Tropical Water Quality Hub

National Environmental Science Programme

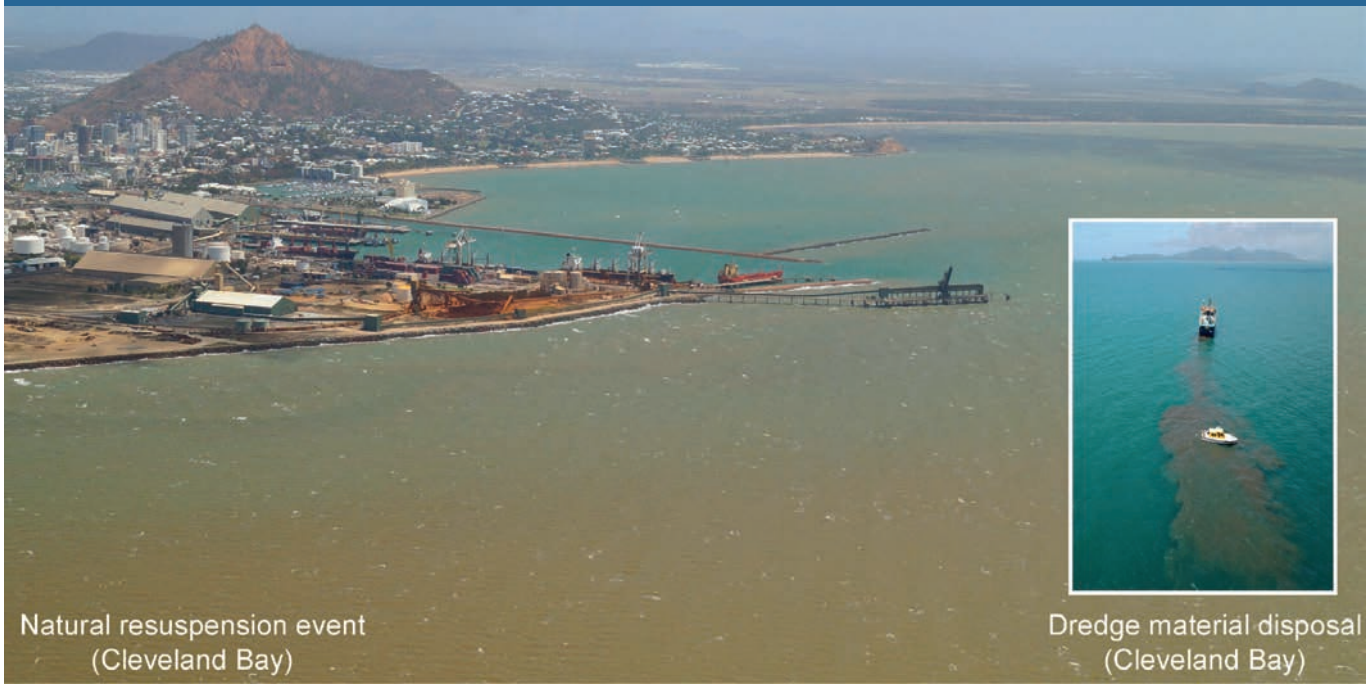
Project 2.1.9 Risk assessing dredging activities

Project Summary

The project will use novel analytical techniques, instruments and approaches to accurately quantify key proximal stressors associated with dredging and dredge material placement – such as sedimentation, changes in light quantity and quality (spectral changes), and suspended sediment concentrations. The project will examine how these parameters vary with increasing distance from dredging and how they compare to natural conditions associated with storms and high wind events (see image below). The team will then test the response of key habitat forming species that may occur near dredged areas – corals, sponges and seagrass – to environmentally relevant and realistic conditions over appropriate time-frames. This will generate pressure-response data that can be used during dredging for adaptive management and with pressure field modelling at the EIA stage for impact prediction purposes. Collectively, this will improve risk assessment processes, provide greater surety for regulators and dredging proponents of likely environmental outcomes, and allow more informed decision-making and dredging policy design.

Issue

There is limited information on the water quality conditions associated with dredging (and dredge material placement), and a lack of understanding of the response of underlying communities to environmentally realistic exposure conditions. This is a challenge for regulatory agencies and dredging proponents. Knowing this information will allow more reliable assessments of whether dredging activities and dredge material placement constitutes a risk to sensitive receptors (as compared to natural background conditions) and the spatial scale of any possible effects.



Natural resuspension event (Cleveland Bay)

Dredge material disposal (Cleveland Bay)

Photos: Port of Townsville and AIMS (drone footage)

How Research Addresses Problem

Desktop studies will be conducted examining water quality data collected during past dredging projects and non-dredging baseline conditions. Field studies will be conducted using newly developed sediment deposition sensors and light spectral profiling instrumentation. Laboratory (aquarium) studies will be conducted at the AIMS SeaSim facility examining the effects of different proximal stressors on the physiology of key habitat-forming species – including juvenile forms of some species to examine possible recruitment and population-level effects.

Photos: AIMS and Ross Jones

One of the most significant difficulties with projects such as this is reliable access to dredging to sample pressure fields. This constraint has been overcome because of a strategic alliance between the research providers (AIMS and JCU) and the Port of Townsville (POTL), who have provided baseline data from existing long-term water quality monitoring projects, facilitated site access during maintenance dredging programs, and provided a dedicated research vessel and crew for the field sampling.

The field-collected information on pressure fields will be re-created in the advanced aquarium facilities of the SeaSim at AIMS, which allows suspended sediment concentrations, sedimentation rates and spectral quality and light quantity to be manipulated and controlled using programmable logic controllers (PLC) to simulate dredging and natural conditions. The response of key habitat forming species – corals, sponges and seagrass – can then be measured under highly controlled settings.

Further information

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