

# Building Biodiversity

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**BUILDING SEAWALLS TO SUSTAIN INTERTIDAL BIODIVERSITY IN ALTERED AND URBANIZED ESTUARIES**

**A Linkage Project  
funded by the  
Australian  
Research Council**

Centre for Research  
on Ecological  
Impacts of Coastal  
Cities  
University of Sydney

NSW Department of  
Primary Industries  
(Fisheries)

BIO-ANALYSIS:  
Marine, Estuarine &  
Freshwater Ecology

NSW Department of  
Environment and  
Conservation

NSW Maritime

NSW Department of  
Natural Resources

Sydney Ports  
Corporation

Hornsby Shire  
Council

Mosman Municipal  
Council

North Sydney  
Council

Wyong Shire Council



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## Project summary

Urbanization along Australia's coasts is increasing, changing natural shorelines through the proliferation of seawalls and other built structures. Seawalls affect intertidal biodiversity by providing inadequate or insufficient area of intertidal habitat, altering natural ecological processes and/or impacting adjacent habitats. There are, however, options in ways walls can be built which may reduce these impacts. The challenge is to achieve desired levels of development, while sustaining biodiversity. This proposal brings together expertise in experimental marine ecology, planning and engineering to identify how best to support diverse intertidal animals and plants in future coastal developments. This project will explore the ways that different types of seawalls affect intertidal biodiversity, using existing sites and planned programmes of construction and repair of seawalls as experiments. This will ensure that recommendations from the research are economically and structurally sound, as well as environmentally valid.

## Who is working on the project ?



*Dr M.G. (Gee) Chapman*

Dr Gee Chapman, Chief Investigator on this Grant, has been doing marine ecological research for many years, working on many problems in many different habitats. Gee has published > 100 scientific papers, book chapters or books and > 45 environmental reports. Her research, with that of students and colleagues, on seawalls in

Sydney Harbour is the most extensive study to date on impacts of these structures on intertidal assemblages. This project is a major extension of that earlier work, addressing changes to ecological processes.

Dr Tim Glasby, Chief Investigator on this Grant, does research on introduced marine pests in the conservation section of the NSW Department of Primary Industries (Fisheries). His earlier research in the Centre for Research on Ecological Impacts of Coastal Cities was strongly focussed on effects of built structures (walls, pilings, pontoons) in estuaries around Sydney on subtidal assemblages of biota living on those structures.



*Dr Tim Glasby*



*Dr David Blockley*

Dr David Blockley, Research Fellow working on this Grant, recently completed his Ph.D. at the Centre, looking at the ecological processes affecting marine organisms on seawalls associated with wharves and differing exposure to waves. He has worked with Dr Chapman since 1999 on her research on seawalls in Sydney

Harbour and will continue this successful collaboration in the present Grant.

Giordana Cocco has been awarded the APAI to do a Ph.D. in this Grant. Giordana moved to Australia from Italy, completing a B.Sc. Honours (1st Class) in Marine Science last year. She expects to broaden her skills in research and logical and critical thinking, while completing research with direct relevance to environmental management.



*Giordana Cocco*

## Building experimental seawalls

An exciting component of this project is the experimental evaluation of building new seawalls in coastal lakes. This experiment will test the efficacy of using temporary structures to “mimic” seawalls. This will allow us to measure changes to adjacent sediments and seagrass in response to the “arrival” of new walls by collecting data beforehand. Having some control over how the walls are built will also ensure data can be appropriately analysed. Then the walls will be removed, allowing us to measure rates of recovery to these habitats. If these methods are successful, they would allow authorities to “trial” sea-walls prior to construction, to assess whether a wall in a particular location is likely to have an ecological impact.

This research is planned to be done on unoccupied land in the Tuggerah Lakes, in association with the Wyong Shire Council and Dr Danny Roberts (BIO-ANALYSIS: Marine, Estuarine and Freshwater Ecology). We are extremely grateful to the Council and Dr Roberts for the enthusiasm with which they have greeted this challenging project and, especially Wyong Council, for the efforts they are putting into assisting us with the necessary paperwork to ensure that this project can go ahead. It is the first time that such an experiment has been done. It provides great opportunity to measure direction, magnitude and rate of both the potential impact and recovery in shallow-water habitats adjacent to seawalls.

## Finalizing the contracts

All of our partners should now be aware of the role of Dr Wayne Davies of the Business Liaison Office here at the University of Sydney who is finalizing the contracts. He says that finding wording in a contract that satisfies several parties all at once was never going to be easy.

As a result, there has been some time-consuming to-ing and fro-ing between the University and the partners. Unfortunately, the conjunction this year of Easter and Anzac Day has added to the overall delay.

Concerns have arisen chiefly from two of our partners while the other partners are ready to progress. Recently, we have, therefore, put in a major effort to draft new clauses that seek consensus with all partners.

At present, the Draft Contract is with the legal team at the University who are vetting the new draft before it gets sent out. It will then be up to our partners to move quickly to give us the OK to sign.

Our Ph.D. student, whom you are supporting on this project, has had to delay to 2nd semester, but is very keen to get started on a project and has already started fieldwork to look for sites. We hope that it should not be long now.

## Some of the developing projects

The first step in this research project has been to meet with our partners to establish the direction of the project and to determine what works are planned and currently under way. We have had a number of promising meetings with many of our partners and discussed some of their planned developments for a number of seawall restoration and building works. Discussions have taken place to see how these can be incorporated into the research programme of the Grant.

For example, North Sydney Council and Mosman Municipal Council have a number of new and progressing restoration programmes for seawalls within their jurisdiction. North Sydney Council are rebuilding a 150m section of seawall at McMahon’s Point. This will involve the demolition of the existing sandstone block wall and the building of a pre-cast concrete wall. Sandstone blocks will then be placed over this as a façade. We are proposing to use this work as part of the linkage project by modifying the design to incorporate rock-pools into the face of the seawall. This will be an innovative approach to improving the diversity of intertidal habitats on seawalls. We will monitor this development to measure what effect these pools have on the biodiversity on the seawall.

Some of the projects we have discussed with Mosman Council include a long section of seawall at Pearl Bay that is degrading and in need of repair. Council is planning to build rubble embankments at the base of some sections of the seawall, which we will use as experimental habitat to test the range of species that will live in artificial boulder fields at the bases of seawalls.

At Curraghbeena Point, there is a low seawall that is completely underwater at high tide, behind which is a shallow pool. We have suggested sealing the face of the low retaining wall to prevent water escaping during at low tide. This will create a large rock-pool, capable of providing habitat to a diverse range of organisms. This development could be used as an educational tool to inform the public of Mosman’s innovative approach to shoreline developments.

Despite the contracts for the Linkage project not having been yet finalised, we have a number of interesting experiments that are beginning to take shape. We are grateful for the useful discussion we have had with our collaborating partners that have led to these. We also look forward to working with our other partners on future seawall developments.

