

An Indian-Australian research partnership

Project Title:	Remote sensing assessment of groundwater depletion in India	
Project Number	IMURA0837	
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Research Clusters:

Research Themes:

Highlight which of the Academy's CLUSTERS this project will address? <i>(Please nominate JUST <u>one</u>. For more information, see www.iitbmonash.org)</i>		Highlight which of the Academy's Theme(s) this project will address? <i>(Feel free to nominate more than one. For more information, see www.iitbmonash.org)</i>	
1	Material Science/Engineering (including Nano, Metallurgy)	1	Advanced computational engineering, simulation and manufacture
2	Energy, Green Chem, Chemistry, Catalysis, Reaction Eng	2	Infrastructure Engineering
3	Math, CFD, Modelling, Manufacturing	3	Clean Energy
4	CSE, IT, Optimisation, Data, Sensors, Systems, Signal Processing, Control	4	Water
5	Earth Sciences and Civil Engineering (Geo, Water, Climate)	5	Nanotechnology
6	Bio, Stem Cells, Bio Chem, Pharma, Food	6	Biotechnology and Stem Cell Research
7	Semi-Conductors, Optics, Photonics, Networks, Telecomm, Power Eng	7	Humanities and social sciences
8	HSS, Design, Management	8	Design

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The research problem

Groundwater (GW) interactions are less studied, especially in agricultural landscapes of India, wherein groundwater is a major source of irrigation. Many farmers suffer from crop failures induced by falling groundwater levels and erratic rainfall patterns from climate change. With less observed data for understanding of GW processes, the groundwater is managed as separate entities by government agencies and farmers. In order to obtain the maximum sustainable groundwater extraction, GW has to be studied in detail with available resources.

To address this issue, a suit of remote sensing images will be tested to assess groundwater related data. This would range from using NASA data and ISRO data. Also, drones and other UAVs will be used for monitoring water availability, use and demand. These would holistically be used to assess groundwater issues in India, and how it can be managed sustainably.

Project aims

Primary objective of the project is to understand the groundwater depletion trends using remote sensing data, and assess potential impacts due to climate change.

Expected outcomes

- Holistic groundwater model that incorporates surface water dynamics
- Realistic scenarios for groundwater management
- Sustainable groundwater use practices
- Sensitization of ongoing groundwater stress and climate change impacts

How will the project address the Goals of the above Themes?

The project will primarily focus on WATER theme, wherein holistic water management practices will be researched. Also, novel information on site specific surface water groundwater interactions will be studied and researched in this project, which are related to WATER theme.

This project will also use GIS and computer simulation models for data processing and simulation of surface water and groundwater interactions. This requires high level of simulation expertise which will be under the SIMULATION theme.

Capabilities and Degrees Required

- The student should have a Masters degree that has a hydrological focus (e.g. water resources management, civil engineering, hydro informatics, etc.)
- Experience in field work, remote sensing GIS and computer simulation models.
- Programming skills/data management skills to manage large datasets
- Excellent writing skills

Potential Collaborators

Please visit the IITB website www.iitb.ac.in OR Monash Website www.monash.edu to highlight some potential collaborators that would be best suited for the area of research you are intending to float.

Dr. Sina Alaghmand has been identified as the potential research collaborator. He has extensive experience on SW-GW interactions modelling and would be able to contribute to the project as co-supervisor. A Skype meeting has been conducted and details of the collaboration discussed.

Select up to **(4)** keywords from the Academy's approved keyword list (**available at <http://www.iitbmonash.org/becoming-a-research-supervisor/>**) relating to this project to make it easier for the students to apply.

**Water resources management, Climate change; Modelling and simulation;
Hydrogeology.**