

## Background

Beaches are the premier location for people to relax worldwide. They are also the natural buffer to storms, protecting the land from inundation by the sea. As a result of human development and climate change, beaches and their dunes are under stress across the globe.

Beaches are loose piles of sand. The sand shifts in harmony with the wave conditions and it is this ability to move that allows beaches to exist in the harsh marine environment. Erosion is therefore a natural process, as sand moves from one part of the beach to another to balance the wave energy conditions. This movement can be over 5 m vertically and over 100 m laterally, with this area being termed the beach envelope.

Understanding the size of the beach envelope is key for sustainable management of our coast and resilience of beaches to climate change. Erosion only becomes a problem when the beach envelope overlaps human infrastructure.

» Dune erosion on the surf beach at Inverloch.



The program is really great for the council as it gives the community a full understanding of how our management is protecting the coast, through the citizen-scientists actually measuring and observing the beach changes”

*Anthony Alfreinko, Great Ocean Road Management Committee, Marengo*

## Acknowledgements

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*The enthusiastic support of our local citizen-science groups is central to the success of the program.*

### For Further Information contact:

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## Citizen-Science Drones



Environment,  
Land, Water  
and Planning



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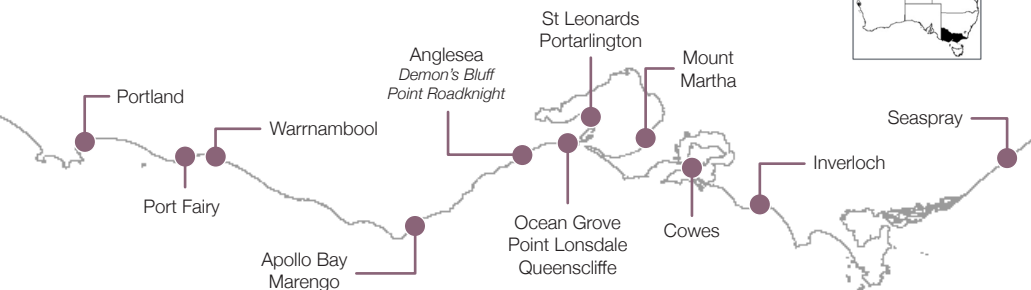
## The Problem

Predicting the impact of storms on beaches is very difficult at the scale relevant for managers. This means we cannot determine whether sand will return naturally after an erosion event or what the impact of climate change may be on a specific beach. Traditional methods for measuring beaches take time and require significant expense.

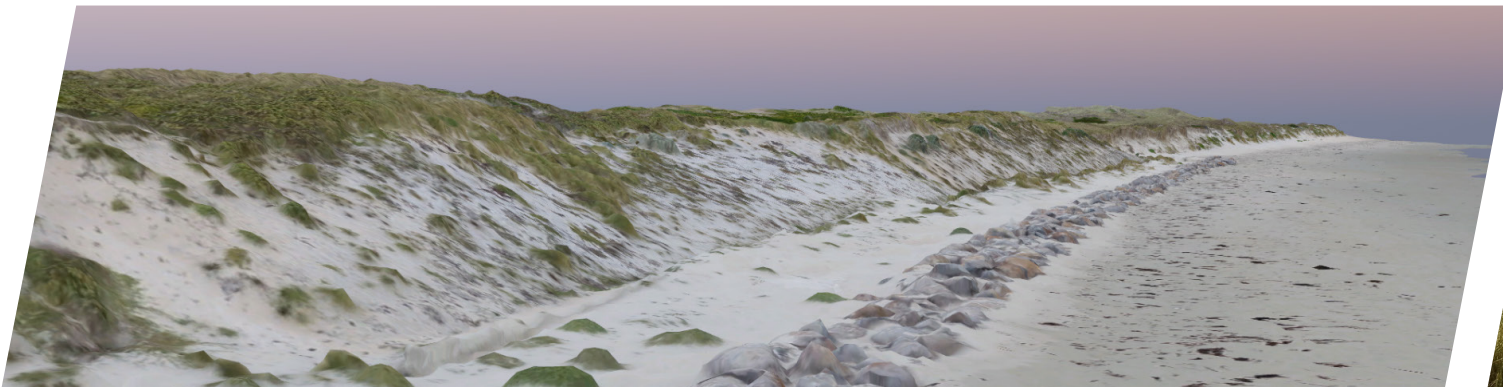
## The Solution

Citizen-science drone surveys are a cost-effective method which both engages local communities in management and delivers highly precise and accurate data for researchers and managers. Drones enable rapid surveying of beach volumes and therefore provide critical information for determining the dynamism of beaches.

The data is available online to all community groups as geo-rectified 3D images. The approach allows fast assessment of changes (if any) in the volume, height and extent of sediment, and other features (such as beach wrack or dune vegetation).



» A 3D model of the beach and rock protection at Port Fairy Beach created by citizen scientists.



## Each group is provided with:

### Equipment

- » Phantom 4 Pro Drone
- » 3 Batteries
- » iPad Mini
- » High accuracy GPS targets (Aeropoints)
- » Hand-held 2-way Radios
- » 1st aid kit

### Training

- » On-site UAV Training
- » Insurance cover
- » 24hr access to all survey data
- » On-call technical assistance

## 2018–2021 Operations

16 sites have been established across Victoria from Portland to Seaspray involving over 100 community members and 25 council & state government employees. Of these, more than 80 people have completed or are nearing completion of their flight training. Over a year's worth of data has already been collected at most sites.

## The Team

### Project Leaders

**A/Prof Daniel Ierodiaconou.** Daniel is a marine ecologist interested in multidisciplinary and multi-scalar approaches to habitat mapping integrating remotely sensed geophysical and biological datasets.

**A/Prof David Kennedy.** David is a coastal geomorphologist specialising the impact of climate and environmental change on sandy, rocky and muddy shores from temperate to tropical regions.

### Flight Operations

**Dr Blake Allan.** Blake completed his PhD on animal movement in modified landscapes and focuses his research on emerging technologies, and how they can be integrated into the collection and analysis of environment variables.

**Ms Karina Sorrell.** Karina's honours thesis focussed on drone surveys of seal populations in collaboration with Phillip Island Nature Parks and Monash University, and she has a keen interest in pushing the limits of this technology.

» Surveying using drones on the Bellarine Peninsula.

