ONE BASIN CRC PhD program

Are you looking at developing world-leading skills in helping communities tackle climate change, capitalise on the digital transformation and accelerate rural innovation? Are you interested in receiving training from internationally renowned experts, whilst working with industry partners in the iconic Murray-Darling Basin on real-world problems?

The One Basin Cooperative Research Centre (One Basin CRC) offers attractive PhD packages in a broad range of disciplinary fields and across multiple universities in Australia (Australian National University, Charles Sturt University, Flinders University, The University of Adelaide, The University of Melbourne, The University of Sydney). Our PhD graduates will be the future leaders in basin research and application. Our One Basin PhD program provides unprecedented leadership development opportunities, extensive industry networking, and the chance to establish a deep understanding of your chosen field. Key features of the One Basin CRC PhD Program are:

- A 3.5 year scholarship with the option of a 6 month-funded internship with an industry partner or equivalent part-time employment.
- A flexible funding package including a stipend as much as $51,300 pa* and generous travel and operational costs, with potential additional income from working part-time with industry partners and further scholarship funding.
- The PhD program seeks to achieve gender balance and attract candidates from all walks of life, with Australians of Indigenous and Torres Strait Islander heritage particularly encouraged to apply.
- Opportunities for travel (including the possibility of international conferences), development and engagement with a strong research network that is being developed through the 10-year CRC.
- Each candidate will spend the majority of their time in one of the following research hubs: Loxton (South Australia), Mildura (Victoria), Griffith (NSW) and Goondiwindi (Queensland) with associated node in Narrabri (NSW).

Our PhD program will give you the professional skills and networks to accelerate your career in research or practice across the water, agriculture or environmental sectors.

** This is dependent on the host university policies, other available co-funding, and candidature experience and background. Candidates will receive a minimum stipend of $35,000 pa and a further minimum $20,500 (total) in operational funding. The exact allocation of the funding package between the stipend and support activities (such as conferences, travel to and from regional hubs) will be agreed to by the host university, PhD student and the 1BCRC. Applicants must be intending to apply for, and be highly competitive for, a Research Training Program (RTP) Stipend (or an equivalent scholarship). The student will enter the PhD program in 2024 and enrol on a full-time basis.*

Apply via: onebasin.com.au/phd-programs

PhD project ID: 1BPhD23-02 **Date advertised:** 8 September 2023

PhD project title:

Optimal Cross-Scale Irrigation Operation in the Era of Sensor Networks, Data Science, and Automation

Description of the topic of PhD project:

The prolonged droughts in Australia, particularly the Millennium Drought, have spurred significant investment and innovation in data collection and operational strategies across various scales, ranging from individual farms to irrigation districts and river basins. The existing infrastructure encompassing sensor technology, data management, and automation is providing an unprecedented opportunity, possibly a unique one globally, to contemplate a shift toward an operational scheme that optimizes system performance in 'real-time' across a variety of objectives, even when they might appear conflicting.

This project aims to forge an advanced framework uniting data science, machine learning, simulation, multi-objective optimization, and uncertainty-based decision making. In collaboration with CRC research projects, objectives encompass: (1) developing a cross-scale water supply simulation model integrating existing process-based models and new machine learning tools linked to sensor data; (2) characterizing diverse water resource interests, including monetary (e.g., crop production) and non-monetary (e.g., environmental and cultural flows), and tracking their temporal and spatial dynamics; (3) creating a multi-objective optimization algorithm that embeds the simulation model to maximize co-benefits of real-time decisions for diverse users and ecosystems.

Through the CRC, this project will work with Murrumbidgee Irrigation (MI) and the Murray-Darling Basin Authority (MDBA). MI, a prominent global irrigation enterprise, possesses extensive proficiency in data, sensors, and operational strategies. In parallel, MDBA, the principal governmental water agency, assumes responsibility for integrated and sustainable basin management. Their collaboration promises invaluable practical insights spanning from farm-level complexities to comprehensive river basin dynamics.

Primary university supervisor(s):
Dr Saman Razavi (Australian National University)

Co-supervisors:
To be confirmed depending on student interests: Dr Danlu Guo, Dr Joseph Guillaume, Dr Serena Hamilton (Australian National University); Prof. Holger Maier (University of Adelaide); Dr Wenyan Wu, Prof. QJ Wang, Prof. Erik Weyer (University of Melbourne)

Requisite qualifications and experience:
Candidates must have a qualification equivalent to an Australian H1 Honours degree (a prior research thesis that was at least six months of full time credit and received an excellent mark, or a first author publication in a peer-reviewed international journal). Candidates with Masters or honours degrees in the following disciplines, or with equivalent research or work experience will be favourably considered: *Data Science, Environmental Engineering, Hydrology, Management and Information Technology, Systems science, Water resources management.*

To determine your eligibility for studying at The Australian National University see:
https://www.anu.edu.au/study/related-information/postgraduate-research-students

1BCRC industry partner(s) potentially involved:
Murrumbidgee Irrigation, Murray-Darling Basin Authority (MDBA)