


Enhancing coastal wetland restoration: maximising biodiversity benefits

Coastal wetlands such as mangroves and saltmarshes provide habitat for a variety of terrestrial and marine fauna, many of them threatened - 35% of terrestrial vertebrate species occurring in mangroves are considered threatened.

Large losses and degradation of coastal wetlands have occurred across Australia, and restoration is critical to reverse this loss. Coastal wetlands store high amounts of carbon and so using finance from carbon markets to pay for coastal wetland restoration is attracting attention as a contribution to climate mitigation. Revenue from such markets can be higher if other benefits can be reliably demonstrated, creating a need for robust ways of **measuring the biodiversity benefits** that accrue from restoration.



Australia has the **third largest area of mangroves** in the world, spanning 11,000 km of coastline supporting 41 mangrove species (amounting to **57% of the mangrove species** found in the world).



Saltmarshes span 36,735 km of Australia's coastline harbouring 103 saltmarsh species with high endemism

How research addresses the problem

There are multiple approaches to quantify biodiversity, but existing approaches are either developed for terrestrial ecosystems or lack a way to assess biodiversity recovery against a benchmark. Quantifying biodiversity in coastal wetlands can be difficult because species are distributed along environmental gradients with distinct transitions between ecosystems, and organisms can be difficult to survey in tidal conditions.

Stakeholder engagement revealed there is demand for biodiversity credits in coastal wetland restoration projects, however outcomes should be measurable and have integrity, permanence, additionality, and be high quality.

Stakeholders considered these components of biodiversity important:

- 1 Vegetation condition
- 2 Fauna species richness
- 3 Connectivity
- 4 Ecosystem extent
- 5 Significant species (threatened or culturally important)
- 6 Threats impacting ecosystem resilience



We are developing a framework to measure biodiversity benefits in coastal wetland restoration projects in Australia. Our objectives are to:

- Develop biodiversity indicators and survey methods to measure biodiversity in coastal wetland ecosystems
- Test biodiversity indicators in selected coastal wetland restoration sites from different climatic regions
- Investigate the pros and cons to quickly measure biodiversity vs more indepth measurements
- Consider the effectiveness of a single mutli-diversity score to quantify biodiversity

Measuring biodiversity

Biodiversity surveys were conducted at two case study sites to represent different climatic and hydrological characteristics, vegetation types, and fauna species composition. These were:

- A Blue Heart (Sunshine Coast, Queensland)**, which comprises 191 ha of former cane land that is being restored to mangrove, saltmarsh and supratidal forest
- B Webb Beach (Upper Gulf St Vincent, South Australia)**, which will restore 256 ha of saltmarsh and mangrove.

Both areas involve the reconnection of tidal flows and were compared against two reference sites.



We assessed vegetation and habitat attributes of vegetation types within each site based on the point-centred-quarter method¹ for mangroves and supratidal forest and the BioCondition assessment² unit for saltmarsh. We also quantified molluscs, birds, and insectivorous bats as indicators of fauna diversity (see illustration below).

The framework will enable restoration practitioners to monitor biodiversity recovery in coastal wetland restoration projects. It is also intended to be a basis for developing a method for achieving accredited biodiversity outcomes under emerging biodiversity markets.

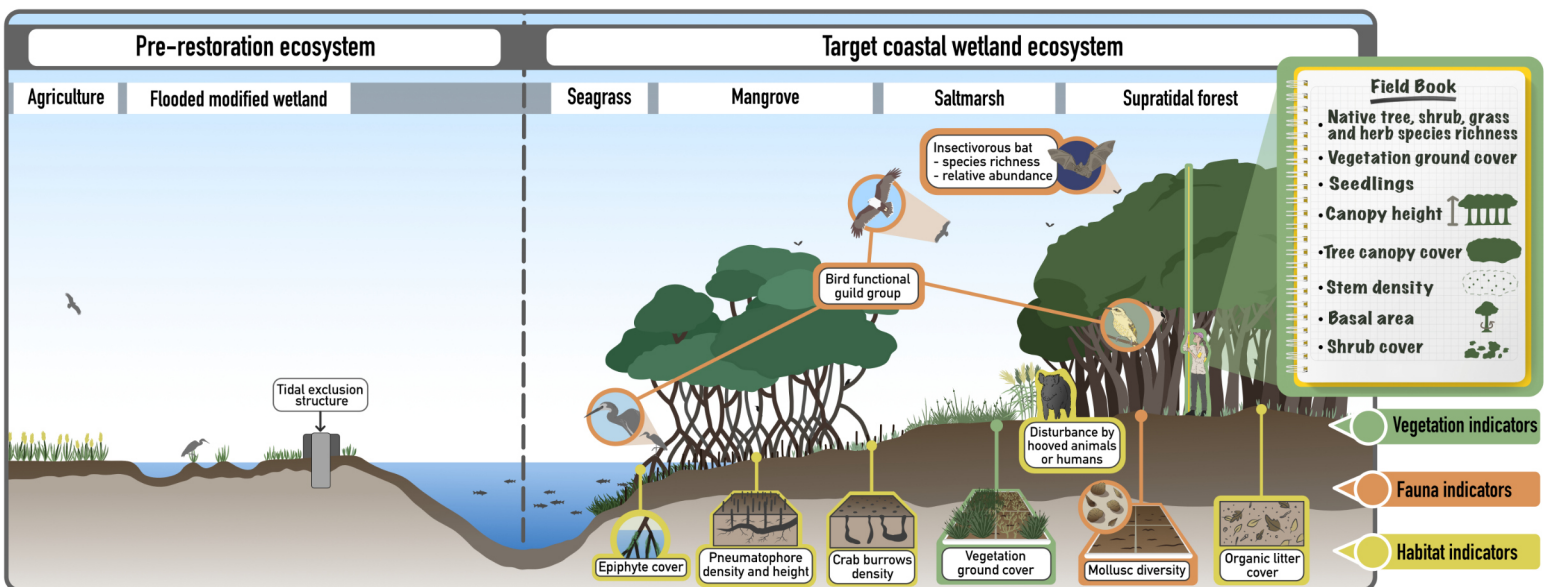


Illustration created by Antoine Minne

References

- Mitchell, K (2010) Quantitative Analysis by the Point-Centered Quarter Method.
- Eyre, T.J., Kelly, A.L, Neldner, V.J., Wilson, B.A., Ferguson, D.J., Laidlaw, M.J. and Franks, A.J. (2015). BioCondition: A Condition Assessment Framework for Terrestrial Biodiversity in Queensland. Assessment Manual. Version 2.2. Queensland Herbarium, Department of Science, Information Technology, Innovation and Arts, Brisbane.

For further information

CSIRO Environment
<https://research.csiro.au/coastal-carbon/>

mat.vanderkluft@csiro.au
 andy.steven@csiro.au
 lauren.hardiman@csiro.au
 v.hagger@uq.edu.au

Or Contact us at:

1300 363 400
 +61 3 9545 2176

csiroenquiries@csiro.au
 csiro.au

