Seasonal Dynamics, Productivity and Resilience of Tropical Deepwater Seagrasses and their Implications for Port Developments

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A research and monitoring program was established to examine the potential impacts of a large scale port expansion on a tropical deepwater seagrass community between February 2008 and June 2010. The aim of the monitoring program was to fill gaps in our understanding of the dynamics of tropical deepwater seagrass habitats, while manipulative experiments aimed to determine their roles in fisheries productivity and their resilience and capacity for recovery from disturbance associated with the proposed developments. Results of the study revealed seagrasses were highly dynamic, changing as a function of season, but also highly influenced by extreme weather events during the life of the study. The productivity and resultant biomass of seagrasses reached a maximum in the late dry season, a trend consistent with observations of seagrasses throughout Queensland. Results also find seagrass meadows at Abbot Point to be highly productive, producing 237g of carbon per m2 per day. Although this is roughly half the productivity of seagrass meadows on reef platforms such as the Torres Strait, this net productivity compares highly with many productive marine and terrestrial ecosystems worldwide. Seagrasses were found to have some levels of resilience to stress, however this varied with species and community type and will be dependent in the future upon the continued availability of seed reserves. Species such as *Halophila spinulosa* were found to have a high capacity for recovery through the use of seed reserves in the sediment, however shallow near shore species such as *Halodule uninervis* failed to recover quickly from simulated disturbance, relying on asexual propagation. Implications of the study for managing impacts to deepwater seagrass communities in response to proposed port developments are discussed.

A report card for monitoring the condition of hard coral communities over steep environmental gradients

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Coral reef communities vary naturally in response to environmental variables such as turbidity, nutrients loads and hydrodynamic setting. Clear relationships between community composition and environmental setting are, however, obscured by the complexity of the processes shaping these communities, e.g. presence of a large number of rare species at some sites, stochasticity in recruitment and differences in disturbance history. This complexity makes it difficult to assess and report the condition of coral reef communities based on composition or abundance alone, as there is no defined "expected" condition against which to compare current observations. We present a condition assessment that is based on the underlying assumption that a healthy hard coral community will show resilience to disturbances by recovering lost cover (e.g. after disturbance) through the recruitment and growth of new colonies or the re-growth of surviving colonies. The assessment is based on five attributes of the benthic communities, which can be considered as indicators for community resilience. Each attribute is scored on a three point scale based on simple decision rules, and these attribute scores are summarised to an overall reef score. The reef scores are aggregated per geographic region to return a single score that is colour-coded to provide an efficient and readily accessible overview of community status to a range of users. Importantly, this assessment allows communities that vary considerably in composition to be considered within a uniform framework. The reef or regional scores can be used to compare condition among sites or, perhaps more appropriately, as the basis for monitoring changes in condition through time.