

An Indian-Australian research partnership

Project Title: **Big Data analysis for rural resource management and development**

Project Number **IMURA0931**

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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

In India there are many agencies that aim to aid sustainable development. Most of these agencies are federal or state government owned and are operated individually or under a specific ministry. Each agency, in order to formulate policies and rules, collect data and manages it. For example, a water resources department collects data on reservoir water levels, water demand and water supply for sustainably managing water supply schemes. Therefore, agencies are divided into themes/focus areas or departments and data is housed in each of these units individually.

This bifurcation of agencies has resulted in limited inter department collaborations, thereby reducing holistic research views. A holistic plan will need diverse data from various sources, that may not be housed in a single agency. For example, holistic view of groundwater depletion involves data and understanding from irrigation department, power department, agriculture department and surface water departments, etc. On that note, CTARA's Rural Data lab collects, stores and analyses data from different agencies, near sensing (e.g. drones) and remote sensing platforms (e.g. satellite).

With such data available there is tremendous potential to understand, monitor and manage rural natural resources. Key sectors include water resource management, soil and agricultural productivity management and rural health.

Project aims

Primary objective of the project is to utilize the potential of Big Data and big data tools to understand the current and future status of rural natural resources (e.g. water). Secondary objectives would include understanding climate change projections for India, assessing potential of remote sensing images for aiding water balance assessments and modelling current and future scenarios.

Expected outcomes

- Novel big data based indicators for rural development
- Decision support tools using big data techniques
- Sensitization of ongoing agriculture water stress and climate change impacts
- Assessment of future climate change impacts on agriculture
- Sustainable agricultural water use practices
- Realistic scenarios for agricultural water management

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

The project will primarily focus on WATER/IT theme, wherein holistic water management practices will be researched. This project will also use GIS and computer simulation models for data processing and simulation using big data techniques, 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 IT or hydrological focus (e.g. water resources management, civil engineering, hydro informatics, etc.)
- Experience in computer simulations, field work, remote sensing GIS and computer simulation models.
- Programming skills/data management skills to manage large datasets
- Excellent writing skills

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.

Big Data, Decision support tools, Water resources management, Climate change; Modelling and simulation.