

# Coastal Vulnerability to Multiple Inundation Sources

COVERMAR project

## FACTSHEET.

The Sydney Coastal Councils Group Inc. (SCCG) has partnered with the University of New South Wales Australia - Pacific Tsunami Research Centre & Natural Hazards Research Laboratory (UNSW APTRC) to undertake a research project addressing coastal vulnerability to multiple inundation sources.

The project will develop a multi-hazard tool to assess the vulnerability of buildings and critical infrastructure to extreme marine inundations caused by both storm surges and tsunamis. Inundation scenarios will be simulated using state-of-the-art numerical models, under present and predicted future climate conditions, and tested at three NSW study sites.

The project will be coordinated by the SCCG and carried out by Dr. Filippo Dall'Osso and Assoc. Prof. Dale Dominey-Howes from UNSW APTRC. It builds upon the project "A Method for Assessment the Vulnerability of Buildings to Catastrophic (Tsunami) Marine Flooding".



**Coastal Inundation.**  
**COVERMAR Project.**

## PROJECT BACKGROUND.

Low-lying coastal areas of NSW are vulnerable to the impact of catastrophic marine floods associated with storm surges and tsunamis. According to the Intergovernmental Panel on Climate Change, climate change projections show that the frequency and intensity of storms will increase over the next few decades, as will the exposure of coastal buildings and infrastructure.

### Decision makers need innovative tools to:

- Assess the vulnerability of buildings and infrastructure
- Calculate and compare probable maximum losses associated with various inundation scenarios
- Plan necessary mitigation measures.

Existing hazard assessment methods estimate the vulnerability to 'single hazards' (e.g., river flood, storm surge, tsunami etc using a variety of different procedures. This makes cross-platform comparison of results difficult and complicates the formulation of balanced, multi-hazard mitigation plans.

## Coastal Vulnerability to Multiple Inundation Sources Project (COVERMAR)



## PROJECT AIMS.

The project will construct a tool using the Papathoma Tsunami Vulnerability Assessment (PTVA) Model. This is a GIS-based model that allows the calculation of a vulnerability index for physical structures affected by flooding. It has been validated and applied worldwide. The model is based on the Analytic Hierarchy Process, a technique typical of multi-criteria analysis, ideal for multiple inundation hazards.

## PROJECT ELEMENTS.

### EXPECTED OUTCOMES

1. Enhanced scientific understanding of single and multi hazard scenarios, incorporating storm and tsunami hazards, impact and vulnerability.
2. Improved modelling/risk assessment capacity of local government and emergency services in relation to individual and multiple hazards, infrastructure, disaster preparedness (including education and evacuation) and recovery and response.
3. Knowledge to underpin decision making and planning
4. Improved community resilience to and education regarding coastal hazards and disasters.
5. Better transferability of technology to local government.

## STUDY AREAS AND INUNDATION SCENARIOS

Study areas along the NSW coast will be selected based on exposure and vulnerability to marine inundations. Inundation scenarios will include a 1/100 year design storm and the worst credible case of tsunami, under present and future climate conditions. The tsunami scenario will be simulated using the latest hydrodynamic modelling techniques developed by UNESCO/IOC and the US Federal Governments NOAA, namely the Community Model Interface for Tsunami (ComMIT) system. The storm surge scenario will utilise outputs from the SCCG's Mapping and Responding to Coastal Inundation Project

([http://www.sydneycoastalcouncils.com.au/Project/Mapping\\_and\\_Responding\\_to\\_Coastal\\_Inundation](http://www.sydneycoastalcouncils.com.au/Project/Mapping_and_Responding_to_Coastal_Inundation)).

## PROJECT PHASES.

1. Upgrade of the current PTVA Model to include recent tsunami event information.
2. Development of a storm surge vulnerability module for the upgraded PTVA Model.
3. Testing the resulting multi-hazard tool in three pilot study sites, using inundation scenarios and the physical characteristics of the exposed buildings and infrastructure.
4. Generation of GIS maps of building and infrastructure vulnerability.
5. Recommendations for medium-long term mitigation measures.

## PROJECT DELIVERABLES.

1. High resolution GIS exposure maps showing inundation extent, flow depth and exposed assets for each of the selected scenarios.
2. High resolution GIS vulnerability maps, showing the vulnerability of buildings and infrastructure to the selected inundation scenarios.
3. Estimates of Probable Maximum Loss for each scenario event modelled.
4. Recommendations for Government addressing long term risk mitigation.
5. A GIS dataset including detailed geo-referenced information about single buildings and infrastructure characteristics (i.e. material, number of storeys etc.).
6. A step-by-step user manual and tutorial for applying the model to other coastal areas.

## PROJECT MANAGEMENT.

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