

Distribution, Abundance and Disease Prevalence of Coral Diseases Along the Coast of the Dominican Republic

Distribución, Abundancia y Prevalencia de las Enfermedades Coralinas a lo Largo de la Costa de República Dominicana

Distribution, Abundance et Prévalence des Maladies des Coraux le Long des Côtes de la République Dominicaine

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EXTENDED ABSTRACT

Introduction

Over the last two decades, the Caribbean has shown to be the main hotspot for coral reefs diseases and syndromes due to their high prevalence and several epizootics reported (Green and Bruckner 2000) (Bruckner 2009) (Harvell et al. 2007). Multiple drivers have been associated with the over-explosion of diseases as well as the appearance of new ones, such as thermal stress, coral bleaching, nutrient enriched currents associated with agricultural runoff, and coastal human impact (Thurber et al. 2013, Bruckner 2009, Woesik and Randall 2017).

To date, no national-level studies have been carried out on which diseases are affecting corals in the Dominican Republic (DR), their distribution and prevalence. Available disease data has been obtained only on limited locations with diseases identified such as Dark Spot, White Plague, Black Band (Brandt, Cooper, and Polsenberg 2003). On March 2019, a voracious new disease called Stony Coral Tissue Loss (SCTLD) was first reported in the Northern coast of the country (Irazabal and Rodriguez 2019), triggering the urge of understanding the scope and damage of coral diseases in Dominican reefs.

Materials and Methods

Research sites / Study Area — Coral disease distribution, abundance and prevalence were studied in 10 different sites distributed in five areas around the coast of the Dominican Republic (see Figure 1). All the colonies in each site, either healthy or presenting disease, were identified visually to species level as well as the disease presented along two belt transects per site (10 m x 1 m), recording all observations 0.5 m to the left and right of the transect line. Coral health conditions were identified based on the Field Guide to Western Atlantic Coral Diseases (Bruckner 2009).

Statistical Analysis — Coral disease prevalence at each area was calculated by dividing the sum of all corals colonies affected by disease in both sites of the area with the total number of coral colonies observed at each area. Prevalence of diseases among the species found was also calculated to determine the most vulnerable species per area of study. Abundance of health conditions for eight sites was obtained based on the area in cm² of the health condition in the colonies found at the transects of each sites.

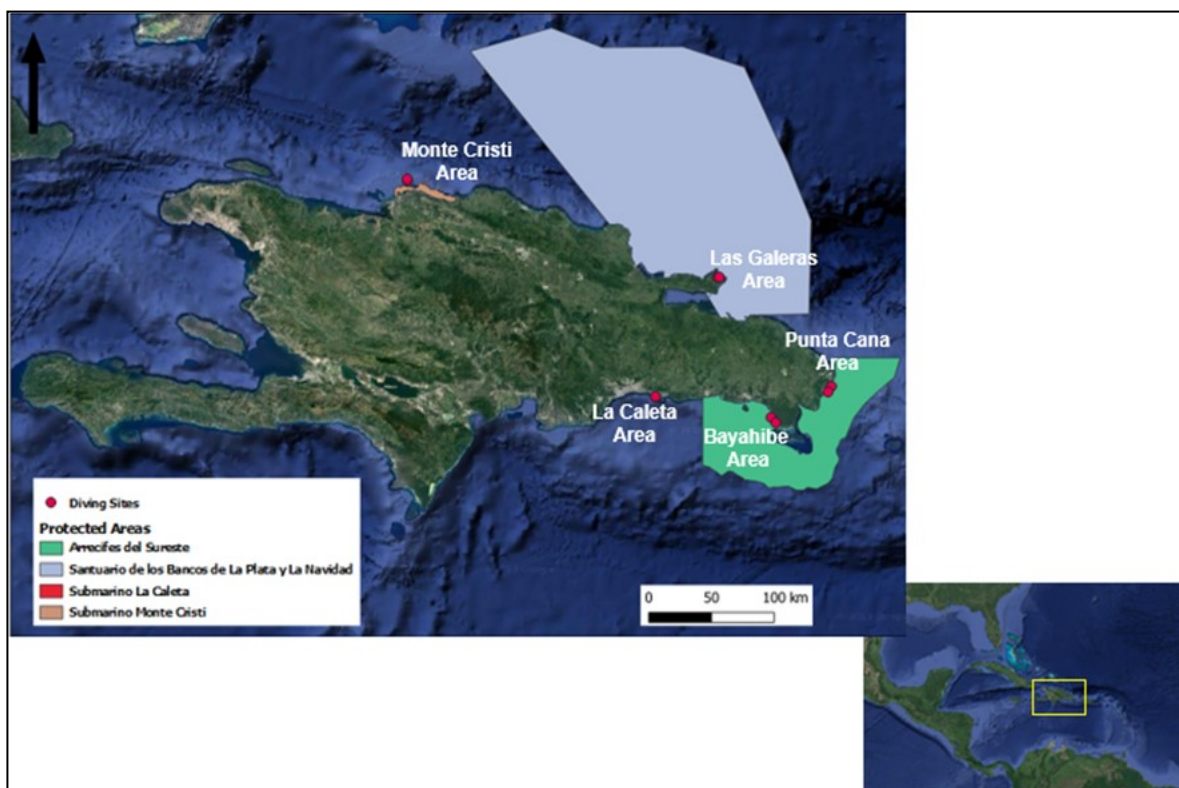


Figure 1. The map of the Hispaniola Island show the location of the five different areas of study. At each area, two diving sites are mark. Diving sites might look overlapped due to scale.

Results and Discussion

Twenty four species were identified overall with the most abundant species being *Orbicella annularis* and *Agaricia agaricites* with 14.7% and 14.4% of all colonies identified (264 colonies) respectively. *Diploria labyrinthiformis* presented the highest disease prevalence followed by *Orbicella faveolata*; 100% (3/3 colonies) and 58% (11/19 colonies) respectively. A total of 9 different health conditions were found through the reef sites, classified as: Yellow Band, White Plague, Discolored Tissue, Unknown Disease, Predation, White Band, Rapid Tissue Loss, Black Band and Caribbean Ciliate Infection. About 46% of all coral species found were affected.

Overall disease prevalence found was relatively high compared to other results found in the Caribbean (Weil & Croquer, 2009). Highest disease prevalence was found in Punta Cana Area with 36% of all diseased colonies, followed by Las Galeras Area with a 23%. La Caleta presented the lowest prevalence, where only 12% of all diseased colonies. Bayahibe and Monte Cristi areas presented similar prevalence with 13% and 16% respectively. Restauración site in Punta Cana Area presented the greatest disease diversity, showing signs of predation, SCTLD, Yellow Band and White Band. Although Las Galeras Area (Coral Garden 1 and Coral Garden 2) seem to present the greatest abundance, mostly from SCTLD, a follow up visit must be

done in order to validate the presence of the disease. This is applicable to Punta Cana Area as well (Figure 2).

The present study represents the first national analysis of coral diseases in the DR. Results obtained highlight that Dominican reefs are show higher vulnerability for Yellow Band Disease, White Plague Disease and possibly Stony Coral Tissue Loss. For now, the latter seems to only be spread on the Northern coast based on the report from Irazabal and Rodriguez in early 2019 and the current results obtained. This shades some hope for the Southern Coast reefs but also urges the diving and scientist community to take appropriate actions for the prevention of southward spreading.

Coastal development appears to be effectively reducing coral resilience and affecting their overall health (Irazabal, 2018) as shown for Punta Cana. Adding to the sedimentation due to coastal modification and run-offs from hotels, coral reefs also face thermal stress, which has been shown to compromise coral vulnerability to infections (Muller & Woesik, 2012). Actions to decrease impacts have been taken, such as the designation of Arrecifes del Sureste Marine Sanctuary, created in 2009, and coral restoration efforts. Follow-up surveys for all areas are imperative in order to track the tendencies of the diseases found, the results of measures taken and improvements to be done.

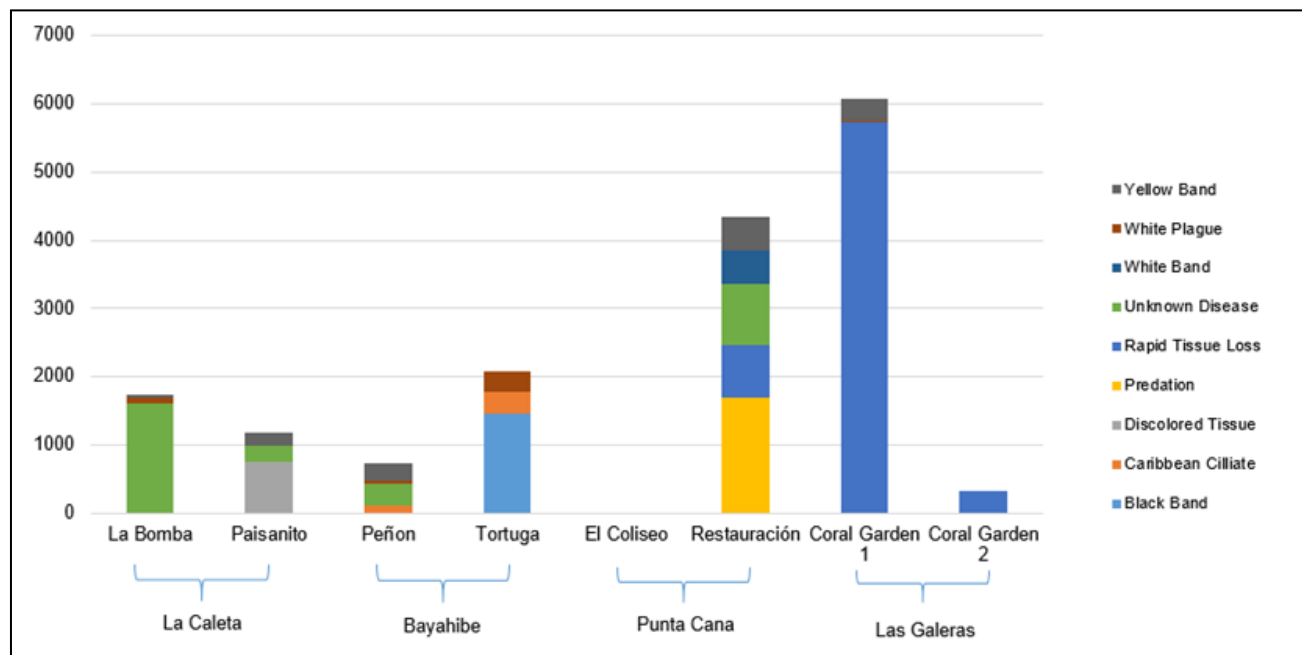


Figure 2. The diversity and abundance of coral disease on selected reef sites. Given that SCTLD is a fast-progressing diseases, follow up visits are needed to validate results, only La Caleta and Bayahibe areas have been validated at the time.

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