Dooge Centre for Water Resources Research

UCD School of Civil Engineering

University College Dublin

SFI Co-Centre for Climate + Biodiversity + Water PhD scholarship

Project title:

Monitoring and Modelling the Impact of Barriers on freshwater hydromorphology

This PhD position is funded by the newly established Science Foundation Ireland Co-Centre for Climate + Biodiversity + Water. The Co-Centre consists of 14 universities and research institutions across three jurisdictions: Republic of Ireland, Northern Ireland and Great Britain. The overall aim of the Co-Centre is to develop solutions to the urgent challenges presented by Climate Change, biodiversity loss and water degradation.

The successful candidate will be based in the UCD Dooge Centre for Water Resources Research in the UCD School of Civil Engineering. The PhD student will be supervised by Dr Fiachra O'Loughlin (School of Civil Engineering), Dr Jonathan Turner (School of Geography) and Associated Professor John O'Sullivan (School of Civil Engineering).

The scholarship provides four years of funding, including a tax-free scholarship of €22,000 per annum, plus UCD tuition fees at EU rates. Additional funding for research equipment, materials, fieldwork and conference attendance is available.

Project Description:

The construction of low-head barrier structures, including weirs, culverts, and bridge aprons has resulted in the fragmentation of channel networks, affecting the upstream passage of fish and the movement of sediment downstream. Given the significant impacts of barriers on ecological health, restoring continuity (longitudinal connectivity) is one of the core management objectives under the EU Water Framework Directive (2000/60/EC), which aims to achieve good ecological status for waterbodies by 2027. In addition, the ambitious target of restoring at least 25,000 km of channel into free-flowing rivers under the new Regulation on Nature Restoration (Nature Restoration Law), means that there will be a marked increase in barrier removal across Europe in the next 5-10 years.

Building on former research that has been conducted in Ireland and overseas, this project will focus on the impact of barrier removal or modification on sediment movement and channel morphodynamics, through an integrated programme of research, combining field monitoring and computer modelling. The successful student will be required to undertake a significant amount of fieldwork across multiple seasons and conditions. It is envisaged that this project will work closely with Inland Fisheries Ireland (IFI) in the identification of barriers that will be

removed during the lifespan of the project. The modelling component of this project will explore the long-term impact of barrier removal and will be supported by an extensive field monitoring campaign. The monitoring campaign will use existing and develop novel techniques to capture channel flow and sediment dynamics before and after barrier removal. This project will advance our understanding of how sediment transport is affected by these structures, provide assessments of the risks associated with barrier removal, including practical tools and metrics to quantify these risks. The outputs from this project will help guide effective river restoration strategies associated with the barrier removal.

Essential Requirements:

Applicants must have:

- A first class or upper second-class honours degree in engineering (civil or environmental), environmental science, physical geography or a related subject
- Demonstrated experience of geographic information systems (GIS) and spatial data management
- Experience with fieldwork or a willingness and understanding of the challenges facing fieldwork
- An understanding of fluvial systems, river hydraulics and/or hydromorphology
- Excellent communication and writing skills
- Ability to work to deadlines and produce effective timelines that achieve key aims
- Ability to work effectively within a team and independently
- A willingness to attend relevant workshops, and to present research at national and international conferences

Desirable (not essential) criteria:

- A Masters degree, or international equivalent, in engineering, environmental science, physical geography or a related subject
- Experience of quantitative/statistical analyses of environmental data
- Evidence of computer programming and coding skills
- A full driving license acceptable in Ireland for the length of the project

For further information, please contact Dr Fiachra O'Loughlin (fiachra.oloughlin@ucd.ie).

Application Procedure:

Interested applicants for this PhD position should email: (i) a Curriculum vitae; (ii) a letter of motivation and (iii) names/email addresses of three references to: fiachra.oloughlin@ucd.ie on or before the 1 November 2024.

Please submit these documents as a single pdf file, titled with "LastName_Monitoring2024". Shortlisted candidates will be invited for interview.