

An Indian-Australian research partnership

**Project Title:** **Life Cycle Assessment of Smart and Sustainable Agriculture vis-à-vis Conventional Agriculture**

**Project Number** IMURA0921

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**IITB Department:**

Environmental Science & Engineering

### Research Clusters:

### Research Themes:

Highlight which of the Academy's CLUSTERS this project will address? (Please nominate JUST <b>one</b> . For more information, see <a href="http://www.iitbmonash.org">www.iitbmonash.org</a> )		Highlight which of the Academy's Theme(s) this project will address? (Feel free to nominate more than one. For more information, see <a href="http://www.iitbmonash.org">www.iitbmonash.org</a> )	
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	<b><u>Clean Energy Environment</u></b>
4	CSE, IT, Optimisation, Data, Sensors, Systems, Signal Processing, Control	4	Water
5	Earth Sciences and Civil Engineering (Geo, Water, Climate)	5	Nanotechnology
6	<b><u>Bio, Stem Cells, Bio Chem, Pharma, Food</u></b>	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

### *Define the problem*

The main objective of this project is to develop solutions for adaptation of agriculture to the incremental climate changes and/or increased climatic variability.

It is intended to develop smart and sustainable agricultural practices which shall minimise the environmental impacts over the life cycle of agricultural and food crops.

The other objective is also to reduce environmental emissions and loading associated with large scale agriculture and hence to reverse or to control climate change or to at least not let climate worsen.

## Project aims

### *Define the aims of the project*

The main aim of the project is develop techniques for smart and sustainable agriculture and to assess their environmental life cycle impacts by:

- (1) developing solutions to increase resilience and sustainability of agriculture to climate change
- (2) finding options for better management of water and soil resources and other required growth inputs
- (3) integrating above two stages to evolve innovative solutions for the adaptation of agriculture to climate change to reduce or contain associated environmental impacts
- (4) finally, translating above outputs and findings to make policies in developing options for smart and sustainable agricultural practices.

The above research shall assess improvements in impacts with the baseline of conventional/traditional agriculture.

## Expected outcomes

### *Highlight the expected outcomes of the project including likelihood of patents*

The main outcomes are options for adaptation of agriculture to climate changes and the policies to help achieve smart and sustainable agricultural practices which are easy to adopt by the common farmers.

There shall be no likelihood/chance of getting patent as the research is supposed to be open source and left to copy at any and all scales.

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

### *Describe how the project will address the goals of one or more of the 8 Themes listed above.*

The project will encompass themes of clean environment and clean water. It also includes global environmental issues of climate change and sustainability.

## Capabilities and Degrees Required

*List the ideal set of capabilities that a student should have for this project. Be as specific or as general as you like. These capabilities will be input into the online application form and students who opt for this project will be required to show that they can demonstrate these capabilities.*

- (1) In depth knowledge of agriculture engineering.
- (2) Have basic knowledge on use of computers and ability to handle word, spreadsheet, power-point etc.
- (3) Basic knowledge on environment, climate change, life cycle approach, sustainability desirable but not essential etc.

## Necessary Courses

*List three tentative core courses relevant to the project that the student should complete during his/her coursework at IITB (the student will require to secure 8 point in these courses)*

- (1) Environmental Systems Modelling
- (2) Environmental Management
- (3) Environmental Impact Assessment

## Potential Collaborators

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

Prof. Annand Rao could be a potential collaborator, should he have interest.

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.

**Modelling and Simulation; Systems Analysis and Control; Water, climate change (Carbon Capture and Sequestration)**