ABSTRACT

Temporal Variation in the Sediment Budgets of West Coast Fringing Reefs, Barbados.

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Between the 1970's and 1990's, substantial changes in environmental conditions on the northern Bellairs fringing reef in Barbados resulted in changes in the calcium carbonate budget of the reef. Reduction of substrate cover by corals and coralline algae and an increase in dead coral cover was brought about by eutrophication and from the effects of Hurricane Allen in 1980. This resulted in a reduction in reef calcification from 22.51 x 10^7 g/yr in the 1970's to 3.44 x 10^7 g/yr in 1994.

Over the same interval, reef degradation due to bioerosion also changed. The principal bioeroder of the 1970's, *Diadema antillarum*, which contributed 80% of sediment production, suffered a major mortality in 1983, though populations had recovered to about 40% of pre-mortality levels in 1994. *D. antillarum* has been superseded by the stoplight parrotfish *Sparisoma viride* as the principal bioeroder, which now contributes 63% of sediment produced from the reef. Despite these changes sediment production is the same in 1994 as the 1970's at 1.2

x 10^8 g/yr, though this result is circumstantial and the values can be expected to vary with continued changes in reef ecology.

Consequently, the net budget has changed from an excess of calcification over sediment production in the 1970's to a deficit condition in the 1990's. These results are consistent for four other west coast reefs, Sandridge, Greensleeves, Sandy Lane and Fitts Village for which comparative calcium carbonate budgets were also constructed.

These results suggest that reef framework is being lost. There are several implications for this, including changes in nearshore hydrodynamics as the reef profile is lowered; loss of sediment generation potential due to reduction in the volume of source material, and lowered environmental quality consistent with degradation of the reef structure.