

Key findings: Port Phillip Bay Coastal Hazard Assessment Gap Analysis

Overview

The Department of Environment, Land, Water and Planning (DELWP), in partnership with CSIRO, is carrying out a coastal hazard assessment for Port Phillip Bay.

The Port Phillip Bay Coastal Hazard Assessment (PPBCHA) builds on the development of four pilot coastal hazard assessments throughout Victoria between 2013 and 2016, and the Local Coastal Hazards Assessment Learnings Project.

The PPBCHA is focused on inundation, erosion and groundwater hazards. The first stage in completing the assessment is a gap analysis. This stage synthesised all relevant information and data and identified any critical gaps in the existing and baseline information that was needed to complete the assessment.

The gap analysis report findings

More than 600 items of literature, numerous datasets and data repositories/tools were reviewed to assess the feasibility of the project methodology. In light of this review, the project methodology has been revised.

A number of data and knowledge gaps were identified, however, none of these were found to be critical to the project's success. The key findings of the analysis are summarised below.

Sea level rise is the key climate factor that will intensify coastal hazards in the bay. Changes in hydrodynamics, due to changes in weather, will be a secondary factor.

Inundation

The assessment of inundation requires knowledge of coastal processes such as tides, storm surges, extreme rainfall events and waves. For example, wave-related processes are important to the assessment of inundation and erosion hazards.

The gap analysis showed that there is sufficient data available for the study area to undertake hydrodynamic modelling under current and future climate conditions, which is fundamental to the assessment of coastal hazards in Port Phillip Bay.

Inundation assessments based on dynamic modelling enable a more comprehensive assessment of inundation hazard.

Conclusion: There is enough information and data available to complete a local scale assessment for inundation around the Bay.

Erosion

The assessment of erosion requires knowledge of geomorphology, such as sediment and rock type/characteristics and depths of any underlying rock characteristics, and the location of natural (e.g. dune) or man-made (e.g. seawalls) coastal defences. The gap analysis showed that although there is a lot of information available for the study area, further data collection is required. Detailed information is required to perform locally relevant erosion hazard assessments. Information from the geomorphic assessment will inform the choice of appropriate models

and methods used in the erosion hazard assessment. CSIRO will undertake a bay-wide geomorphic assessment to collect the information needed to complete the hazard assessment.

Conclusion: CSIRO will undertake field work to gather data on the geomorphology of the coast. Together with this new data, the available information and data is enough to undertake a local scale assessment for erosion around the Bay.

Groundwater

The assessment of groundwater change requires knowledge of a range of attributes, such as hydrology, geology, aquifers, water usage, landscape feature, salinity and groundwater management practices. The gap analysis has shown that there is insufficient information and data on:

- whole-of-bay conceptual and numerical hydrogeological models,
- the ecosystem services provided by groundwater around the bay,
- the social and amenity values supplied by groundwater around the bay, and
- the cultural and heritage value of groundwater around the bay.

However, there is adequate data to construct a conceptual model of the groundwater systems for the whole of the bay area.

The gap analysis identified six regions where the response of groundwater systems to sea level rise and climate change could be further investigated, based on:

- sufficient geological and hydrogeological information for conceptual groundwater response models to be developed
- groundwater vulnerability and potential risk to groundwater resources,
- and groundwater hazard and potential risk to assets from groundwater threats.

Of the six regions within Port Phillip Bay, only three have sufficient data to undertake an assessment at a finer scale, namely the Werribee Delta, the Beaumaris to Frankston 'sand belt' and the Nepean Peninsula.

Conclusion: *While there are obvious limitations in data, there is adequate data to construct conceptual models of the groundwater systems for the whole of the Bay area. There are also a few areas where more data is available and higher resolution conceptual models can be developed.*

Summary

The findings of the gap analysis confirm that it is possible to complete local scale assessments (finer resolution) for inundation and erosion. For groundwater, it is possible to complete a coarse scale assessment for the bay and a small number of finer resolution scale assessments at specific locations around the coast.

Many of the gaps identified in the report reinforced the importance of carrying out the PPBCHA to develop a suite of data products and information on the hazards in Port Phillip Bay that reflect up-to-date climate information and predictions. The data will inform the next steps in planning for a changing climate.

In addition, we have looked at what decision-support tools currently exist that can utilise data produced through the PPBCHA.

Tools that could potentially utilise the data include Smartline, FloodZoom, and Coastal Risk Australia. A key limitation of these tools is that they incorporate one, or at most, two hazard types. The PPBCHA will offer data for three hazard types.

Given this limitation, CSIRO will develop a new tool that allows the user to visualise and analyse outputs from all three hazards in one interface.

Probable users of this PPBCHA data and new tool are land managers and planners.

Next Steps

With the gap analysis now completed, CSIRO has started the modelling work that will inform/guide the hazard assessments. They have also commenced field work to understand the sediment characteristics along the Port Phillip Bay coastline.

Model development is likely to be completed by September 2019. Once the models are complete, CSIRO will run the models for various climate change scenarios.

The model outputs will be overlaid with other localised information to create the hazard assessments. The hazard assessments are expected to be completed by February 2020. CSIRO will then combine the data for each of the coastal hazards assessed to create a final report and comprehensive hazard maps for the Bay that define the extent of land expected to be threatened by the coastal processes of inundation, erosion and groundwater change.