

NOTE

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Mass mortality of macrobenthic communities in the lagoon of Hikueru atoll (French Polynesia)

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Abstract Epibenthic macrofauna communities (corals, molluscs, echinoderms, and macroalgae) were investigated at Hikueru Atoll, Tuamotu Archipelago. The very low diversity and abundance that we observed (1 coral genus, and 2 mollusc, 1 echinoderm, and 17 macroalgal species) is likely to be the result of a mass mortality event that occurred 18 months earlier. Hydrological surveys suggest that this high mortality was the result of a major dystrophic crisis. Other atoll lagoons in the Tuamotu Archipelago have also been affected by high mortalities in the past, but Hikueru appears to have been the most frequently and intensely affected. The present study confirms that mass mortalities associated with phytoplankton blooms may be one of the major disturbances affecting coral reef ecosystems.

Key words Coral reefs · Tuamotu Archipelago · Dystrophic crisis · Disturbance

Introduction

In March–April 1994, the lagoon of Hikueru Atoll experienced an extensive mortality of fishes and

macrobenthic organisms. No other mortalities of such magnitude were reported in French Polynesia during 1994. Hydrological surveys made between 10 and 16 April 1994, and in September 1994 (Dufour and Harmelin-Vivien 1997) suggest that this high mortality was the result of a major dystrophic crisis that occurred during March 1994 (Harris and Fichez 1995). In this note, we report the status of macrobenthic communities in Hikueru lagoon that were assessed in September 1995, 18 months after the event.

Hikueru (17°33'S; 142°40'W) is one of 77 atolls in the Tuamotu Archipelago (Fig. 1). Approximately 130 inhabitants live in the only village, located on the northwest part of the atoll. The total surface area is 107 km², including 82 km² of lagoon (Andréfouët et al. 2000). Average depth in the central part of the lagoon is 28 m. Hikueru lacks passes, but swell-driven exchange between lagoonal and oceanic waters occurs through large sections of submerged reef flats in the south and through narrow *hoa* (i.e., shallow channels between reef islets) in the north and northwest. The degree of aperture of the atoll rim (i.e., sum of the widths of *hoa* and submerged reef flats divided by the perimeter of the atoll rim) is 0.18. This is typical of the Tuamotu Archipelago, where most of the atolls have degrees of aperture between 0.15 and 0.25 (Andréfouët et al. 2000). The atoll is asymmetrical in aperture, i.e., more than 90% of the aperture is exposed to the southern swell, while the northern rim is almost completely closed.

The most conspicuous macrobenthic species were considered by examining four taxa: (1) corals; (2) molluscs; (3) echinoderms; and (4) macroalgae (Chlorophyta, Phaeophyta, and Rhodophyta, not including coralline algae). A stratified sampling strategy based on benthic habitat zones was applied, according to a preliminary survey made on three lagoons in the Tuamotu Archipelago which recognised geomorphology as a stratifying factor (Dufour and Harmelin-Vivien 1997; Adjeroud et al. 2000). Two stations were established at each of the five principal benthic habitat zones recognised in the lagoon of Hikueru (Fig. 1). These were: (1) the inner reef

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