IITB-Monash Research Academy

Indian Institute of Technology Bombay | MONASH University

An Indian-Australian research partnership

# Project title:

## Development and testing of stormwater quantity and quality models based on radar rainfall data

**Project number:** IMURA0108


**Monash University supervisors:** Dr. David McCarthy
Prof. Ana Deletic

**Monash University contact:** Dr. David McCarthy;
Email: david.mccarthy@eng.monash.edu.au
http://civil.eng.monash.edu.au/about/staff/dmacca

**IITB supervisors:** Dr. Subimal Ghosh

**IITB contact:** Dr. Subimal Ghosh
Email: subimal@iitb.ac.in
http://www.civil.iitb.ac.in/~subimal/


---

## Research Academy theme/s

List only the research academy theme/s that is relevant to the project

**Advanced computational engineering, simulation and manufacture**
**Water**

## The research problem

Many current water quality and quantity models designed to predict the behaviour of urban stormwater systems are usually based upon point rainfall measurements. However, models developed using radar rainfall offers many advantages: (1) the high spatial representation of radar rainfall provides much more detailed information about rainfall events (including the direction of the storm across the given catchment) which can help improve a model's predictive performance, (2) models developed using radar rainfall as input can be used to create real-time information about urban stormwater systems, and (3) these models can be easily applied to catchments without the requirement of point rainfall measurement devices. The development and adequate testing of these types of models is limited, with the majority of models producing poor results for urban stormwater quality predictions.

## Project aims

The project aims at developing a new urban stormwater quantity and quality model which is capable of using radar rainfall data to accurately predict flows and pollutant concentrations. The model will be thoroughly tested, with a full input data uncertainty analysis and parameter sensitivity testing.

## Expected outcomes

The project will produce a model which is capable of being used by researchers and practitioners to help them estimate stormwater flows and pollutant levels from urbanised catchments. The model will be tested robustly, and the results of which will provide an indication of the level of confidence which can be expected from the modelled results. The project is expected to contribute to the knowledge around a total error framework for urban stormwater quality models.

## Which of the above Theme does this project address?

The project mainly deals with **water** related issues.

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

At the moment, over 150 tonnes/year of nitrogen is entering Port Phillip Bay in Melbourne, and a sizable amount of this is from urban stormwater runoff. It is of high importance to reduce this load to ensure the protection of our already jeopardised downstream systems. The current project will develop a model which can adequately predict stormwater flows and quality. During the development of such a model, it is possible to understand and learn about the processes involved in pollution generation, including the production of nitrogen loads. This knowledge is important for the mitigation of such pollution and as such the project will help cities around the world (including Melbourne) to protect their receiving waters from urban stormwater pollution.

Furthermore, the developed model will help industry and research bodies accurately model urban stormwater pollution and runoff generation processes. This modelling tool can then be used to help assess different water sensitive urban design options to help mitigate urban stormwater pollution. This type of tool is essential and could help improve current standards and practices in modelling urban stormwater in cities around the globe.