



The importance of herbivory in determining community structures on artificial reefs.

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Motivation

Over the past decades, coral cover on Caribbean reefs has declined severely. This has resulted in extensive loss of three-dimensional structure (so-called “flattening”) of the reef and a degraded habitat function. On many islands, artificial reefs are being deployed in an attempt to partially restore ecosystem functions by contributing to the three-dimensional structure. Although numerous studies show that the performance of artificial reefs vary greatly between different reef types, there are almost no comparative studies available. We hypothesize that artificial reefs with multiple smaller shelter opportunities will be more suitable for herbivorous fish and sea urchins than reefs with a single large internal space. The higher level of herbivory on these reefs is expected to result in lower algae cover and subsequent higher coral recruitment, survival and growth.

Aims and Objectives

In this project we aim to compare the performance, defined as the provision of habitat function for coral and fish, of three types of artificial reefs: reef balls™, layered cakes™ and piles of basaltic rock. Reef balls, made from concrete and with a single internal space, are one of the most common artificial reef types in the Caribbean. The layered cake is an adapted version of the reef ball, with higher complexity and more shelter availability. Rock pile reefs are reported to work well in other parts of the world and are one of the cheapest artificial reefs to construct. In this project, the effect of artificial reef type on the herbivore assemblage and the subsequent effect of the herbivores on the benthic communities of the artificial reefs, are studied.

Method

Per type of artificial reef, four replicates are placed in the waters of Saba and St. Eustatius, Dutch Caribbean. Fish assemblages and benthic communities of the artificial reefs will be monitored twice a year for two years after construction. The impact of grazing on the benthic community structure will be quantified using remote underwater video. Open top enclosure experiments will be conducted to assess the effect of the herbivorous sea urchin *Diadema antillarum* on the benthic reef communities.



Figure 1: Layered cake artificial reef directly after deployment (top) and after 6 months (bottom).

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