

POLLUTION AND SPONGES OF GREAT BARRIER REEF AND CARIBBEAN  
NEARSHORE REEFS

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The biomass of sponges was determined for nearshore coral reefs of the Great Barrier Reef (GBR) and the Caribbean/West Atlantic region. The techniques employed were similar to those employed previously to examine sponge distribution (Wilkinson and Trott, 1985). The data reported here represent wet sponge biomass per, square metre based on three, 40 m<sup>2</sup> transects at constant depths of 20 m (or 15 m when deeper areas were not available).

Sponge biomass was considerably larger on Caribbean nearshore reefs than on comparable reefs of the GBR. Table 1 represents a subjective classification of reefs by the degree of land influence on the areas surveyed. In each region the reefs are listed from lowest influence to the highest perceived, which usually equates to human induced pollution. For instance, Clack Reef is approximately 35 km from land in an areas remote from settlements, whereas Pandora and Phillips Reefs are 19 and 17 km from land, within a shallow embayment, near large towns. All the Caribbean reefs are within 10 km of land, but in most circumstances the land masses are small. Barbados East coast and the Exuma Cay sites are in clear water, under predominantly Atlantic Ocean influence. By contrast, the Key Largo and Barbados West coast sites are adjacent to areas of extensive tourist developments.

The data in Table 1 show clearly that sponge biomass is clearly related to the degree of land influence. This was shown in a previous study of sponges across the continental shelf of the GBR (Wilkinson and Trott, 1985). The most likely causative factor is increased organic nutrient concentration through either increased productivity, via raised levels of land derived inorganic nutrients, or additional organic matter from the land e.g. pollution from sewage. In areas where there is extensive human based development and agriculture, both sources would be applicable.

Differences in sponge populations in the Caribbean were directly related to the degree of land influence. The lowest biomass was recorded on Barbados East coast and Exuma Cay sites where land influence is minimized because the predominant currents sweep in from the Atlantic Ocean. The highest biomass was recorded on the two sites adjacent to tourist developments. Untreated sewage is discharged directly adjacent to the reefs on the West coast of Barbados with the result that sponge biomass is almost 7 times greater than on, the East coast. In parallel with increased sponge growth, there has been a decrease in the viability of corals on these reefs because of increased loading of organic matter and reduced light penetration (Tomascik and Sander, 1985). The reefs off Key Largo in Florida are under the direct influence of extensive developments in the Florida Keys and the city of Miami.

Any reduction in coral coves will have deleterious effects for tourist development, as the visitor usually wishes to view flourishing corals rather than sponges. This is more accentuated on the GBR, where sponges are generally smaller and less spectacular than on Caribbean reefs. In addition, increased nutrient loadings will accentuate the growth of bioeroding organisms, especially sponges with the result that the reef framework will be gradually destroyed. In order to maintain fringing reefs, it is essential that organic pollution be controlled and that only well treated sewage effluents be discharged in the vicinity of fringing reefs.

#### REFERENCES

Tomascik, T. and Sander, F. 1985. Effects of eutrophication on reef-building corals I. Growth rate of the reef-building coral *Montastrea annularis*. Mar. Biol. 87, 143-155.

Wilkinson, C.R. and Trott, L.A. 1985. Light as a factor determining the distribution of sponges across the central Great Barrier Reef. Proc. 5th Int. Coral Reef Cong. 5, 125-130.

**Table 1.** Biomass of sponges on fringing reefs of the Great Barrier Reef and the Caribbean. The reef sites are listed in descending order from low to high incidence of land influence.

REEF SITE	BIOMASS g m <sup>-2</sup>
Great Barrier Reef	
Clack Reef' Northern GBR	1 9 7
Pandora Reef Central GBR	570
Phillips Reef Central GBR	399
Caribbean/West Atlantic	
Barbados East Coast	368
Exuma Cay East Side	399
St. Croix, Buck Island	654
Puerto Rico South Coast	792
St. Croix Salt River Canyon	1354
Key Largo French Reef	1259
Barbados West Coast	2458