First artificial reef Biorock installed in St. Maarten waters

Ocean Care's dream comes true

BY ELIANE POLACK*

Ocean Care, in partnership with the Sky is the Limit Foundation and the Global Coral Reef Alliance, recently hosted St. Maarten's first pilot project of a new, third generation artificial coral reef, which is called Biorock. Ocean Care had tried to make the foundation's President Jesus Ruiz Lopez' dream come true and start a Biorock reef on St. Maarten for over two years. Having learned about the method, he thought it would be a perfect way to restore some of St. Maarten's marine world. Funding was the biggest problem, but when the Sky is the Limit Foundation offered to become a partner in the project, Ocean Care was able to invite Dr. Thomas Goreau to come to St. Maarten and construct the first Biorock project.

Architect Wolf Hilbertz invented the Biorock technology with his partner Tom Goreau, an internationally renowned marine scientist. They have constructed many reefs worldwide. For the Biorock reef on St. Maarten, all material was obtained locally, except for the special anode Dr. Goreau brought with him. Supervised by Dr. Goreau, the metal frame of the reef was made and taken out to the site at Little Bay with the help of Ocean Care's volunteers and the St. Maarten Dive Scouts (Scouting Antilliano section St. Maarten).

Earlier that same week, the anode was prepared to make its connection water resistant. The anode is made of a special titanium alloy, which will not dissolve over time and is not toxic, contrary to zinc or other metals commonly used for anodes.

The structure needs only a small amount of electricity, so an 85-Watt solar panel was installed on the cliff near the site of the reef with the aid of Divi Resort's Chief engineer John Speetjens. An insulated electrical cable runs down along the cliff to the anode under water.

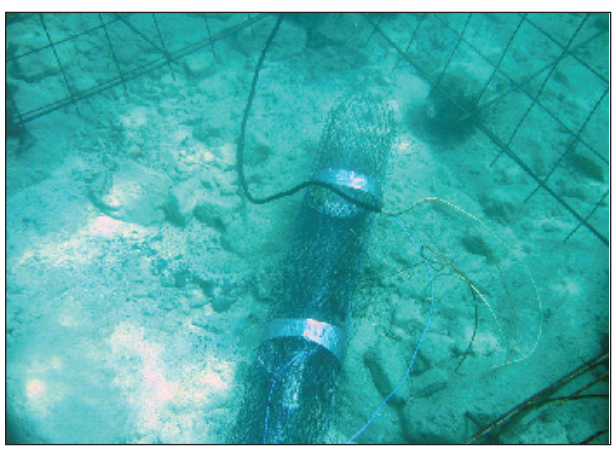
Once all cables had been properly connected, it was time to search for pieces of broken coral fragments which could be used to transplant. This took a number of volunteers a couple of days to collect.

The pieces were attached to the Biorock structure with metal Ty-wire. After a few days the rust on the metal frame came off and after a week the structure turned white, as the metal became encrusted with precipitated minerals. Electrical fields, plus the shade and protection offered by the metal/limestone frame, attracts a wide range of colonizing marine life.

This first Biorock reef is a pilot project, since Ocean Care would like to build a large one. It has become clear from other Biorock projects around the world that they are ideal as a breakwater to prevent beach erosion. It will even make beaches grow, so a large Biorock reef could be very interesting for a number of resorts on St. Maarten.

After two weeks the transplanted coral pieces have begun to bond to the accreted mineral substrate and start to grow.

Transplanting fragments



The anode under water.

After a few years, a full scale Biorock reef is a good tourist attraction, as it can offer a house reef with living corals just off the beach, something very few resorts in the world can claim nowadays. As Dr. Goreau noted in one of his presentations, it is interesting to see how resorts spend millions on landscaping its terrestrial terrain, but never invest under water. The majority of their guests have seen their brochures with colourful tropical fish and pictures of beautiful corals. Once there, the tourists find they have to be taken out miles off the coast by boat to see a few dying reefs.

Biorock Technology is a method that applies safe, low voltage electrical currents to a metal construction under water, causing dissolved minerals to crystallize on the structures, growing into a white limestone similar to that which naturally makes up coral reefs and our white sand beaches. It can be used to make robust artificial reefs on which corals grow at very rapid rates. The change in the environment produced by electrical currents accelerates formation and growth of both chemical limestone rock and the skeletons of corals and other shell-bearing organisms.

Building the structure.

Biorock methods speed up coral growth in damaged areas and restore authentic coral reef habitat and species. The structures become rapidly colonized by a full range of coral reef organisms, including fish, crabs, clams, octopus, lobster and sea urchins. Species typically found in healthy reef environments are given an electrical advantage over the weedy organisms which often overgrow them in reefs stressed by human impact.

Biorock structures cement themselves to the hard bottom, providing a physical wave barrier which over time grows larger and stronger, making them ideal for breakwater shore protection.

A number of variables influence the erosion process of beaches, including the ecological conditions of the coastal waters and the characteristics of the near-shore sea bottom. With the decrease of coral cover, there is an increase in the factors that enhance coastal erosion. A living reef in front of the shoreline is the natural beach protection system and constantly produces new calcareous material to re-nourish the beach.

The building of artificial breakwaters with Biorock Technology has proven to be a cost effective and very successful method to protect valuable sand beaches. In the Maldives a team built a submerged breakwater about 125 feet long, 13–20 feet wide and 3–4 feet high. The project proved that this way to dissipate the wave energy not only costs less than a tenth as much as the typical concrete breakwaters, but also works so well that the protected beach has grown 15 metres in a few years.

In addition to attracting fish from the surrounding areas, the structures created with Biorock Technology support a wide range of marine organisms. Especially organisms with calcareous skeletons like corals, oysters and clams benefit from the particular environmental alterations near the steel structure.

The fragments have started to grow (two weeks old).

A Biorock project can demonstrate the feasibility of sustainable marine production practices which are both environmentally sound and profitable. It should ideally be complemented by a number of other elements:

- *Training and education of the local reef users in Biorock practices.*
- *Introducing and implementing micro enterprise and income diversification projects in the coastal communities (e.g. aquaculture of oysters, clams or corals, boat operation services, rent of scuba/snorkel gear etc.)*
- *Set up of a coastal fisheries licensing system and the adoption of community-based coastal resources management.*
- *Control and management of land based causes for reef deterioration (e.g. reforestation, erosion control, sewage treatment etc.)*

On St Maarten, tourism is the most important source of income, and everyone involved in this industry should realize the importance of having environmental friendly methods of operation and the careful stewardship of the natural resources.

Note: Eliane Polack is secretary of St. Maarten-based Ocean Care Foundation.