CITY OF GREATER GEELONG

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Climate Systems

National Environmental Science Program
Enabling best practice adaptation

Case Study

# Artificial reefs for coastal protection

Brullo, T., Barnett, J., Boulter, S., Waters, E. and Roob, R. 2024.

The Ramblers Reef from above. Note the low-lying area and vulnerability of houses on Ramblers Road (The City of Greater Geelong).

The City of Greater Geelong (Victoria, Australia) installed two artificial reef projects over the past ten years to protect the coastal environment.

The Ramblers Reef, on Ramblers Road in Portarlington, was conceived in 2014 and completed in 2018. The Dell Eco Reef, located at Clifton Springs, began in 2018 and was completed in 2022. Both offshore semi-submersible artificial reefs were designed to dissipate wave action, with the Dell Eco Reef also serving as a snorkelling attraction.

These projects were investigated by the National Environmental Science Program (NESP) Climate Systems Hub project *Enabling Best Practice Adaptation* to understand why and how these projects have been successful.

*This case study was undertaken April – July 2024. Data was collected primarily through interviews.*

## What is climate change adaptation?

**Climate change adaptation is action to reduce the vulnerability of people, houses, environments, animals and other assets to the impacts of climate change. This can include preparing for sea level rise, natural disasters or changes in temperature and rainfall.**

## Ramblers Reef

In the period leading up to 2014, residents of Ramblers Road were increasingly concerned about loss of foreshore land and the impacts they were seeing on their properties: including coastal flooding of properties and dwellings during storm tide events. Many attempts to reduce erosion on the beach with sand bagging, fencing and other 'soft' engineering had very limited success. Traditional sea walls can negatively impact the beach, marine ecosystem and sand dune ecosystem. Instead, it was suggested that an offshore reef would be better suited.

The Ramblers Reef consists of several rectangular steel cages filled with rock, from nearby development work, and shell, from local scallop fisheries. This artificial reef provides the added co-benefit of new habitat for marine species, including mussels which were introduced to the reef.

Ramblers Reef, and the associated coastal engineering works undertaken, have been overwhelmingly effective at reducing the erosion that was occurring in the area. Monitoring shows that the width of the beach has increased by up to 40 metres at certain times. This has stopped inundation and negative impacts to residents and assets in the area. Initial observations show that the structure has been successfully colonised by many local marine species.

The Dell Eco Reef from above (The Reef Design Lab).

## Dell Eco Reef

The Dell Eco Reef Project began as a proposal to develop an underwater sculpture park and tourism destination. Implementation barriers disrupted 'The Sunken Gallery' project such that it was put on hold, however, this provided opportunity to repurpose the funding to address concerning erosion and damage to the historic remains of the Clifton Mineral Springs.

The Reef Design Lab was engaged to design an appropriate artificial reef. The chosen design was for several circular reef 'modules' which could be arranged together in a linear pattern.

The design sought two outcomes:

- to reduce wave energy; and
- to provide a diverse and yet safe environment for snorkelling.

*"It also merges art and science, and it's giving people a different perspective…. I think people in the community love to hear about things like that."*

Upon installation, the Dell Eco Reef has been well received. Community have taken up opportunities to use the reef as a snorkelling destination, with lots of children enjoying the shallow water environment. The media has also given the reef much attention, with numerous 'good news' stories.

The ecological co-benefits of the reef modules are also widely appreciated by community groups, environmental professionals and individuals. Numerous small invertebrates have taken up residence on the reef modules. While it is too soon to measure the impact of the reef on erosion, no further erosion has been observed.

## Why are these projects a good example of adaptation?

While these two projects were undertaken in response to current coastal erosion, rather than for future sea level rise, they have been seen as good adaptation because they have successfully achieved their goals of reducing erosion and providing benefits to their local community.

At Ramblers beach both accumulation of sand, recovery of the dune ecosystem and reduced coastal flooding have been very good results. At The Dell, the reef has also effectively become an attraction for locals, researchers, and even international visitors. People value the positive environmental impacts of the reefs, creating habitat for native species, and the effort that was taken to ensure their design did not have negative impacts.

*"...you can see now suddenly the ecological benefit and tourism is an add-on because you can snorkel out there and it's nice… It's also good for us."*

## What can we learn?

This case study offers an opportunity to learn how to implement good adaptation projects in other areas of Australia as we start to prepare for our changing climate.

Some of the key lessons include:

- Local leaders, both individuals and groups, can have a very significant impact driving forward adaptation.
- Different types of knowledge, both scientific knowledge and local understanding about the environment, are really important to consider.
- Projects that have multiple other benefits to community and the environment are valued.
- It is important to ensure all community and stakeholders are involved in planning conversations and decision-making processes for climate change adaptation.
- Government regulation processes can be really important for ensuring best practices are followed when designing and implementing new projects.

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