Port Phillip Bay Coastal Hazard Assessment

Decision Support System
January 2020

Overview

As part of the Port Phillip Bay Coastal Hazard Assessment (PPBCHA), a Decision Support System (DSS) is being built.

Currently, Victorian Government coastal and planning policy has stipulated the use of Sea Level Rise Baselines for all planning and management considerations.

The Decision Support System is a platform that will enable planners to evaluate and understand the impacts of coastal hazards on land under different sea level rise scenarios.

It is expected that the DSS will be ready for user trials by the end of April 2020 and ready for general use late 2020.

Developing a decision support system for Port Phillip Bay

PPBCHA is focused on modelling three coastal hazards for the bay area: inundation, erosion and groundwater.

The project aims to generate hazard information that can be used to plan for and manage natural, cultural and economic assets now and in the future.

This will be achieved by integrating modelling, field work and data acquisition to ensure that the three hazards are projected consistently for a series of climate change scenarios.

The DSS is being built on an existing open source web-based geospatial platform developed by CSIRO called Terria: https://terria.io/.

The DSS is being designed and developed based on the needs of key users including land and asset managers and planners. A User Testing Group with membership from EPA, DELWP, Parks Victoria, Melbourne Water and local councils is regularly consulted to ensure that the DSS reflects end user needs.

The DSS will offer the following key features:

- Web based.
- No specific software installation required.
- Secure user login ability.
- All three coastal hazards datasets integrated, including climate change components.
- Ability to carry out analytics such as distance of hazard from a specific point of interest, extent and area of hazard calculation for a relevant region and hazard uncertainty considerations for specific parcels of coastal land.
- Ability to extract relevant hazard layers for further analytics with other layers.
- Additional relevant data, such as tidal patterns, beach profile calculations and historic aerial imagery for the region.
- Ability to carry out a side-by-side visual comparison of various relevant data layers such as inundation to understand the relative impact of a given sea level rise scenario for a region. These comparisons can be made year vs year and/or location vs location.
- Ability to view the outputs in a 3D environment. This feature gives the user a meaningful perspective of a hazard's local impact.
- Ability to record a 'story' to provide a digital record of hazard interpretation and analysis that can be used for communications, decision making and visualisation.

Examples of how the DSS outputs for each hazard will look can be seen overleaf. Examples are test data only.

Coastal Inundation

A sample visualisation of coastal inundation outputs from the DSS is shown in Figure 1. The figure shows a side-by-side comparison of coastal inundation demonstrating how inundation levels will change based on current day sea levels, to a 1.4 m sea level rise scenario. Colour is used to show the force of the inundation, i.e. speed and depth of the flooding.

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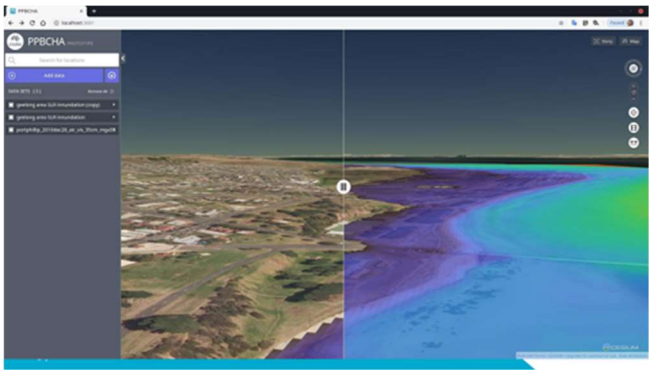

Figure 1: Visualisation of coastal flood inundation hazard within the DSS.

Coastal Erosion

A sample visualisation of coastal erosion outputs within the DSS is shown in Figure 2. The erosion levels under different sea level rise scenarios will be shown in the form of zones based on probability.

Figure 2: Visualisation of coastal erosion hazard within the DSS

Groundwater

As shown in Figure 3, groundwater hazard will be presented using two parameters: water table depth and salinity.

The outputs from this model will be integrated with climate projections relating to precipitation and evapotranspiration, as well as sea level rise and storm surge inundation.

This will be used to estimate future states of ground water for the Port Phillip Bay region.

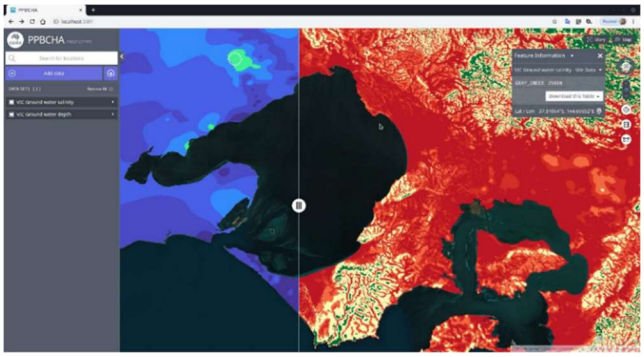

Figure 3: Visualisation of ground water hazard within the DSS

Additional datasets

In addition to the coastal hazard's datasets, relevant historical aerial imagery from the 1930s to 2018 for the region, beach profiles, and tidal time series will also be available in the DSS, to allow users to investigate all relevant details for a region.

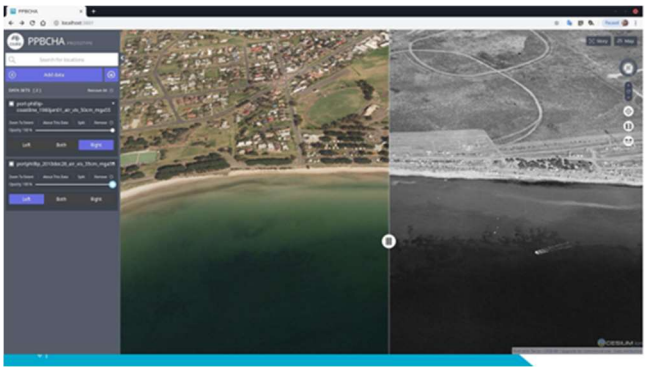

Figure 4: Side-by-side comparison of historical aerial imagery vs recent imagery for Port Phillip Bay within the DSS.

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Accessibility

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