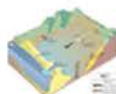


AUSTRALIA'S COASTAL INFORMATION

OzCoasts provides comprehensive information about Australia's coast, including its estuaries, coastal waterways and climate change impact. This helps to generate a better understanding of coastal environments, the complex processes that occur in them, the potential environmental health issues.



Search Data



Conceptual Diagrams



Coastal Indicators



Natural Resource Management

Coastal organisations in Australia



List provided for information only

<http://ozcoasts.org.au>

Conceptual Diagrams

Conceptual diagrams are concise and visually-stimulating illustrations that use symbols or drawings to depict the important features, processes and management challenges in a particular environment, such as coastal waterways. This is accomplished using the most current knowledge or understanding of that particular environment and is presented in a way that is easy to understand.

Coastal wetland classification



Beach Typology



Estuary typology



Science models

Beach geomorphic diagrams



Estuarine biophysical diagrams



Process/Threat diagrams

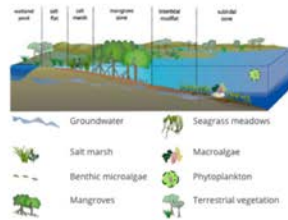


Stressor diagrams

What are conceptual diagrams?

Conceptual diagrams are concise and visually-stimulating illustrations that use symbols or drawings to depict the important features, processes and management challenges in a particular environment, such as coastal waterways.

This is accomplished using the most current knowledge or understanding of that particular environment and is presented in a way that is easy to understand. Conceptual diagrams should evolve in tandem with knowledge as it expands with research developments.



Conceptual diagrams are useful because they:

1. Facilitate communication. Conceptual diagrams are a tool through which detailed technical concepts can be summarised in a non-technical way, and presented to end users such as environmental managers and other coastal zone stakeholders.
2. Integrate knowledge across disciplines. Conceptual diagrams provide a physical background upon which the understanding derived from various scientific disciplines (e.g. ecology, chemistry and geology) can be integrated with the perspectives of other stakeholder groups or addressing management issues.
3. Increase understanding. Conceptual diagrams help users to understand the often complex processes in a system (e.g. how things work, what drives these things and major impacts) and demonstrate the links between them.
4. Identify knowledge gaps. Conceptual diagrams can help users to identify any gaps in [scientific understanding](#), [monitoring](#) or [natural resource management plans](#).
5. Help with decision making and planning. Conceptual diagrams can assist environmental/natural resource managers and stakeholders in developing coastal waterway management plans and prioritise research and monitoring efforts.
6. Facilitate participation. Conceptual diagrams can facilitate participation of stakeholders, and assist with interaction between different stakeholder and government groups.

Using diagrams to determine indicators

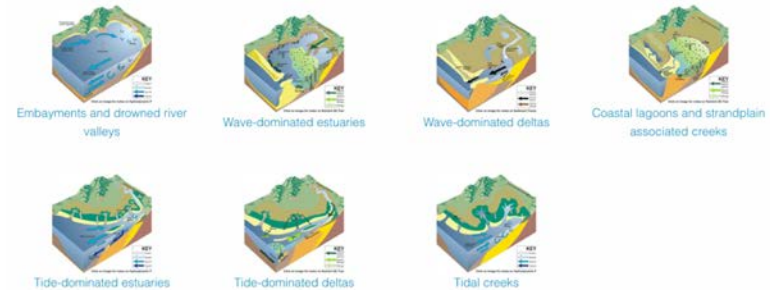
To develop an appropriate set of [indicators](#) to monitor an estuary there is a logical process that needs to be followed (see Fig. 1). The first part of the process is to determine what type of [estuarine wetland](#) you are [monitoring](#) (i.e. its [typology](#)). Currently there is no comprehensive typology of Australian [estuaries](#), however, the geomorphic classification presented here is an initial start and is currently the national default typology. Developing a [typology](#) allows different types to be recognised, this is an important step to group similar [estuaries](#) together, ensuring that 'apples' can be compared with 'apples'. The next step in the process is to produce [science diagrams](#) which synthesise the current understanding of each type's key [processes](#), components and functions, thus providing a basis of sound understanding for the development of individual [stressor diagrams](#). These stressor diagrams then allow pressure and condition indicators to be determined that are specific to a particular estuarine type.

Knowledge-focused content, such as conceptual diagrams, which present complex coastal topics in publicly consumable formats

Easy to understand and useful for many levels – from students to politicians

Estuarine biophysical models

Currently there is no comprehensive typology of Australian [estuaries](#), however, the geomorphic classification presented here is an initial start and is currently the national default typology. Geomorphic conceptual models have been developed for each of the seven types of Australian [estuaries](#) and coastal waterways.



Each [conceptual model](#) comprises a three-dimensional block diagram depicting detailed summaries of the structure, evolutionary characteristics, and basic [habitat](#) distribution for each [coastal waterway](#) type. These block diagrams can be 'overlayed' by flow diagrams that depict some of the important biotic and abiotic processes, namely hydrology, sediment dynamics, and nutrient dynamics. The models were developed with close linkages to the [Coastal Indicators](#) module. It is intended that these conceptual models should continually evolve and be improved through ongoing testing and review by coastal managers and researchers. You can provide feedback about any aspect of the conceptual models here.

Coastal indicators:

- Knowledge about coastal topics
- Written by expert authors
- Based on published reports and data

Beaches

The Australian coast contains 10,686 beach systems, which occupy half the coast (around 15,000 km) and can be classified into 15 beach types [1]. Of the beach types, there are six wave-dominated, three tide-modified, and four tide-dominated types which are a product of wave-tide and sediment conditions. There are also two types which are influenced by intertidal rocks and fringing reefs. Wave-dominated beaches occupy the higher energy, microtidal southern coast exposed to persistent Southern Ocean swell (Figures 1 and 2). Tide-modified and tide-dominated beaches occur most frequently around the tropical northern coast as well as some sheltered and mesotidal southern locations (Figure 1 and 2). The tropical northern coast area experiences meso-, macro-, and mega-tides and receives lower seas.

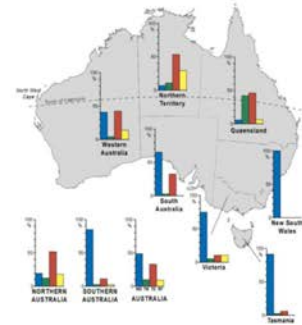


Figure 1. State, regional, and Australian distribution of wave-dominated (WD blue), tide-modified (TM green), and tide-dominated (TD red) beaches and beaches with rock/coral flats (RF yellow). Note the dominance of wave-dominated beaches in the southern states and tide-dominated in the north.

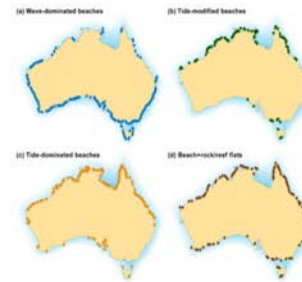


Figure 2. Australia Beach types distribution. Wave-dominated beaches prevail around the southern half of the continent, while tide-modified and tide-dominated are more prevalent across the northern half. Beaches fronted by rock flats can occur right round the coast, while those fronted by fringing coral reefs are restricted to the tropical northern half.

References

1. Short, A.D. Australian Beach System – Nature and Distribution. *Journal of Coastal Research*, vol. 22, pp.11-27, 2006.
2. Short, A.D. and Woodroffe, C.D. 2008. *The Coast of Australia*. Cambridge University Press, Melbourne, 288 pp.
3. Short, A.D. 1996. *Beaches of the Victorian Coast and Port Phillip Bay*. Sydney University Press, Sydney, 296 pp.
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5. Short, A.D. 2001. *Beaches of the Southern Australian Coast and Kangaroo Island*. Sydney University Press, Sydney, 346 pp.
6. Short, A.D. 2005. *Beaches of the Western Australian Coast: Eucla to Roebuck Bay*. Sydney University Press, Sydney, 433 pp.
7. Short, A.D. 2006a. *Beaches of the Tasmanian Coast and Islands*. Sydney University Press, Sydney, 353 pp.
8. Short, A.D. 2006b. *Beaches of Northern Australia: The Kimberley, Northern Territory and Cape York*. Sydney University Press, Sydney, 402pp.

Important links

1. [Surf Life Saving Australia](#) Visit the Surf Life Saving Australia website for tips on beach safety.
2. [Coastwatch](#) Live and local cameras (surfcams) at Australian beaches, surf reports, surf forecasts, news and events.

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Saline intrusion

What is saline intrusion?

In simple terms saline intrusion is the inflow of sea water into an area that is not normally exposed to high **salinity levels**. This could be the inflow of seawater into a fresh water wetland or a fresh water aquifer. Storm sea likely to impact estuaries.

What causes saline intrusion?

BREAKDOWN OF NATURAL BARRIERS

In some areas natural barriers such as mangroves or salt ridges (dykes) separate the ocean from estuaries or fresh water habitats. Breaks can be created in these barriers allowing seawater to access the areas behind them. These breaks can occur in a number of ways such as naturally from the action of storms or flooding, by human intervention such as dredging for navigation or access from boat wash, or by the activities of animals such as feral water buffalo, in the Northern Territory which strip vegetation to form of swim channels and washes.

RIISING SEA LEVELS

As sea levels rise, then saline water will be able to overcome natural barriers to move into low lying areas now dominated by freshwater. Rising sea levels will also push seawater into coastal fresh water aquifers. While this impact may not be noticed on the surface it could affect groundwater that seeps into estuaries.

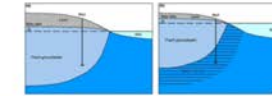


Figure 1. Saline intrusion. (a) unconfined (hypothetical) coastal aquifer, and (b) the same aquifer under a sea level rise scenario. In the sea level rise scenario, seepage from the coastal boundaries would be reduced or stopped altogether due to the intrusion of saline water into the aquifer.

STORM SURGES

One of the projected impacts of climate change is a potential increase in the number of severe cyclones and/or an increase in the intensity of storms in general. Large storms produce larger storm surges and the combined with a rise in sea level could result in much higher rates of coastal erosion which would in turn impact on the levels of saline intrusion.

Mitigation Actions

Not all actions will increase saline intrusions. It is possible to reduce or prevent seawater from intruding, particularly in areas where the major cause of the intrusion is the breakdown of barriers, by preventing the further loss of barriers or reconstructing damaged barriers. There are many examples of these types of mitigation actions in from the mangroves of the Murray River to much longer earthen walls on rivers in NT. While these have proven to be effective in some cases, their long term impact and their environmental impact and effectiveness in light of climate change and sea level rise is unclear in most cases.

Existing information and Data

Work on the Mary River, in the Northern Territory, has shown that almost 200 km² of wetlands has been affected due to saline intrusion. The major impact is the death of the salt sensitive vegetation (such as the melaleuca), which is replaced with mudflat vegetation and eventually salt tolerant Mangroves.



Figure 2. Melaleuca Deaths from Saline Intrusion on the Mary River, Northern Territory.

The Mary River wetlands have been shown to be highly productive and their loss would have an impact not only on local communities dependent on them but also commercial fishing. The key question being addressed by Northern Territory government is whether or not mitigation actions can be cost effective, i.e. will the economic benefits of mitigation outweigh the costs. Initial research suggests that even just taking into account tangible benefits such as fishing and grazing that mitigation will have an economic benefit!

Key questions and further research needs

- Which estuaries and associated wetlands are sensitive to saline intrusion?
- Will mitigation be practical and cost effective?
- How will saline intrusion impact estuarine health and productivity?

Links

Move on potential impacts of sea level rise and climate change on [coastal aquifers \(UNSW\)](#)

Contributor

Geoscience Australia

References

1. Australian Government Office 2004. *Coastal wetlands of the Mary River estuary*. Canberra.
2. Bath C and Manning GJ 2002. *Wetland Mitigation for the Mary River Catchment*. Northern Territory. Natural Heritage, East Precinct No. 50/16. Department of Industry, Planning and Environment, Darwin.

Future work on integrating:

- Register of water quality instrumentation
- Dynamic connection of coastal data repositories to Coastal Indicator pages (e.g. get the latest data on seagrass when you are reading about it)
- Register of coastal organisations and coastal research (possibly replacement for the CSIRO Coastal Research Portal)

Data integration & interoperability

- Data interoperability has come a long way in the last 5 years
- Improvements in data services, semantics and vocabularies
- These improvements make it possible to dynamically leverage data repositories in systems like OzCoasts – blending knowledge with automated feeds from data services

Data integration & interoperability

- Systems like the GEOSS Data Broker are building working examples which can be leveraged.
- ODIP, in collaboration with GEOSS have done this for ocean data

