Fully funded PhD Opportunity

Environmental Engineering Research Group
Dept. Civil, Structural and Environmental Engineering, Trinity College Dublin

Vulnerability of karst groundwater systems to contamination by on-site wastewater effluent

Applications are invited from suitably qualified candidates for a full-time PhD (Structured PhD programme) in the field of karst hydrology. The project is funded by iCRAG, the SFI Research Centre in Applied Geosciences.

Project background and description

The extent of microbiological contamination and transport of waterborne pathogens in aquifers is still not well understood and remains an ongoing, globally important, water quality and associated public health problem. Moreover, as a result of increasing numbers of point and non-point sources of faecal pollution in catchments, population growth, extreme weather events associated with climate change, and rapid land-use alterations, such water quality problems are likely to be exacerbated in the future. Groundwater from karst aquifers, through springs, boreholes and wells, is a major source of drinking water for approximately one quarter of the world's population. Such karst aquifers are particularly vulnerable to contamination from a variety of different sources due to relatively fast recharge of water into the upper part of the karst system (epikarst), commonly thin soil coverage, and/or the rapid infiltration into the groundwater system directly through discrete flowpaths (i.e. swallow holes), which connect directly into the highly conductive network of conduits. This research project will develop enhanced understanding and novel models of the microbial contamination of karst aquifers from which more rigorous groundwater protection schemes can be developed for these specific groundwater resources.

The objectives of this project are to:

- Select and instrument karst catchments to gather hydrological field data over minimum 2-year period
- Carry out discrete and continuous monitoring of the water quality focussing on tracers of human effluent contamination
- Characterise flow paths through karst aquifers by time / frequency series analysis
- Develop semi-distributed / distributed models of hydrology and contaminant transport

- Develop more generalised algorithms for predictive contamination event purposes
- Synthesise findings into policy recommendations

Candidate requirements

- Applications are invited from graduates holding a first or 2.1 class honours degree or M.Sc. in Environmental Engineering, Environmental Science or related discipline.
- The successful candidate should be practically and technically minded, and interested in both working in the field as well as in the development of mathematical models of environmental systems.
- The candidate should be self-motivated, prepared for extensive field-based and laboratory work and someone who enjoys data analysis, writing and communicating/disseminating their work.
- Prior experience in karst hydrology, particularly in modelling of such systems would be advantageous.
- A full, clean Irish/European driving licence and fluency in English are essential.

Award

The successful candidate will be enrolled for a 48-month (Structured) PhD programme in the Department of Civil, Structural and Environmental Engineering, Trinity College Dublin. The Fellowship provides University fees and a stipend of **€18,500 per annum over four years**. Funds for project costs are also provided.

Application deadline: 20th August 2022 by 5pm (Irish local time)

Start date: The projected start date is September 2022, or as soon as possible thereafter (with a latest start date on the first of January 2023).

Further Information

Prof. Laurence Gill email: laurence.gill@tcd.ie

Application Procedure

Interested applicants should submit, within a single PDF document, a CV with educational background, transcripts of degree results, list of publications and conference presentations, a short (1–2 page) letter of motivation and contact details for 2 referees submitted directly to Prof. Laurence Gill (laurence.gill@tcd.ie). The motivation letter should clearly state how the applicant's research interests and skills relate to the research project outlined above.

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