

PhD project with scholarship: Response of floodplains in semi-arid environments to changing precipitation patterns

About the position

Groundwater is the only perennial water source in arid and semiarid zones, which encompass 1/3 of the global landmass and ~70 % of Australia. However, we still do not fully understand how floodplains contribute to groundwater recharge in semi-arid zones, but groundwater recharge dynamics may significantly influence ecological thresholds and impact nature conservation efforts. Therefore, understanding water infiltration, retention, and compartmentalization in different structures, along with water age modelling, is critical for predicting potential impacts caused by climate change and mining operations on groundwater resources. The semi-arid Pilbara region located in Western Australia provides an excellent opportunity to further develop our understanding of the significance of floodplains in the water budgets of local ecosystems. This region has an extensive groundwater monitoring system and local infrastructure made available by the project industrial partner, and our initial studies have provided an excellent foundation for the current project.

The West Australian Biogeochemistry Centre, School of Biological Sciences, in collaboration with School of Earth Sciences, The University of Western Australia (UWA), is seeking a highly motivated PhD candidate to work in the areas of modelling of the flood plains functioning in a semi-arid climate, their contribution to groundwater recharge and their impact on groundwater dependent ecosystems. The study will assess direct responses to flood events using loggers and compare them to indirect measurements inferred from hydrochemical and isotope tracer models to better understand recharge patterns, evaporative losses, and interactions between surface runoff, floodplains, and aquifers at different positions in the landscape.

This project is co-funded from a larger-scale study conducted in Pilbara, Western Australia and financed by the Australian Research Council and the industrial partner Rio Tinto Iron Ore. The PhD student will collaborate closely with the industrial project partner and spend substantial periods working at remote locations in the Pilbara. Extensive groundwater modelling, analyses of hydrochemical and stable isotope compositions and water age modelling will be key methods used in this study to characterise flooding regimes and extents with respect to changing rainfall patterns and vegetation response.

Qualifications

Prospective candidates should have Masters or Honours degree (first class or equivalent) in hydrogeology, hydrology, or in related fields of earth and life sciences. Some previous experience with modelling, spatial analysis, Python or R programming, and working with large data sets is expected. Good interpersonal communication and the ability to work as part of a multidisciplinary team will be expected from the candidate. The ability for independent, organized work and advanced communication skills in English (oral and written) are also essential. All fieldwork participants are subject of periodic drug and alcohol testing as per mining site requirements.

Scholarship

This is a full-time PhD position fully funded for 3 years with scholarship co-funded by the project and UWA with a total of 35,000 AUD + industrial top-up of minimum 5000 AUD per year (in total 40,000 AUD per year), possible extension to a maximum of 3.5 years in total.

How to apply and contact

Interested applicants are encouraged to contact principal supervisor Dr Greg Skrzypek at Grzegorz.Skrzypek@uwa.edu.au for more information. Please include a cover letter describing your interest in the field, CV, publications, an academic transcript, relevant supporting documents of prior research, and the names and contact details of two potential referees. The project will be co-supervised by Dr Jim McCallum from the School of Earth Sciences UWA and Dr Huade Guan from the National Centre for Groundwater Research and Training at Flinders University, and other project partners.

Closing date

Applications close on 15 October 2023, 11.59 PM, AWST.