

Volunteers start to build artificial coral reef at Divi

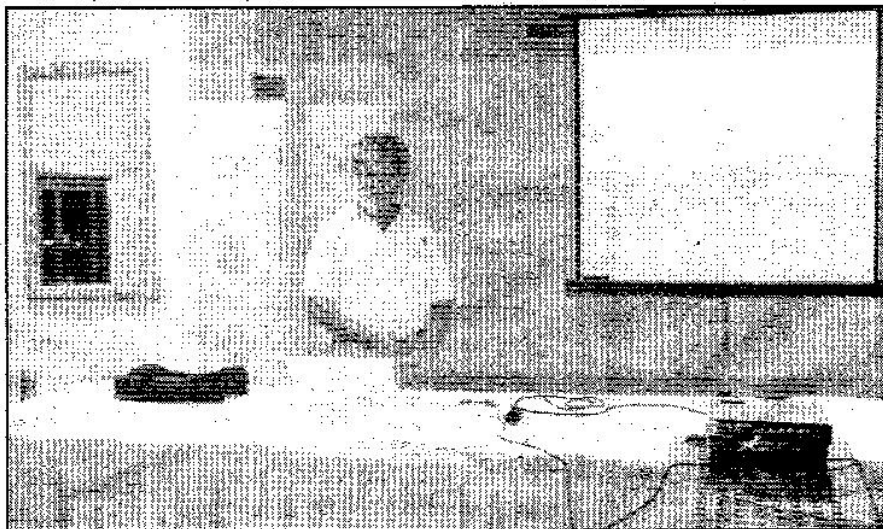


Photo: Geno

Dr. Tom Goreau, a marine scientist who has won many international awards for his work to save the environment, tells an audience how an artificial coral reef known as Biorock works. He illustrated his program last night at the Pasangrahan Hotel with slides.

GREAT BAY - St. Martin is cooperating with a marine scientist to create the island's first pilot project of a new third generation artificial coral reef that heals itself from natural or manmade disasters and grows stronger with age.

Dr. Tom Goreau, whose father was the world's first diving marine scientist, is president of the Global Coral Reef Alliance headquartered in Cambridge, Mass. In partnership with Ocean Care and Sky is the Limit Foundation, the alliance and a group of volunteers today launched a pilot project to build an artificial reef made of Biorock at Divi Little Bay Resort.

Artificial reefs create new habitat for fish and other marine life where

none existed before or where the natural habitat has been destroyed, Dr. Goreau told a crowd of interested observers last night at the Pasangrahan Hotel. Sen. Maria Buncamper-Molanus, who helped form the Sky is the Limit Foundation, attended the presentation.

Invented by Dr. Goreau and his partner, architect Wolf Hilbertz, Biorock is made through a technology that uses safe, low voltage electrical currents to a metal construction underwater. The application causes dissolved minerals to crystallize on the metal, growing into a beautiful white limestone similar to that which naturally makes up coral reefs and white sand beaches.

Master of the colorful adverb, Dr. Goreau enthralled

the crowd by using slides to show how quickly the artificial coral can grow to attract fish, shellfish and other marine creatures while rapidly building a healthy artificial reef.

He said the process is ideal for building breakwaters. Biorock structures literally 'cement themselves to the hard bottom, thereby providing a physical wave barrier that grows larger and stronger over time and making it into the perfect breakwater.

'Biorock grows three to five times faster than natural coral reef and it heals up to 20 times faster,' said the marine scientist.

'It can survive temperatures up to 50 times higher than adjacent reefs and it attracts an incredible number of fish,' he added. He also

said the artificial reef is an improvement on the environment.

'Fishermen can grow their own reefs and greatly increase the fish and shellfish population,' he said. 'They can turn themselves from hunters into farmers while increasing their catch.'

He said Biorock is the only marine construction material that actually gets stronger with age.

St. Martin residents and visitors can learn more about Dr. Goreau and his work with Biorock on his website, www.globalcoral.org.

In closing, he told the audience he hoped the Divi Little Bay coral reef pilot project is only 'the first of many similar projects.'

A team built a submerged breakwater 125 feet long, 20 feet wide and four feet high in the Maldives that survived a major tsunami while other nearby coral reefs were severely damaged, he said.



About four Scouts helped to build the framework for a manmade reef using Biorock technology at Bobby's Marina on Thursday. This John Halley photo shows the frame being placed into a boat to be transported to another location where it will be placed underwater.

Manmade 'Biorock' coral reef for Little Bay

PHILIPSBURG--Ocean Care in partnership with The Sky Is The Limit Foundation and the Global Coral Reef Alliance has organised a pilot project to build a manmade reef, using Biorock technology.

Biorock technology, or mineral accretion technology, is a method that applies safe, low voltage electrical currents to a metal construction under water, causing dissolved minerals to crystallise on the structures, growing into a white

limestone similar to that which naturally makes up coral reefs and white sand beaches.

A Biorock dome will be built in Little Bay starting this month under the supervision of Dr. Tom Goreau, who helped develop the technology with his partner and inventor of Biorock Architect Wolf Hilbertz.

Supervised by Goreau, the metal frame of the reef will be welded and taken out to the underwater site by Ocean Care's volun-

teers and St. Maarten Dive Scouts (Scouting Antilliano section St. Maarten). The volunteers will also help Goreau with transplanting coral to the structure and will monitor the growth of the transplanted corals over time.

Goreau will give a presentation on the project in Pasanggrahan Guesthouse conference room on Friday starting at 4:00pm. He will address the impact of global warming and land-based sources of pollution on coral reefs, coral diseases and reef restoration.

After the Biorock project in Little Bay is completed, there will be an additional presentation in Holland House on Monday in which Goreau will show the various stages of the Biorock construction.

Goreau's trip to the island was covered by a donation from The Sky Is The Limit Foundation, headed by Island Councilwoman Maria Buncamper-Molanus.

Pasanggrahan Hotel has sponsored today's presentation while Holland House Hotel provided accommodations for Dr. Goreau as well as the facilities for the presentations Monday. Bobby Velazquez will help put the structure in place.

Ocean Care is planning for Dr. Goreau to return early next year to build another larger reef once additional sponsors have been found.



Murray parties with Scottish students

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Hawaii's Big Island rocked by 6.5 earthquake

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Marine scientist anchors artificial reef in Little Bay



In a scene reminiscent of 'Raiders of the Lost Ark,' Dr. Thomas Goreau, Jesus Ruiz Lopez, and John Speetjens, chief engineer at Divi Little Bay, look for the best place to drop a metallic creation that will form the base of a new artificial coral reef and breakwater.

By Geno Lawrence

The spirit of Jacques Cousteau lives and you can give the credit to Dr. Thomas Goreau, president of the Global Coral Reef Alliance, and his global team of volunteers who have a passion for saving the oceanic environment through marine technology.

On Saturday, Dr. Goreau was up bright and early to send a boat to Divi Little Bay to deposit a metallic foundation that will result in a new artificial coral reef and breakwater at Little Bay.

The artificial coral is known as Biorock. According to Dr. Goreau, it grows at a rate 10 times faster than natural coral, it gets stron-

ger with age and it heals itself. Using a low-grade electrical shock, the volunteers coax the artificial coral reef to attach itself to the steel. Once attached, the coral begins growing at a rate much faster than natural coral. It helps protect the environment and the St. Martin coastline by creating an artificial breakwater.

It also attracts legions of fish. At a presentation in Philippsburg Friday evening, Dr. Goreau told a group of avid volunteers and friends of his Global Coral Reef Alliance of his hopes of using the new ma-

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Artificial reef

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rine process to create breakwaters and build artificial coral reefs around the world.

He calls his pilot project here a 'third generation artificial reef,' adding that such reefs have been effective in creating new habitat for marine life in places where none has existed before or where the natural habitat has been destroyed.

The marine scientist says he hopes the reef at Divi Little Bay is just the first of many to be built in St. Martin and throughout the Caribbean.

On Saturday, Dr. Goreau, along with Jesus Ruiz Lopez and John Speetjens, chief engineer at Divi Little Bay Resort, did some tricky rock

gymnastics to get down to the scenic area of the bay where the foundation would be dropped.

One observer, watching the marine scientist and the others climb down the rocks, nodded admiringly.

'You have to be dedicated to do that kind of work,' he said. 'This will be good for our island.'

Global Coral Reef Alliance is headquartered in Cambridge, Mass.

According to an Alliance spokesman, the artificial coral reef has proven itself to be superior to natural coral reef, with no adverse side effects on the environment.

Pilot Project Biorock

St Maarten
October 10–17, 2006



Biorock, 9 months old. Photo by Laurent Lavoy

During the second week of October, Ocean Care in partnership with The Sky Is The Limit Foundation and the Global Coral Reef Alliance will organize St Maarten's first pilot project of a new, third generation artificial coral reef, which is called Biorock.

Artificial reefs have proven effective in creating new habitat for marine life where none existed before, or where the natural habitat has been destroyed. There are various types of artificial reefs. So-called third generation artificial reefs, constructed with the Mineral Accretion Technology (Biorock), even act as coral nurseries that sustain healthy corals, while the ones in the surrounding natural reefs suffer under diverse stresses.

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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.

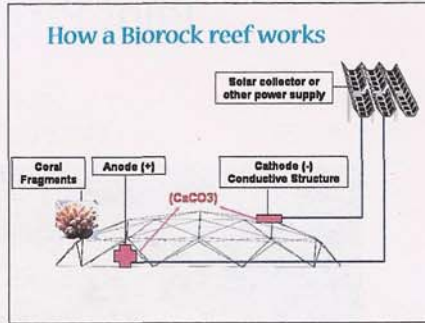
Biorock methods speed up coral growth in damaged areas and restore authentic coral reef habitat and species. The structures become rapidly colonized by a full range of coral reef organisms, including fish, crabs, clams, octopus, lobster and sea urchins. Species typically found in healthy reef environments 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.

Architect Wolf Hilbertz invented the Biorock technology with his partner Dr Tom Goreau. They have constructed many Biorock reefs worldwide.



A 3-month old Biorock structure. Photo Emma Woolacott.



When a positively charged anode and a negatively charged cathode are suspended in sea water with an electric current flowing between them, calcium ions combine with carbonate ions and adhere to the structure (cathode). The result is calcium carbonate. Corals adhere to $CaCO_3$ and grow quickly.

Erosion 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 renourish 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 started to grow 15 meters in a few years.

Fish

Artificial reefs constructed with Biorock Technology have proven their ability to serve as Fish Aggregating Devices in many areas around the world. In addition to merely attracting fishes from the surrounding areas, like most of the conventional Fish Aggregating Devices do, 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 result is that mineral accretion structures quickly become a part of a living and healthy reef supporting a wide variety of reef creatures.

Coral Farming

Broken fragments of coral lying on the seabed, due to either human or natural impacts, are very likely to die before they can reattach themselves to hard substrate. If these coral pieces are not too severely stressed they can recover by being fixed to Biorock structures where



1½ -year old Biorock structure. Photo Emma Woolacott.

they profit from the beneficial environmental conditions (e.g. higher pH-level). For monitoring and evaluation purposes the coral transplants can be tagged with a number. If such a coral nursery is managed by a tourist resort or a dive shop it can operate at a cost covering basis by offering diving visitors to get personally involved in reef restoration efforts.

Sustainable management

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 their natural resources.

Biorock St Maarten is sponsored by:

Bobby Velasquez
Holland House
Pasangrahan Hotel
Ocean Explorers

Dr Tom Goreau, President of the Global Coral Reef Alliance, a non-profit organization for coral reef protection and sustainable management, has dived longer and in more coral reefs around the world than any scientist. His father was the world's first diving marine scientist, and he grew up swimming in coral reefs as soon as he could walk. He was previously Senior Scientific Affairs Officer at the United Nations Centre for Science and Technology for Development, in charge of global climate change and biodiversity issues. He has published around 200 papers in all areas of coral reef ecology, and on global climate change, the global carbon cycle, changes in global ocean circulation, tropical deforestation and reforestation, microbiology, marine diseases, soil science, atmospheric chemistry, community-based coastal zone management, mathematical modeling of climate records, visualizing turbulent flow around marine organisms, scientific photography, and other fields. He developed the method to predict the location, timing, and severity of coral bleaching from satellite data with Ray Hayes. He holds patents with Wolf Hilbertz for new methods for preserving coral reefs from global warming and pollution, restoring marine ecosystems, shore protection, mariculture, and non-toxic methods of preserving wood from marine boring organisms, termites, rot, and fire, in order to increase the lifetime of wood and decrease logging. In 1998 he and Wolf Hilbertz were awarded the Theodore M. Sperry Award for Pioneers and Innovators, the top award of the Society for Ecological Restoration.

Dr Goreau led developing country NGO efforts in marine and climate issues at the United Nations Conference on Environment and Development (Rio de Janeiro, 1992), the UN Summits on Development of Small Island Developing States (Barbados, 1994, Mauritius, 2005), and the UN World Summit on Sustainable Development (Johannesburg, 2002). Dr Goreau works with tropical fishing communities around the world to restore their coral reefs and fisheries, especially the Kuna Indians of Panama, the only Native people of the Americas who have preserved their cultural and political independence. He is also a hereditary leader of the Yolngu Dhuwa Aboriginal clan of Arnhem Land, Australia, that preserves the oldest creation myth in the world. Of Panamanian origin, he was educated in Jamaican primary and secondary schools, at MIT (B.Sc in Planetary Physics), Caltech (M.Sc in Planetary Astronomy), Yale, Woods Hole Oceanographic Institution, and Harvard (Ph.D. in Biogeochemistry), and is a certified nuisance crocodile remover.



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