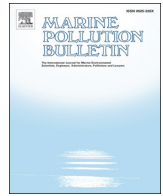




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State of corals and coral reefs of the Galápagos Islands (Ecuador): Past, present and future[☆]

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ABSTRACT

Coral populations and structural coral reefs have undergone severe reductions and losses respectively over large parts of the Galápagos Islands during and following the 1982–83 El Niño event. Coral tissue loss amounted to 95% across the Archipelago. Also at that time, all coral reefs in the central and southern islands disappeared following severe degradation and eventual collapse due primarily to intense bioerosion and low recruitment. Six sites in the southern islands have demonstrated low to moderate coral community (scattered colonies, but no carbonate framework) recovery. The iconic pocilloporid reef at Devil's Crown (Floreana Island) experienced recovery to 2007, then severe mortality during a La Niña cooling event, and is again (as of 2017) undergoing rapid recovery. Notable recovery has occurred at the central (Marchena) and northern islands (Darwin and Wolf). Of the 17 structural reefs first observed in the mid-1970s, the single surviving reef (Wellington Reef) at Darwin Island remains in a positive growth mode. The remainder either degraded to a coral community or was lost. Retrospective analyses of the age structure of corals killed in 1983, and isotopic signatures of the skeletal growth record of massive corals suggest the occurrence of robust coral populations during at least a 500-year period before 1983. The greatest potential threats to the recovery and persistence of coral reefs include: ocean warming and acidification, bioerosion, coral diseases, human population growth (increasing numbers of residents and tourists), overfishing, invasive species, pollution, and habitat destruction. Such a diverse spectrum of disturbances, acting alone or in combination, are expected to continue to cause local and archipelago-wide mortality and degradation of the coral reef ecosystem.

1. Introduction

The following descriptions and definitions clarify terminology used in this review. The term “corals” refers to reef-building scleractinian corals that harbor endosymbiotic dinoflagellates (zooxanthellae). From

a global perspective, coral reefs in the Eastern Pacific are small, distributed discontinuously, less diverse, and less structurally robust compared to their counterparts in the Indo-West Pacific, Central Pacific and Caribbean (Cortés, 1997; Glynn, 2001). Furthermore, the 17 reefs that Glynn and Wellington (1983) documented, scattered across the

[☆] A Salute: This article acknowledges the pioneering work of Jerry (Gerard) M. Wellington who was the first to document systematically the occurrence and nature of coral communities and coral reefs in the Galápagos Islands, a biologically diverse and highly valued ecosystem in the Galápagos Marine Reserve.

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