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Seasonal Changes in Biomass and Shoot Characteristics of a *Zostera capricorni* Aschers. Dominant Meadow in Cairns Harbour, Northern Queensland

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Abstract

Spatial and temporal variability of *Z. capricorni* biomass, shoot characteristics (canopy height, surface area, flowering), distribution and detrital content were examined from December 1988 to December 1990. Between August 1987 and August 1991, 15% (2·0 ha) of the meadow was lost. Biomass of above- and below-ground structures showed a unimodal seasonal pattern with maxima in late spring (mean 194·92 g dry weight m^{-2} and 426·67 g DW m^{-2} respectively) and minima in winter (mean 28·72 g DW m^{-2} and 56·98 g DW m^{-2} respectively). Mean above-ground biomass (95·53 ± 2·21 g DW m^{-2}) was approximately half the mean below-ground biomass (177·28 ± 4·49 g DW m^{-2}). Leaf canopy heights were greatest between October and February (maximum 53·4 cm) and lowest around mid year (minimum 4·4 cm). Leaf surface area per square metre of seagrass meadow ranged from 10·28 to 1·39 m^2 (mean 3·692 ± 0·104 m^2), and flowering occurred during September and October. Detrital biomass ranged from 339·73g DW m^{-2} to 11·83 g DW m^{-2} (mean 77·39 ± 2·36 g DW m^{-2}). Detrital biomass was higher during July–October and lower during February–May. The climate during the study was typical for the area, and all trials displayed similar seasonal patterns, although the amplitudes differed among some trials. The environmental parameters that may influence seagrass and detrital biomass were investigated. The best models explained only 14% of the variation in above-ground biomass, 15% of the variation in below-ground biomass, and 21% of the variation in detrital biomass. These models suggest that fluctuations in seagrass and detrital biomass in Cairns Harbour were influenced by changes in light availability, temperature, salinity and exposure.

Introduction

Seagrass meadows exist in most shallow, sheltered, soft-bottomed marine coastlines and estuaries throughout the world and rank among the most productive systems in the ocean (Thayer *et al.* 1975, 1984; McRoy and McMillan 1977; Knox 1986; Ott 1990).

Although tropical Australia has the greatest diversity of seagrass communities in the Indo-West Pacific region (Poiner *et al.* 1989), studies on tropical intertidal seagrasses are few apart from those conducted in Townsville (Birch and Birch, 1984; Lanyon 1991) and Papua New Guinea (Brouns and Heijs 1986). Most research on tropical coastal seagrasses has been concerned with mapping distributions in relation to tropical fisheries (Bridges *et al.* 1982; Coles and Lee Long 1985; Coles *et al.* 1985, 1987*a*, 1987*b*, 1989, 1993; Poiner *et al.* 1987).

Once seagrasses have become established, their abundance and shoot characteristics may display seasonal patterns, a result of irradiance (Sand Jensen and Borum 1983), temperature (Livingston 1984), salinity (Walker 1985) and available nutrients (Short 1987). Because light and temperature are the major factors controlling photosynthesis, seagrasses in the tropics have the greatest productivity owing to greater sunlight and extended growing season (McRoy and McMillan 1977; Knox 1986). However, tropical seagrasses also show seasonal variation, and factors that influence this seasonality have been little studied.

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