Fully funded PhD Studentship available

School of Biological, Earth and Environmental Sciences
Environmental Research Institute
University College Cork

'Hyporheic zones as bioreactors for groundwater pollutant transformation and hydrochemical fluxes in headwater agricultural catchments (HYPOFLUX)'

Applications are invited from suitably qualified candidates for a full-time interdisciplinary PhD programme investigating in-situ transformation of diffuse subsurface pollutants at groundwater-surface water interfaces (hyporheic zones) and associated chemical fluxes in intensively managed agricultural catchments. The HYPOFLUX project is funded by iCRAG, the SFI Research Centre in Applied Geosciences and the successful candidate will work within the Water and Environment Research Group at UCC and with collaborators at the University of Barcelona.

Project Description

Groundwater nitrate concentrations are rising nationally in Ireland in response to ever-increasing agricultural intensification pressures. Hyporheic zones are increasingly recognised for their potential as natural bioreactors capable of reducing or even eliminating co-mingled groundwater pollutant fluxes from contaminated aquifers to hydraulically connected surface water bodies. The overarching goal of the HYPOFLUX project is to better understand how microbially-mediated transformation processes and residence times impact fluxes of nitrogen species and potentially toxic trace elements (including arsenic and nickel) along intergranular baseflow pathways. This integrated conceptual understanding will help inform policy and practice on management and protection of this critical ecosystem service and elucidate the role groundwater quality and quantity plays in headwater agricultural catchments.

The successful candidate will:

- Conduct a scoping review of relevant literature that considers groundwater pollutant transformation capacity of hyporheic zones globally.
- Investigate multi-scale hydrodynamic processes, residence times and biogeochemical gradients (including greenhouse gases) in hyporheic environments.
- Quantify contaminant relationships with dissolved organic matter composition and reactivity using laboratory A-TEEM spectroscopy and in-situ tracer studies.
- Conduct anaerobic laboratory contaminant transformation batch experiments.
- Undertake passive microbial sampling and analysis of bioflim consortia using qPCR molecular microbiology techniques at the University of Barcelona.
- Develop conceptual and numerical models of contaminant transport and hydrochemical fluxes under different hydrological scenarios.

- Actively disseminate research through peer-reviewed publications and oral presentations at national and international conferences.

Requirements

Applicants should have a good primary degree (first or upper second-class honours) in an appropriate discipline (e.g., earth sciences, biogeochemistry, hydrology, hydrogeology, aquatic ecology). The successful candidate should be numerate, highly self-motivated and demonstrate excellent written and oral communication skills. An interest in interdisciplinary field and laboratory geoenvironmental research is important. The successful candidate will ideally have additional experience (e.g., an MSc) with substantial field and/or laboratory components. Knowledge of biogeochemistry and/or geomicrobiology would be a distinct advantage. A valid driving licence is required in order to undertake independent field work.

Award

The successful candidate will be enrolled for a 48-month studentship at UCC which includes a stipend of €18,500 per annum and university fees over four years. The studentship includes a significant materials and consumables budget as well as funds for participation at national and international conferences together with a short secondment at the University of Barcelona, working with Dr Diana Puigserver on the geomicrobiology aspects of the project.

Start date: November 2022

Further Information

Dr John Weatherill, Water and Environment Research Group, School of Biological, Earth and Environmental Sciences, University College Cork. Email: john.weatherill@ucc.ie.

Application Procedure

Please submit a Curriculum Vitae (including the contact details of two referees) and a cover letter stating your interest, motivation and suitability for the PhD position as a single pdf document to Dr John Weatherill (john.weatherill@ucc.ie).

Closing date: 23rd of September 2022 at 5 pm (local) Irish time.