

An Indian-Australian research partnership

Project Title: **Groundwater availability assessment for non-monsoon irrigation in arid regions of India**

Project Number **IMURA0836**

Monash Main Supervisor

(Name, Email Id, Phone)

Prof Sina Alaghmand

Sina.Alaghmand@monash.edu

Full name, Email

Monash Co-supervisor(s)

(Name, Email Id, Phone)

NA

Monash Head of

Dept/Centre (Name,Email)

Prof Jeffrey Walker

Jeff.Walker@monash.edu

Full name, email

Monash Department:

Department of Civil Engineering

Monash ADGR

(Name,Email)

Prof Emanuele Viterbo

Emanuele.Viterbo@monash.edu

Full name, email

IITB Main Supervisor

(Name, Email Id, Phone)

Prof Pennan Chinnasamy,

P.Chinnasamy@iitb.ac.in

Full name, Email

IITB Co-supervisor(s)

(Name, Email Id, Phone)

NA

Full name, Email

IITB Head of Dept

(Name, Email, Phone)

Prof. Satish Agnihotri,

Head.ctara@iitb.ac.in

Full name, email

IITB Department:

Centre for Technology Alternatives or Rural Areas -
 CTARA

Research Clusters:

Research Themes:

Highlight which of the Academy's CLUSTERS this project will address? (Please nominate JUST <u>one</u> . For more information, see www.iitbmonash.org)		Highlight which of the Academy's Theme(s) this project will address? (Feel free to nominate more than one. For more information, see www.iitbmonash.org)	
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

--	--	--	--

The research problem

Surface water and groundwater (SW-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 understanding of SW-GW processes, the surface water and groundwater are managed as separate entities by government agencies and farmers. In order to obtain the maximum sustainable groundwater extraction, SW-GW has to be managed in unison as one entity.

To drive this paradigm shift in agricultural irrigation water management, there is a need for distributed surface water simulation models that are coupled with groundwater models. The output of these models will be used to test different scenarios wherein SWGW can be managed as a single source for the benefit of farmers, especially in arid regions of India.

Project aims

Primary objective of the project is to understand the surface water and groundwater connectivity in an arid region of India. Secondary objectives will involve identification of crop water availability in aquifers before the non-monsoon farming season (Rabi), scenarios to maximize natural groundwater recharge rates, decentralization of managed aquifer recharge (MAR) infrastructure and demand side management (e.g. diversification of crops, drip irrigation, etc.)

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.