

Sustainable reef design to optimize habitat restoration

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Effective habitat restoration requires innovative reef designs that optimize biological processes, alternative reef building methods that do not use plastic or concrete, and use renewable energy from solar, tidal, wind and wave power as energy sources. Special attention must be paid to maximize flow of water and light through the reef, providing reef inhabitants the maximum amounts of oxygen, food, and nutrients, while flushing away wastes. Reefs should be designed so their shape increases growth of structure-builders like coral and oysters, while providing habitat for other reef organisms to hide and spawn, increasing biodiversity. This is especially important if the reef is to be used for sustainable fish farming. Specially sized and shaped nooks and crannies can be designed into artificial reefs so that particular species will live there and can be successfully farmed without the use of nets, antibiotics, growth hormones, or external food additions. Special attention must also be paid to surrounding waters and benthic habitat so there is as little impact as possible and light as well as water can pass through the structure. Designs of structures presented in this paper utilize the concept of “Biomimicry”, adapting their blueprints from Mother Nature’s design strategies, which have evolved over billions of years, on a wide variety of scales from microscopic to megascopic. Designs based on these principles should allow restoration of degraded habitat that is much more biologically diverse and productive than conventional artificial reef structures.



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