Fishes Banking ecotechnology: new concept for coral reef restoration

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Abstract

Today, the world loosed already about 40% of its coral reefs. Predictions confirm that many of the remaining reefs may disappear within the next 40 years if current trends continue and if no action taken to mitigate local and global threats, including anthropogenic activities like destructive fishing or pollution, and climate change causing coral bleaching and ocean acidification. Reef degradation results in decreased live coral cover, that leads to the accumulation of coral rubbles. Coral rubble is considered as limestone waste, promotes algal turf formation and become ecological host for harmful microalgae. To value these dead-degraded corals, we invented a pyramid model of handmade and patented artificial reefs called Fishes Banking ecotechnology® (FBe), using coral rubbles as row material. The model was designed to attract reef species (fish and invertebrates), and to allow natural coral recruitment. We immersed a total of 30 pyramid FBe, on degraded inner and outer reef slopes off Nosy Tafara coral reef (southwest Madagascar). Twelve months after immersion, 53 fish species (belonging to 22 family), and 49 fish species (belonging to 20 family) were inventoried respectively from inner and outer reef slopes, among which 20 species are common to both sites. A total of 32.4±9.8 colonies m⁻² coral juveniles have been identified with 3% of Acroporidae, 88% of Pocilloporidae and 10 unidentified (others). In addition, crustacean, echinoderms, ascidians and hydrozoans were observed and counted. Compared to other artificial reefs, these results show excellent fish and invertebrate recruitment, which constitute a base point to an effective resilience of reefs and for coastal communities. The Fishes Banking ecotechnology® is a concept that can be used for research purposes and for reef restoration.

Keywords: coral rubble, artificial reef, ecological restoration, coral colony, fish diversity, Fishes Banking ecotechnology®