

Healthy Estuaries

Assessing the effect of urbanisation and catchment development on ecosystem health in north Australia's estuaries

Estuaries are valuable

Estuaries have a range of ecological, economic and social values. They play a key role in processing nutrients from rivers, provide a home for unique fauna and flora, and form the breeding grounds for many fish species of commercial and cultural value.

Most of Australia's northern estuaries are healthy however, new pressures are emerging. For example, agricultural and urban development can impact on these estuaries by increasing the loads of sediment and nutrients, and changing river flows.

Keeping northern estuaries healthy

This project will assess the effects of different land-based development pressures on the assets and values of northern estuarine ecosystems.

The project will be run in two parts with the first focussing on the effects of urban development in Darwin Harbour. Existing data on water quality and sediments will be synthesised to gain a better understanding of how the harbour functions and to highlight knowledge gaps. This will be used to construct a conceptual model describing how the Harbour's ecosystem functions. For example, do more nutrients come from land run-off or treated sewage?

Field and laboratory work will then fill some of the knowledge gaps by focussing in on mangrove creeks and validating existing mathematical models. A key question of interest is: would future increases in nutrients put the food webs in estuaries at risk? In particular, would the amount of microscopic algae increase? To determine this, the sediments in mudflats will be analysed to describe how nutrients move through the system.

The second part of the project will focus on the effects of agriculture and potential water resource development in the southern estuaries of the Gulf of Carpentaria. The Gulf currently supports a range of fishing activities and is part of the valuable Northern



Photo: Michele Burford

Prawn Fishery. Research will assess the effect of changes to river flow, sediment and nutrient inputs on the estuary food web, including juvenile prawns. While prawns live and spawn offshore as adults, ocean currents move the larvae into the estuaries where they live and feed as juveniles. They then return to the deep sea in the wet season, driven, in part, by freshwater flows. This makes estuaries key nursery grounds for prawns, providing a critical food source. But it's still not clear whether these freshwater flows are important in stimulating the growth of the prawns' food sources.

A difficult "day at the office"

Tropical estuaries are difficult places to work in. With 7-8 metre tidal ranges, crocodiles, extreme heat, biting insects and remote, inaccessible conditions, TRaCK researchers will be battling the elements to collect the necessary field measurements. To help overcome this in the Gulf of Carpentaria, two staff will be based in the township of Karumba for 6 months over the wet season



to carry out sampling. Local participation and knowledge of the waterways and conditions will be a critical factor in the success of this work.

Better understanding ...better management

This research will provide valuable information to help guide future development affecting tropical estuaries. Results from the Darwin Harbour work will be used in the development of the Northern Territory Government's Water Quality Protection Plan. As part of this plan a modelling tool is being developed to predict the impacts that expanding development and population may have on the harbour's water quality. The findings from research in the Gulf of Carpentaria will be used by other TRaCK research projects which are evaluating different scenarios for development in northern Australia, describing the trade-offs, and their likely effect on key coastal industries such as the prawn fishery.

Who is on the team?

The project will be carried out by a team of researchers from Griffith University, Charles Darwin University, Northern Territory Government, Geoscience Australia, Australian Institute of Marine Science and CSIRO.

The project team will be working collaboratively with commercial fishing companies in the Gulf who will contribute resources and local knowledge. Local community involvement will also be sought in planning and implementing field work and identifying values of estuaries.



Where is the research happening?

Field work on Darwin Harbour will focus particularly on the mangrove creeks which have been poorly studied. Work in the Gulf of Carpentaria will be centred on the Norman River estuary, with some sampling also occurring in the Flinders River. The project started in April 2007 and will finish in 2010.

How will it help?

By better understanding how the river flows and accompanying nutrients and sediments interact with estuary food webs, resource managers will be able to make more informed decisions when considering issues such

sewage treatment options to cope with expanding urban development or further development in catchments. Future investments to maintain or improve water quality, upgrade sewage treatment plants or change broader scale land management practices can be better targeted.

This research will provide fisheries managers and commercial fishing operators with an improved understanding of how river flow, nutrient and sediment inputs can affect recruitment to the prawn fishery. Predictions can be made about how changes in river flows resulting from future increases in water extraction, may affect prawn catch. The results will also be relevant to other fisheries species in tropical Australia. The potential benefits and impacts of further agricultural and urban development can then be properly balanced against the interests of other economic enterprises, as well as social and environmental effects.



Photo: Ian Dixon

Team contacts

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