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**Topic:** From Grey to Green: Opportunities and Community Perceptions of Eco-Engineering in Port Phillip Bay

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**Date:** Tuesday 21<sup>st</sup> April 2020

**Speaker:** Dr Rebecca Morris  
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**Focus:** Eco-engineering – the ecosystems and ecological benefits; the opportunities that exist in Port Phillip Bay; and outcomes of recent work around community perceptions of eco-engineering in Port Phillip Bay. This included:

- Introduction to coastal eco-engineering / micro-habitats. Refresh so we're all on same page!
- Opportunities relevant to Port Phillip Bay – across a range of scales, costs, sites and purpose (eg. retrofitting, maintenance, new).
- Ecosystem considerations when designing artificial structures – maximising ecological benefits with coastal engineering, retrofitting and maintenance
- Addressing the perceived barriers
- Effectiveness in comparison to artificial protection structures
- Community perceptions in Port Phillip Bay

**Evaluation:** [Click here](#) to complete the 3-question survey

**Recording:** [Click here](#) to access a recording of the forum and presentation  
<https://vimeo.com/410490293>  
Access password: !m@v!

**Resources:** Australian Social Survey Publication (which includes Port Phillip Bay community perceptions to eco-engineering:

[Building blue infrastructure: Assessing the key environmental issues and priority areas for ecological engineering initiatives in Australia's metropolitan embayments.](#)

Strain, E.M.A., Morris, R.L., Bishop, M.J., Tanner, E., Steinberg, P., Swearer, S.E., MacLoed, C., Alexander, K.A. 2019. Journal of Environmental Management 230, 488-496.

Global Social Survey Publication (which the Australian survey was part of):

[Urban blue: A global analyses of the factors shaping urban residents' perceptions towards harbour environments and ecological engineering](#)

Strain, E.M.A., Alexander, K., Kienker, S.E., Morris, R.L., Jarvis, R., Coleman, R.A., Bollard, B., Firth, L.B., Knights, A.M., Grabowski, J. H., Airoldi, L., Chan, B.K.K., Chee, S. Y., Cheng, Z., Coutinho, R., de Menezes, R.G., Ding, M., Dong, Y., Fraser, C.M.L., Gomez, A.G., Juanes, J.A., Mancuso, P., Messano, L.V.R., Naval-Xavier, L.P.O., Scyphers, S., Steinberg, P., Swearer, S.E., Valdor, P.F., Wong, J.X.Y., Yee, J. and Bishop, M.J. (2019). Science of the Total Environment 658, 1293-1305.

## YOUR QUESTIONS:

### **Q. Durability of the structures**

If you are building from the design phase then you should be able to engineer the durability to be similar to a traditional defence structure. When using retrofitting, it can be harder to engineer something that persists over time, you need to make sure that the attachments can withstand the wave forces that the structure is subjected to.

Some techniques have been through specific engineering durability tests. For example, the living seawalls tiles are designed to withstand conditions that can be expected to occur over a 20-year period. The “flowerpot” rock pools went through an iterative process of designing the stainless-steel brackets for attachment. If you are using subtractive (rather than additive) retrofitting techniques, such as drill-coring rock pools into rock revetments there would be little concern for durability, but you could check with an engineer that what you wanted to do wouldn’t compromise the structure.

### **Q. What are techniques for sea wall design to ensure flood waters behind the walls can flow towards the ocean while not allowing sea water to come inland?**

If you are retrofitting structures, there is very little change that can be made to the overall design of the existing structure. Therefore, there shouldn’t be any effect on the function of the existing structure in terms of protection provided.

If you were to apply eco-engineering techniques in the design phase and re-design the traditional structure (e.g., using stepped walls instead of vertical ones, incorporating horizontal steps for rock pools and vegetation benches) then it would need to go through all of engineering designs and specifications that an ordinary sea wall design would. Most of the work to date is retrofitting, less so design from scratch. New sea wall eco-engineering in downtown Seattle best example of large-scale application, as well as case studies from Georges River Council in Sydney.

We are currently running a project in Wyndham Harbour seeding structures with mussels predominantly with an aim to improve water quality and reduce surface area for colonisation of invasive species. This does not have any effect on the function of the existing structures, are just seeding them with bivalves.

### **Q. What is the name of the company that made the textured tiles - are they doing this commercially?**

Reef Design Lab - <https://www.reefdesignlab.com/>. The ABM is in communication with Reef Design Lab to organise a site-based meeting to hear more about their projects and products. This event has been delayed due to COVID-19 restrictions and will be scheduled at a later date.

A number of eco-engineering designs being done inhouse, such as through University of Melbourne projects.

### **Q. How important is it to increase the biodiversity in these structures? Would there be any threatened species in PPB that need this habitat?**

Research on swimming nets in Sydney found they support habitat for White Seahorse. Through that project they looked at eco-engineering techniques to support sea horses (“sea horse hotels”).

Weedy Sea Dragon in Port Phillip Bay uses artificial structures as habitat. The aims of different eco-engineering techniques, therefore, could vary from trying to enhance a particular species, to biodiversity more generally.

**Q. Has cost-benefit exercise been undertaken? Particularly for drilling which could probably be achieved cheaply?**

Lacking detailed information on cost-benefit, internationally. A lot of projects have been small scale experimental work to date. Information I have on the Living Seawalls tile suggests they are \$135-175 each, depending on the number of tiles ordered and tile design.

Becki is going to follow up on costs for some of the other options she discussed and will send around.

**Q. Increasing habitat complexity crevices/pools in rocky areas e.g. seawalls also increases the likelihood of species such as urchins and blue ring octopus which represent a human hazard. This should also be considered.**

The size and depth of rock pool that we studied on the natural rocky shore and rock revetments were shallow and would not be appropriate habitat for blue ring octopus or urchins. But agreed, if larger and deeper ones were made in the low intertidal this could be a possibility.

A key consideration might be avoiding designs that could attract potentially dangerous species or considering how you want people to access the area e.g. only provide access in safe areas.

**Q. Are their case studies from Half Moon Bay available?**

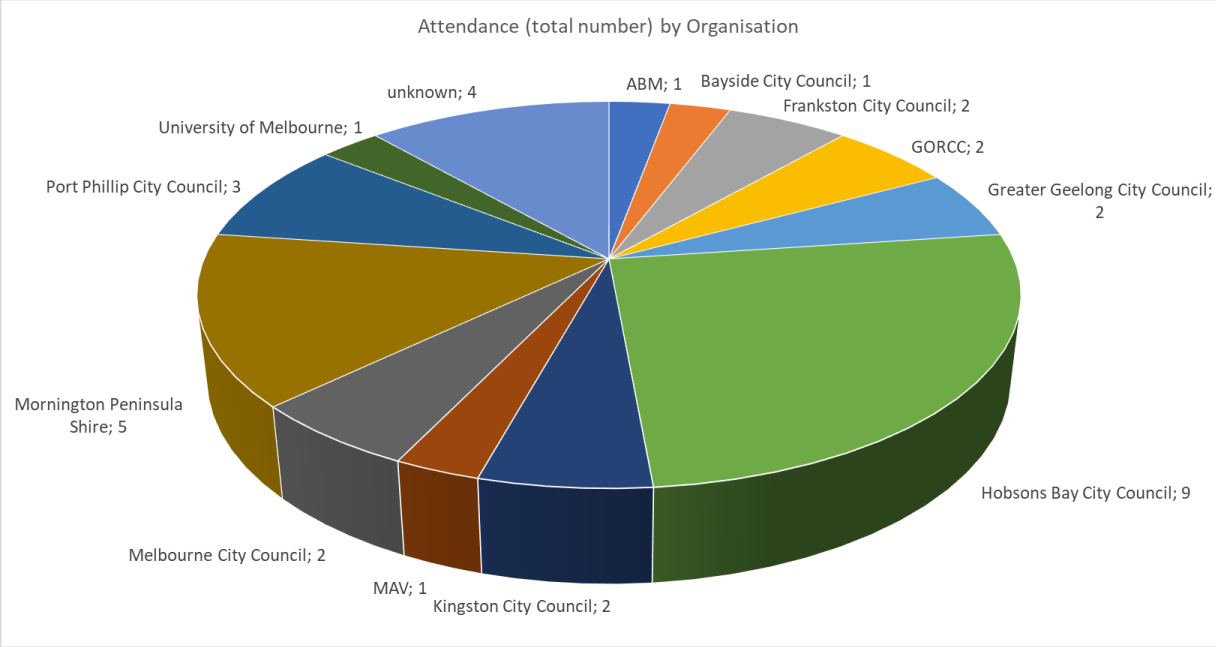
They are not published, but Becki will put together a short overview document on the results of the studies and costs of interventions to be shared.

**YOUR FEEDBACK:**

- thank you, was very interesting
- Thank you Rebecca, very interesting. Could apply some of these techniques to several areas in my council. Also looking at using living reefs as wave attenuators.
- Thanks Becki, really interesting information
- Very interesting! Definitely have interest in exploring these opportunities.
- Thank you for hosting this informative session
- Thank you very interesting
- Thank you great presentation
- 👍👏😊
- thanks it was great!
- Thanks Bec! very interesting :) ^\_^
- thanks so much for a great presentation
- Thanks Jacquie and Rebecca! Great!
- Thanks Rebecca for the presentation and to Jacquie for organising
- Thank you for the invite, and Bec for taking the time. Really interesting!
- Thanks! That was fantastic. Very interested to explore further.
- Wonderful - very interesting
- thanks very much. most interesting
- Great presentation! Thanks Rebecca!
- Thank you - very interesting. Looking forward to finding out more.
- Thanks Becki, very interesting topic and I'm sure there will be further discussion between Councillors and officers

**Attendance: 36**

Mornington Peninsula Shire, Frankston City Council, Kingston City Council, Bayside City Council, Port Phillip City Council, Melbourne City Council, Hobsons Bay City Council, Wyndham City Council, Greater Geelong City Council, MAV, GORCC.



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