Global Coral Reef Alliance℠

Dedicated to the Growth and Management of Coral Reefs Around the World

A Solution for Corals in Peril

At the recent Coral Reef Symposium in Bali, Indonesia, scientists concluded that most of the world's ocean reefs have been killed or severely damaged with the remainder in certain jeopardy. Disastrous reverses in reef health threaten marine biodiversity, tourism, fisheries and shore protection worldwide.

Reefs die for many reasons: rising water temperatures, sewage flows, eutrophication, disease, and negligence. A reef ecosystem that took hundreds of years to grow can be destroyed in a single afternoon by dredging, dynamite or cyanide fishing.

When coral reefs die, fish populations disappear; beaches and shorelines are damaged. Unprotected by breakwaters, fragile land areas become vulnerable to erosion, saltwater intrusion and destruction from waves.

Coral bleaching is now common in reefs around the world. Bonaire, NA

The Global Coral Reef Alliance (GCRA)

The Global Coral Reef Alliance is a 501(c)(3) nonprofit organization dedicated to growing, protecting and managing the most threatened of all marine ecosystems—coral reefs. Through extensive research, GCRA has pioneered methodologies to help reefs survive and recover from diseases and anthropogenic damage caused by excessive nutrients, climate change and physical destruction.

Eutrophication, often caused by inadequate sewage treatment, smothers corals with nutrient fed algae. Bay Islands, Honduras.

Global Warming, Population and Pollution

Conventional wisdom might say that a small entity like GCRA, can do little but sound an alarm. Restoring marine ecology is a job for nations, not individuals.

But conventional wisdom is wrong. GCRA does have a solution—a patented form of mineral accretion we call the Biorock Process. With it corals thrive, even in environments where water quality is poor and surrounding corals are dying.

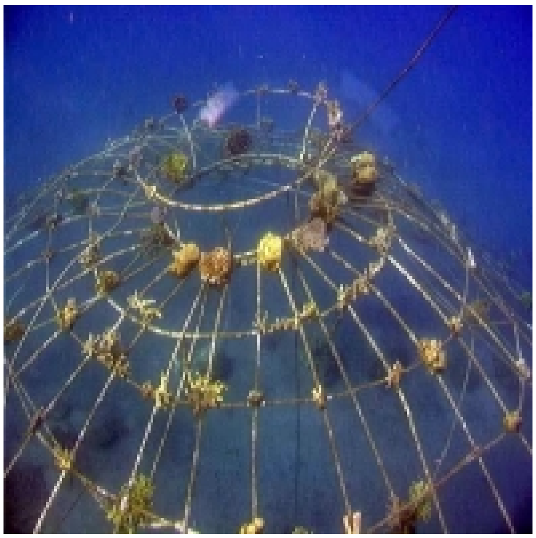
Biorock℠ Process Accelerates Coral Growth

In pilot installations in Mexico, Panama, Indonesia, Maldives, Thailand, and Papua New Guinea, we have built artificial reefs where corals grow rapidly even in stressed environments.

Applying a low voltage electrical current (completely safe for swimmers and marine life) to a submerged conductive structure causes dissolved mineral crystals in seawater to precipitate and adhere to that structure. The result is a composite of limestone and brucite with mechanical strength similar to concrete. Derived directly from seawater, this material is similar to the composition of natural coral reefs and tropical sand beaches.

Biorock structures can be built in any size or shape depending only on the physical makeup of the sea bottom, wave and current energies and construction materials. They are well suited for remote, third world sites where exotic building materials, construction equipment and highly skilled labor are non-existent.

Biorock methods provide a cost-effective way to increase coral survival from bleaching and disease, while restoring damaged reefs. In time, these structures cement themselves to the ocean bottom, providing a physical barrier that can protect coastlines from waves and currents that cause erosion.



Structures can be any shape or size depending only on available materials and power. Bali, Indonesia.

In the Maldives, during the 1998 warming, fewer than 5% of the natural reef corals survived. But on our Biorock reefs, 80% of corals not only survived, they flourished. Corals from these ark reefs are now recolonizing the surrounding natural habitats. Biorock reefs are growing in Thailand, Indonesia, Papua New Guinea, Panama, and Mexico.

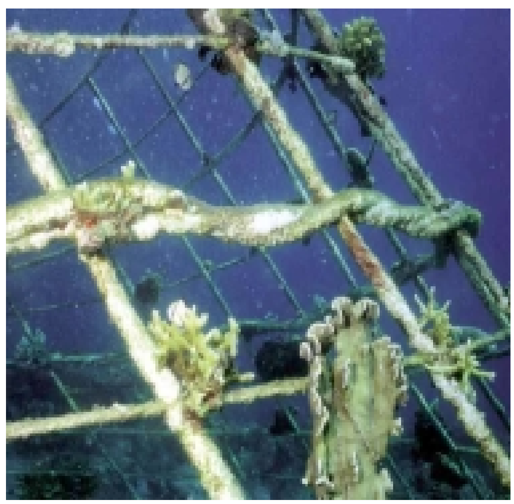
Constructing A New Reef

To build a Biorock reef, an electrically conductive frame, often made from construction grade rebar or wire mesh, is welded together, submerged and anchored to the sea bottom. Sizes and configurations vary to fit the setting. Then a low voltage direct current is applied using an anode (power sources can include chargers, windmills, solar panels or tidal current generators). This initiates an electrolytic reaction causing minerals naturally found in seawater, mainly calcium carbonate and magnesium hydroxide, to grow on the structure.

Limestone quickly covers the metal frame. Bali.

Within days, the structure takes on a whitish hue as it becomes encrusted with precipitated minerals adding rigidity and strength. Electrical fields, plus the shade and protection offered by the metal/limestone frame, attract a wide range of colonizing marine life including fish, crabs, clams, octopus, lobster, and sea urchins.

Once the reef structure is in place and minerals begin to coat the surface, the next phase of reef construction begins. Divers transplant coral fragments from other reefs and attach them to the ark's frame. Immediately, these coral pieces begin to bond to the substrate and start to grow—typically three to five times faster than normal. Soon the reef takes on the appearance and utility of a natural reef ecosystem rather than a man made one.



Coral fragments transplanted to the structure soon begin to grow. Bali.

No Area of the World is Too Remote

Reefs often need restoration far from convenient sources of electrical power. Accordingly, GCRA scientists use electricity generated by renewable resources including the sun via photovoltaic panels, as well as wind and water-driven generators.

Healthy Reefs In Stressed Environments

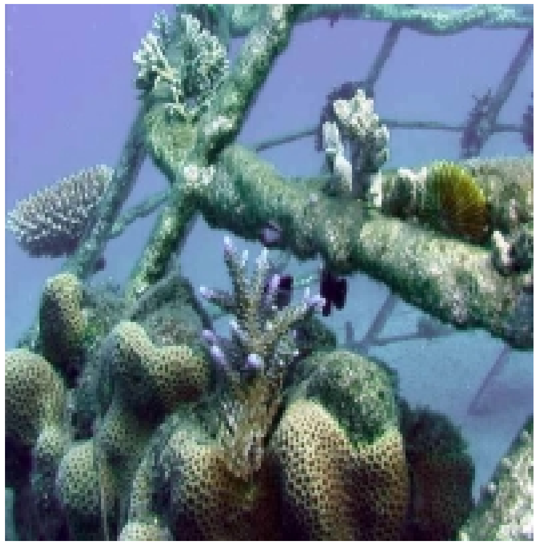
Due to electrolysis, corals on ark reefs gain energy affecting growth, reproduction and their ability to resist environmental stress. These reefs grow rapidly and get stronger as they age. Plus, they don't leach harmful pollutants like other types of artificial reefs made from discarded cars or tires.

The Biorock Process is the only known technology that can sustain corals through warming water temperatures.

We hope to build as many Biorock sites as feasible before reef degradation and coastal erosion passes the point where recovery and restoration becomes impossible.

Coral species gain a major advantage over the weedy organisms that often overgrow them in areas stressed by eutrophication. In tests where the electrical current is interrupted, the Biorock Process stops and weeds begin to cover the corals. But, when the current is maintained, coral reefs grow well, even as neighboring reefs without current die.

As the corals grow, the structure takes on the appearance of a conventional reef attracting a wide variety of indigenous marine life. Bali.



Healthy corals grow quickly—up to ten times faster than normal when exposed to electrolysis, even in poor water conditions. Bali.

Biorock structures have unlimited potential for making breakwaters that actually get stronger with age. If waves or colliding ships cause damage, Biorock makes them, to an extent, self-repairing.

GCRA—Dedicated and Ready To Help

We would be pleased to consult on Biorock technology as well as coral reef construction and restoration. GCRA scientists are ready to work with foundations, governments or private firms to build, restore and maintain coral reefs, nurseries and sanctuaries wherever funding and suitable conditions exist. Projects might include breakwaters for shore protection or coral reefs for tourism.

Please see our web site for more information.

http://globalcoral.org

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