

Pacific Australia Climate Change Science and Adaptation Planning Program

Adaptation planning and decision making

Simple coastal inundation models developed for areas of PNG, Tonga and Vanuatu and other priority areas using high resolution Digital Elevation Models (DEMs) derived from LiDAR data.

Background

The combination of rising sea levels and changes in extreme events associated with climate change gives rise to two basic risks on the coast: inundation and coastal erosion. The severity of impacts in a particular location is affected by a range of factors related to climate, geomorphology, and the presence of settlements, infrastructure and assets in low-lying coastal areas.

Adaptation to future sea level rise to build resilience in coastal communities requires a sound understanding of the potential impacts and risks associated with coastal inundation and erosion. Coastal adaptation responses in all sectors must be guided by sound baseline information such as geophysical, topographic, oceanographic, economic, social and climatic data. An early investment in good quality information will not only assist in making effective planning decisions to respond to climate change, but also avoid inappropriate adaptation responses that could increase social or environmental damage.

Some key data gaps to assist coastal inundation modelling are currently being filled through the acquisition of high resolution elevation data (or digital elevation models – ‘DEMs’) under the *Pacific Adaptation Strategies Assistance Program* (PASAP), as well as national scale climate projections for Pacific Island partners delivered under the *Pacific Climate Change Science Program* (PCCSP). Another important source of data will be the *Pacific Exposure Database* being developed by SOPAC, the World Bank and the Asian Development Bank, which includes spatial and other information on infrastructure for a number of Pacific countries.

This PACCSAP program activity will aim to build on these investments and inform adaptation planning by developing simple coastal inundation models and undertaking risk assessments for priority coastal settlements the Pacific region. Settlements in PNG, Tonga and Vanuatu have been identified as focus countries in the first instance due the presence of settlements and critical infrastructure in low-lying coastal areas. The project will involve three key components: methodology development; risk assessment reports; and capacity building.

Proposed approach

1. Develop methodology for coastal inundation modelling and ‘first pass’ risk assessment of priority coastal settlements in Tonga, PNG and Vanuatu.

- a. To achieve the project objectives, a simple coastal inundation and risk assessment methodology must first be developed.
- b. The level of accuracy of coastal inundation modelling will in part depend upon the resolution and accuracy of the baseline data that is used in the analysis. The following critical baseline data inputs as well as some potential data sources are identified in **Figure 1** below to support the analysis. This will need to be investigated further during implementation of the project.

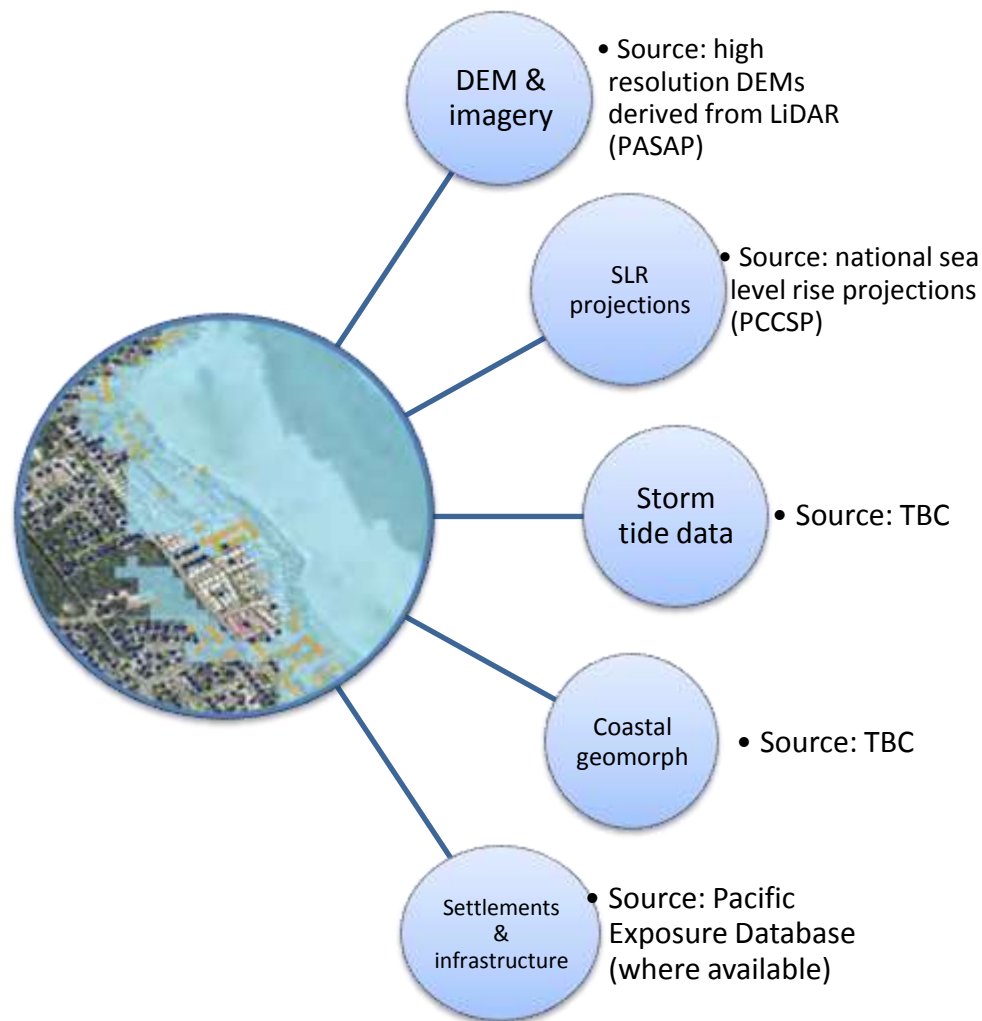


Figure 1: Critical data layers for inundation modelling and risk assessment

- c. Following clarification of available baseline data, it is proposed that a team of experts develop a simple and robust methodology for coastal inundation modelling and coastal risk assessment. A draft methodology could be prepared by a small core group of experts in the first instance, followed by an expert workshop involving a broader range of participants.
- d. Key partners identified to date include leading Australian coastal researchers involved with the National Coastal Risk Assessment, regional experts and partners including SOPAC and NIWA, and representatives from each focus country.

2. Prepare high-level risk assessment reports for each country.

- a. A short, high-level risk assessment report will be prepared for each country utilising the methodology developed through the expert process outlined above. The report will identify areas at risk from inundation and coastal erosion as a result of sea level rise and detail the underlying methodology.
- b. The report must be prepared in consultation with relevant agencies from each focus country and will ideally draw conclusions and make recommendations regarding useful follow-up work, lessons learned, and how the information may be used to inform adaptation planning in the coastal zone in each country.
- c. The report must be in a format that will enable the integration of results into adaptation planning projects, including other outputs under Outcome 4 of the PACCSAP.

3. Implement capacity building programs in each of the countries.

- a. Capacity building requirements in Tonga, PNG and Vanuatu for receiving and using high resolution elevation data were scoped as part of PASAP. Based on this, capacity building programs are being designed specifically for each country and will be delivered as part of this PACCSAP activity.
- b. The capacity building programs are likely to include:
 - i. awareness raising sessions with relevant government agencies to ensure broad knowledge of the availability of the elevation products and their applications;
 - ii. technical workshops for key technical staff on the fundamentals of elevation data and ArcGIS, and utilising the products to perform simple coastal inundation modelling to assist decision making;
 - iii. software and hardware upgrades for the data custodian agencies if required;
 - iv. implementation of procedures for spatial standards;
 - v. ongoing mentoring through placements of staff in the Australian Government; and
 - vi. monitoring and evaluation.

Governance and partners

DCCEE will be responsible for overseeing the project. A regional partner could be engaged to coordinate the methodology development, source input data, undertake coastal inundation modelling and prepare the risk assessment reports. The capacity building program will need to be delivered by a suitably qualified consultancy with both GIS and IT expertise, engaged by DCCEE.

It is also important that regional partners and counterparts in all three countries are involved in the coastal inundation modelling to maximise capacity building opportunities and ownership of project outputs. As such, integration of all three project components outlined above will require close consultation between project partners and consultants.

Discussion questions

1. Who are the key stakeholders and regional partners for engagement in this project?

- a. Which stakeholders within the region and in each of the three focus countries would benefit from involvement in the project?
- b. Is there a regional partner who would be well-placed to coordinate project components 1 & 2 (i.e. methodology development, source input data, undertake coastal inundation modelling and prepare the risk assessment reports)?
- c. Is there a regional partner or organisation who would be well-placed to deliver the capacity building program?

2. What key data sources can support the project?

- a. Is there an inventory of relevant data available for the region?
- b. How might key data gaps be filled – in particular, where can storm tide and coastal geomorphology data be sourced?
- c. What other data layers may be useful to support inundation modelling and risk assessment?

- 3. Are there other coastal inundation modelling projects underway or completed for the region? If so:**
- a. What methodology was used?
 - b. Who is the key point of contact?
 - c. Are there any potential synergies with this PACCSAP project?
- 4. What information outputs or products would be useful to support adaptation planning in the coastal zone?**
- a. Who is typically responsible for coastal zone management and planning in the focus countries?
 - b. What key information sources do they currently use to inform planning and management decisions?
 - c. What types of products might be useful to inform adaptation planning?