, and other pertinent EU legislation (e.g. Soil Monitoring Law, Common Agricultural Policy, and Nitrates Directive).

This project is an international collaboration between University of Basel and the European Commission's Joint Research Centre (JRC).

This PhD project is a part of the Collaborative Doctoral Partnerships programme (CDP), an initiative by the Joint Research Centre to train a new generation of doctoral graduates on the science-policy interface.

Eligibility criteria

Candidates should, prior to the start of the employment contract with the JRC:

- have the nationality of a Member State of the EU or a country associated to the EU Research Framework Programme in force or being resident in a EU Member State since at least five years and
- be enrolled in a PhD programme with the University of Basel.

Candidates who are already enrolled in the doctoral study program with the University of Basel for fewer than 12 months and have the nationality as indicated above can also be considered eligible.

The selected candidate will have no more than 6 months from the request for confirmation of interest in the position, to produce proof of enrolment in the doctoral study program.

Employment conditions

While employed at the JRC, the salary and benefits are those of a JRC Grantholder Category 20, following the Grantholder Rules. The annual gross salary will be around 45,000 Euro and is subject to national income tax.

While employed at the University of Basel, the salary and benefits are those of University of Basel.

Selection process

The University of Basel screens applications for eligibility and invites from the list of candidates for a first interview organised by the University of Basel. Based on the results of the first interview, the JRC invites 2 to 4 shortlisted candidates for a second and final interviews.

Qualifications and Specific competences:

- You have (or are near completion of) a Master in Ecology, Soil Science, Soil Conservation, Agricultural Sciences, Environmental Sciences, Geosciences, Bioscience (or a related field).
- You have a strong interest in soil erosion mapping/modelling and eutrophication due to phosphorus losses.
- Experience with soil monitoring of bio-physical properties and erosion processes.
- Preferably, experience with erosion or/and biochemical models, data assimilation, spatial analysis and GIS approaches.
- Programing skills (e.g. R or Python) for data manipulation and visualisation, and to perform statistical analysis (e.g. mixed models).
- Experience in Remote Sensing (e.g. Sentinel-2, Copernicus) and large scale datasets
- You work proactively and independently and have good communication skills.
- You have a very good knowledge of English, both spoken and written.
- If available, relevant publications in peer review journals should be highlighted.
- You are highly motivated, ambitious and result-oriented.

Place of employment and place of work:

The place of employment is Environmental Geosciences, University of Basel, Switzerland, and the European Commission Joint Research Centre (JRC), Via Enrico Fermi, 2749, 21027 Ispra (VA), Italy.

Contacts:

Applicants seeking further information are invited to contact: Professor Christine Alewell, christine.alewell@unibas.ch

How to apply:

Please submit your complete application documents, including a letter stating your motivation and a short statement of research and teaching interests, experience and skills, a CV and contact details of at least two references via our online recruiting platform. Please follow this link to submit your application. Applications via Email will not be accepted. Application deadline is **April 6th 2026** 23:59 CET. Preferred starting date is 1 June 2026.

For information about application requirements and mandatory attachments, please see our application guide.

For more information about the Grant Holder contract and its rules, please consult:

https://joint-research-centre.ec.europa.eu/collaborate-us/collaborative-doctoral-partnership-cdp-programme/cdp-programme-phd-candidates_en

Shortlisting will be used, which means that the evaluation committee only will evaluate the most relevant applications.