



## WAMSI Progress report to 30 July 2007 for WAMSI Node 3 Project 4 (WAMSI Code 3.4):

### *Ningaloo Marine Park Inshore Geomorphology, Surficial Sediments and Habitat Linkages*

#### Executive Summary

The Ningaloo Reef, situated on the central west coast, is Australia's largest fringing coral reef extending southward from 22°S for approximately 290 km, and the only extensive reef in the world fringing the west coast of a continent. The Ningaloo Reef is one of the last relatively pristine major coral reef systems in the world. Its remote location has so far prevented over-development of the area, providing an ideal case study to advance baseline understanding of near pristine reef geomorphology, sediment distribution and habitats and establish the current condition of the reef for the evaluation and monitoring of future change. The location and geomorphology of the reef environments has a critical relationship with the oceanography within and surrounding the Marine Park and the complex intertidal and subtidal geomorphology plays a significant role in the variety of marine habitat types and correspondingly high species diversity.

The characterisation and conservation of benthic habitats and communities based on physical factors is central in the ongoing monitoring and management of the Ningaloo Marine Park (NMP). Physical factors including geomorphology, sediment composition, mobility of the substrate, bathymetry, the texture of the seabed and water depth, can be significant in describing the distribution of benthic biota and coral reef habitat types over this broad geographic region.

This research presents an interdisciplinary study through the use of a Geographic Information System (GIS) and remote sensing techniques, traditional sedimentological sampling, benthic video and still photography. In July and November 2006 students from Curtin University of Technology (CUT) and the University of Western Australia (UWA), initiated surveys in the northern part of the NMP to characterise finescale fish and coral communities, and map the geomorphology and sediment distribution, aiding in the development of broadscale coral reef habitat maps of the inshore component of the Ningaloo Reef. This research meets needs originally identified in the *Ningaloo Marine Park Management Plan 2005*. Subsequently the Western Australian Marine Science Institution (WAMSI) has outlined the key research priorities needed for geomorphic, sedimentary and habitat investigations. Initially this includes an understanding of their spatial distribution and characterisation.

The main goal of this study is to improve the understanding of the character of the geomorphology and surficial deposits of the Ningaloo Reef system. This report covers the inshore parts of Objective 1 and 2 in WAMSI Node 3 Project 3.4. The project will focus on mapping the reef system with remote sensing imagery (aerial photography and hyperspectral imagery) and collecting ground-truthing data including georeferenced video transects, sediment grabs, rock samples and shallow cores. The relationships determined at this scale may be used to inform our understanding of benthic habitat variability across the whole Marine Park. Known relationships will be extrapolated to the broader area to aid in the production of broadscale habitat maps of the Ningaloo Marine Park (NMP).

In this context the first two of four finescale surveys of habitats, sediments, geomorphology and reef fish assemblages, a collaborative effort with a UWA PhD student under WAMSI Project 3.2, were completed in July and November 2006. Using diver operated benthic video, specific lagoon habitats were surveyed and broadscale sediment grabs were collected. Further surveys will take place in July and November of 2007.



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The underlying geologic framework and geomorphology provide the primary control on benthic habitats and communities within the shallow waters of NMP. Initial results have characterised specific lagoon habitats across the main geomorphic zones of the reef including; outer reef flat coralline algae/coral community, middle/inner reef flattabular *Acropora* community, inner reef flat patchy staghorn, massive and submassive coral community, lagoonal sand flats with sparse corals and algae community, Coral "bommies" and algal patch reef community in lagoonal and inter-reef gutters, macroalgal community on lagoon pavement shoreward of reef passes, mixed coral, algae, rubble/sand communities in reef passes and a diverse coral community in lagoonal channels. Additional investigations will further quantify these habitats and communities and provide detailed information on the coral communities. Further information collected on habitat validation and sediment distribution will aid in the production of broadscale GIS habitat maps based on a hierarchical coral reef classification scheme of the NMP.