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Marine Pollution Bulletin 51 (2005) 343–350
MARINE POLLUTION BULLETIN
www.elsevier.com/locate/marpolbul

Seagrass population dynamics and water quality in the Great Barrier Reef region: A review and future research directions

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Abstract

Seagrasses in the Great Barrier Reef region, particularly in coastal habitats, act as a buffer between catchment inputs and reef communities and are important habitat for fisheries and a food source for dugong and green turtle. Within the Great Barrier Reef region there are four different seagrass habitat types now recognised. The spatial and temporal dynamics of the different types of seagrass habitat is poorly understood. In general seagrass growth is limited by light, disturbance and nutrient supply, and changes to any or all of these limiting factors may cause seagrass decline. The capacity of seagrasses to recover requires either recruitment via seeds or through vegetative growth. The ability of seagrass meadows to recover from large scale loss of seagrass cover observed during major events such as cyclones or due to anthropogenic disturbances such as dredging will usually require regeneration from seed bank. Limited research into the role of pollutants on seagrass survival suggests there may be ongoing impacts due to herbicides, pesticides and other chemical contaminants. Further research and monitoring of seagrass meadow dynamics and the influence of changing water quality on these is needed to enhance our ability to manage seagrasses on the Great Barrier Reef.

Keywords: Seagrass; Disturbance; Recruitment; Nutrients; Light limitation; Pollutant

1. Introduction

Global losses of seagrass meadows due to various human impacts have stimulated an active network of researchers attempting to understand the dynamic nature of seagrass communities (Short and Wyllie-Echeverria, 1996). This undertaking is considerable due to the global diversity of seagrass species and habitats. As Australia has the highest species diversity of seagrasses in the world and numerous different seagrass habitats, this region faces a significant challenge to gain the comprehensive understanding of seagrass dynamics required to facilitate the reversal of seagrass loss. Australia's high species diversity is due to overlap of both tropical and temperate seagrass floras, and its' biogeographic confluence with endemism in a number of regions (Walker and Prince, 1987). In particular, an extensive and diverse assemblage of seagrasses exists along tropical and subtropical coastlines of northeast Australia and the associated Great Barrier Reef (Birch and Birch, 1984; Lee Long et al., 1993; Carruthers et al., 2002). These seagrass meadows from tropical regions are known to provide critical habitat for various commercial fisheries (e.g. penaeid prawns) and maintain high biodiversity of various invertebrates and fish (Connolly et al., 1999). In addition seagrass meadows in the Great Barrier Reef region play a significant role as dugong and green turtle food resources enhancing the biodiversity values of the region. Our understanding of these important seagrass meadows remains far from extensive (Carruthers et al.,

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doi:10.1016/j.marpolbul.2005.01.017