

An Indian-Australian research partnership

Project Title: Evaluation of adaptation to climate change in coastal cities

Project Number IMURA0681 (5)



Monash Main Supervisor
(Name, Email Id, Phone)

Edoardo Daly
Edoardo.Daly@monash.edu
Dr Mahesh Prakash (CSIRO)
Mahesh.Prakash@data61.csiro.au

Full name, Email

Monash Co-supervisor(s)
(Name, Email Id, Phone)

Monash Head of Dept.
(Name,Email)

Jeffery Walker
jeff.walker@monash.edu

Full name, email

Monash Department:

Civil Engineering

Monash ADRT
(Name,Email)

Emanuele Viterbo

Full name, email

IITB Main Supervisor
(Name, Email Id, Phone)

Subhankar Karmakar
skarmakar@iitb.ac.in

Full name, Email

IITB Co-supervisor(s)
(Name, Email Id, Phone)

Subimal Ghosh
subimal@civil.iitb.ac.in

IITB Head of Dept
(Name, Email, Phone)

Sanjeev Chaudhari

Full name, email

IITB Department:

CESE

Research Academy Themes:

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. **Advanced computational engineering, simulation and manufacture**
2. **Infrastructure Engineering**
3. Clean Energy
4. **Water**
5. Nanotechnology
6. Biotechnology and Stem Cell Research

The research problem

India has a vast coastline of around 7,500 km and several large cities including Mumbai, Chennai, Surat and Vishakhapatnam are located in coastal areas. In especially Mumbai and Chennai the two biggest coastal cities in India flooding has been a significant challenge recently. The floods occur during monsoon and are directly related to rainfall events. More recently the magnitude and frequency of these floods have increased significantly. Going forward such flooding issues are only going to get worse due to the impacts of climate change and the accompanying increases in sea level as well as possible rainfall frequency and intensity. Unseasonal rainfall events are also a big challenge for these cities. Going forward and in order to thrive in an uncertain climate environment it is essential for these cities to understand their future from a flood and related hazard perspective as well as start preparing through visualising possible future scenarios which includes well thought out, cost effective and deployable adaptation scenarios.

Project aims

In the above context several opportunities exist for PhD student projects which can include the following key elements:

1. Hydrodynamic/hydrological modelling of coastal cities which includes combined coastal and catchment flooding with a view to generating evidenced based scenarios that provide an outlook of future flooding for key coastal cities in India.
2. The future of water management in coastal cities in India: a climate adaptation perspective.
3. Local scale climate projections for sea level rise and its input into hydrodynamic/hydrological models for evaluating potential future flood risk in coastal cities in India.
4. The use of satellite based GIS and remotely sensed data as input into hydrodynamic/hydraulic models for evaluating combined coastal and catchment flooding in coastal cities in India.
5. An analysis of historical flooding in coastal cities in India, their causes and future casting event intensity and frequency.

An assessment of infrastructure impacts due to coastal/catchment flooding today and into the future.

Expected outcomes

Development of coastal cities in India with a lens of climate future and adaptation utilising innovations in computational modelling and remote sensing.

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

Water and Infrastructure are key resources that will need to be managed effectively for a city to thrive, this project provides an evidence based approach to doing this with a lens on climate change and adaptation. This will be done by applying innovations in computational modelling and remote sensing. There will also be an emphasis on capacity building as part of this project.

Capabilities and Degrees Required

List the ideal set of capabilities that a student should have for this project. Feel free to 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.

Computational Modelling, Fluid Mechanics, Remote Sensing, Understanding of Coastal Environments and a Passion for Environmental Processes, Climate Modelling.