Underwater Regeneration

Biorock reefs, underwater life-support systems for ailing reefs, are helping return Samui to its original state

By Kevin Luton

Hundreds of thousands of tourists visit Samui annually, fully expecting the waters and beaches to be a pristine and untouched paradise.

Many people are not disappointed. Some areas in the Gulf of Thailand still offer the desert-island lifestyle. However, these islands are becoming more and more popular, and statistics from one of the world's largest dive-training organizations show that Koh Samui, Koh Pha Ngan and Koh Tao now produce the second-largest number of newly certified divers in the world after the Great Barrier Reef. Koh Tao currently has more than 50 dive operations, with Koh Samui not far behind. This popularity has its consequences, and the biggest casualties are coral reefs.

Known as the "rainforests of the sea", coral reefs have existed for over 200 million years and are the oldest, most productive areas on Earth. Aside from their environmental importance, coral reefs are extremely useful to local tourism and fishing industries and benefit human health and more. Yet we are diminishing this vast resource at an alarming rate.

Fortunately, scientists and conservationists have already come up with a number of solutions to environmental destruction, and many of these are already being used to great effect around the world. One such operation is Biorock, an underwater life-support system for ailing reefs that is the brainchild of marine scientist Dr Thomas Goreau.

The Biorock method is the only one known to produce the natural limestone that corals need to grow. It also accelerates coral growth, healing and resistance to stress. Biorock employs electric or solar energy to strengthen and regenerate coral, allowing it to survive conditions that would otherwise kill it, and allowing reefs to be restored when they cannot recover naturally. Biorock reef corals provide superior habitats for fish and shellfish, and have helped severely eroded beaches in the Maldives grow up to 15 metres in just a few years. In fact, Biorock reefs in the Maldives and Indonesia have more corals and fish than the surviving natural coral reefs around them, making them prize-winning eco-tourism attractions.

> Biorock reef corals could act as a catalyst for increased cooperation and environmental understanding.

Dr Goreau visited the Gulf of Thailand last year and joined forces with Tom Sarkisian, the local Global Coral Reef Alliance representative to assess Biorock's potential applications in the area. When he saw the seas around Samui, he was convinced something needed to be done fast.

"The situation we saw off these islands was not good at all," he says. "High water temperatures naturally destroy coral reefs, but on Samui this is coupled with both bad land management, which leads to excessive soil erosion, and a lack of sewage treatment."

Dr Goreau and Sarkisian began their research into appropriate locations for reef renovation on Koh Tao. They decided to install a pilot Biorock frame close to the shore in Chalok Baan Khao. "On Koh Tao we simply bought a roll of construction mesh and laid it on the seabed in the shallow water," says Sarkisian. "The Koh Tao Dive Association helped us find a suitable site and local businesses provided assistance with the electricity supply. The coral has already come back in large quantities."

Following the success of this project, in October 2005, the Koh Samui Municipality Office initiated a Fishery Habitat Restoration Project intended to restock Samui's fish population. Together with the Tourist Association of Koh Samui (TAKS), Biorock Technology Thailand was commissioned to design, construct and deploy five fishery habitat restoration sites around the island.

The first project was in Ban Makham, near Nathon, and the construction of the structures was undertaken by several teams of volunteers consisting of assemblers, welders, electrical experts, divers and deployment crews, all of whom worked in tandem for the duration of the project. The individual frames were arranged and connected together by a dive team from Captain Caveman's GO ECO Dive Center, making this a good example of Samui's divers and fishermen working together on projects to improve environmental conditions for both parties.

Once in place, mains electricity was supplied to the metal structures and existing live broken corals were attached to the electrically charged frame. After several months, the growth of the corals on the structures has been encouraging, and the attachment of more corals is still going on today. The healthy coral has already attracted schools of local fish to this new habitat, and Khun Kornwit of the Thai Fisheries Department believes such projects give local fishermen a better awareness of the value of coral reefs and even shame them into acting more responsibly. The installation of Biorock reef corals around the island could therefore act as a catalyst for increased cooperation and environmental understanding.

Based on the success of these two artificial reef projects, Goreau and Sarkisian along with Cholnakochorn Anumart, and Wolf Hilbertz of Biorock have produced a draft proposal to the Koh Samui Government, Business, Tourism, and Environmental communities titled *Koh Samui, Paradise Restored by Re-greening and Re-bluing.* In the document, they clearly define individual projects they believe are necessary to restore the island to its original state.

These projects include the construction of Biorock reefs specifically for the use of divers and snorkellers next to the existing reefs in Chaweng, Lamai and other sites, Biorock reefs in other parts of the island, including off Nathon, would then be dedicated and zoned for fishing. Another suggestion is to start a community nursery to produce *Vetiver zizanoides* ("*khus*", a grass related to lemongrass but with very long roots) for a planting project that would provide plants for soil erosion control on all development sites.

At present, few hotels are using septic sewage systems to treat waste to prevent destructive nutrients from flowing into the sea. The team, therefore, also proposes that a plan be devised to capture and treat all sewage generated on the island and then recycle the wastes on land, without polluting the sea.

There are a great number of threats to coral reefs, and most of them can be attributed either directly or indirectly to humans. The list of solutions to the many coral reef problems facing Samui is extensive. Unfortunately, implementation and enforcement has not been strong enough in the past, and will probably not be in the future. The education and cooperation of local people and visitors is therefore desperately needed if coral reefs are to survive.

What you can do

1. Avoid purchasing souvenirs made from coral or any threatened or endangered marine species.
2. Support the establishment of coral-reef protected areas and encourage better protection and management for those that exist.
3. While travelling, choose resorts and tour operators who properly treat all their sewage and wastewater.
4. While operating a boat, navigate carefully to avoid contact with coral reefs and other vulnerable ecosystems such as seagrass beds and maintain engine equipment to prevent oil and gas spills.
5. As a diver or snorkeller, choose tour operators that use mooring buoys or drift-diving techniques whenever possible rather than anchors that can cause reef damage.
6. Make wise choices in selecting seafood by avoiding menu items that are caught or farmed using destructive or unsustainable practices including reef-killing poisons, explosives and illegal equipment.
7. Avoid purchasing tropical wood furniture or products obtained from clear-cut tropical forests, which causes siltation damage to coral reefs.
8. As a diver, practisce buoyancy control skills in a pool or sandy area before diving near a coral reef. Make sure your gauges and equipment are secured to avoid accidental contact with the reef, and never touch, stand on, or collect coral.
9. Report all damage of coral reefs to dive operators and scientific or conservation groups that monitor coral reef health.
10. Get educated and share your knowledge. Tell others about life in the coral reefs and explain their importance to future generations.

To learn more about preserving our aquatic natural resources go to **www.biorock-thailand.com**, **www.projectaware.net** and www.globalcoral.org