

Biorock® Technology - selected pictures

Reef rehabilitation
Fisheries enhancement
Coastal erosion protection
Sustainable coastal tourism

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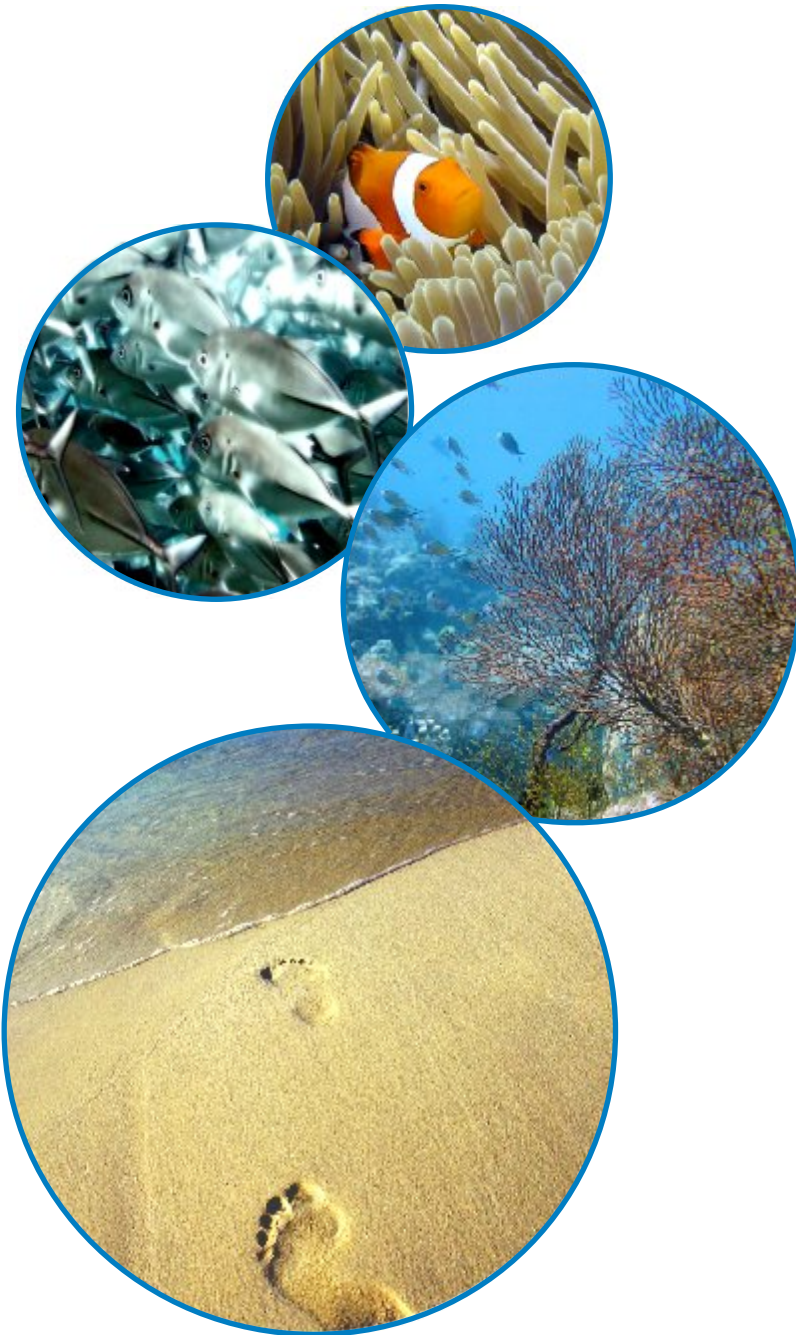
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Web site: <http://www.globalcoral.org>

updated: May 2008

use arrow buttons on keyboard to flip pages



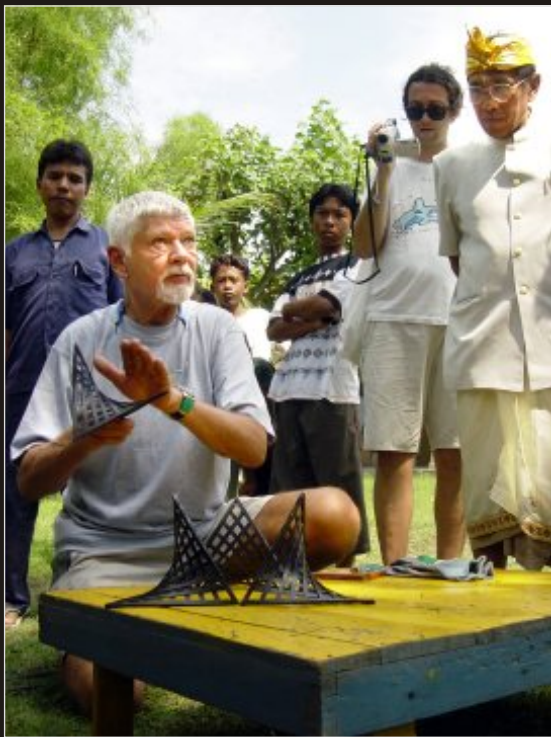


fig.01

Projects of any complexity generally require a formal set of construction plans and specifications for implementation. Therefore, the first step is to assess the physical and biological characteristics of the project site. Based on the results of a site assessment, engineering drawings and models are a useful tool to visualize the physical structure of the project and locate features such as species plantings and monitoring stations.

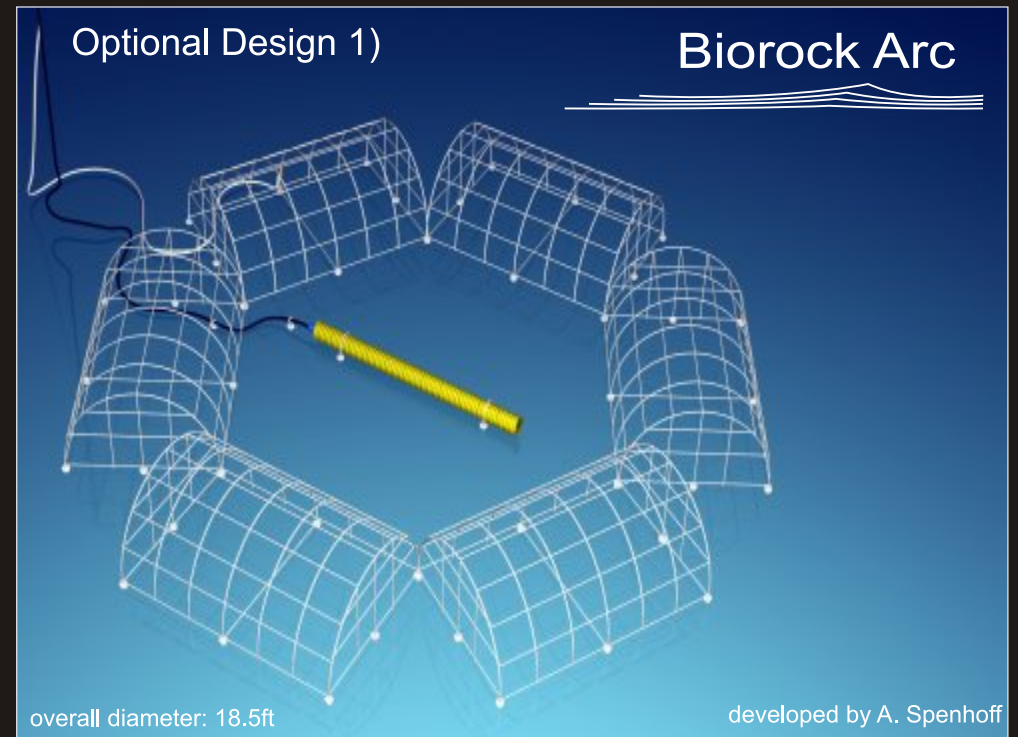


fig.02



fig.03



fig.04

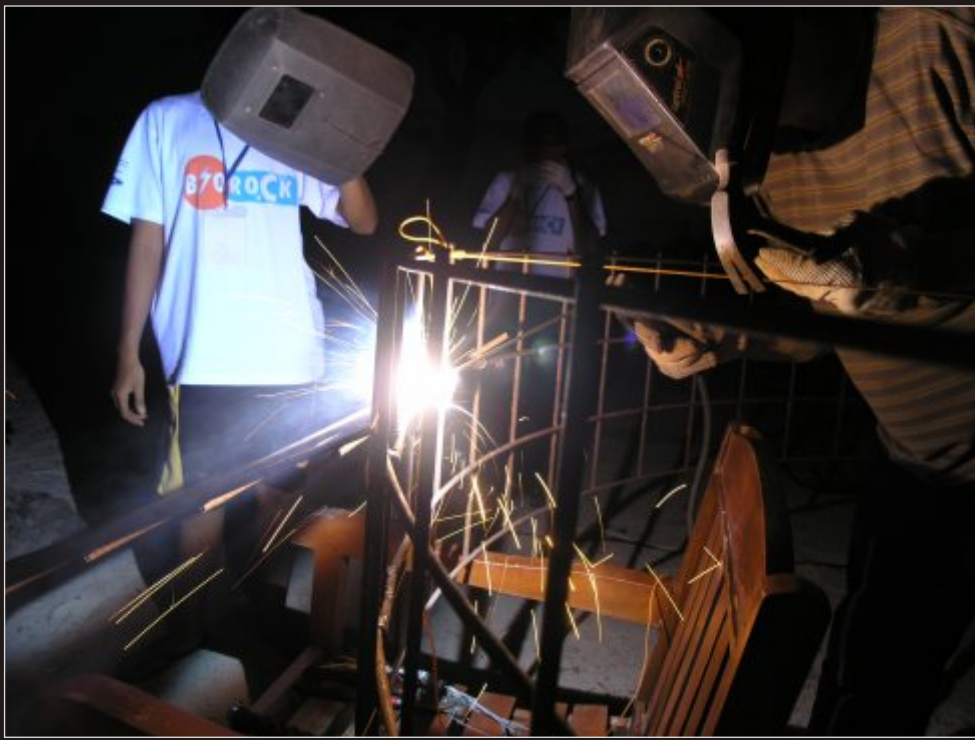


fig.05

To build a *Biorock*® Reef, an electrically conductive frame, often made from construction grade rebar, is welded together, submerged and anchored to the sea bottom.



fig.06



fig.07

The *Biorock*® method is well suited for remote sites where exotic building materials, construction equipment and highly skilled labour are non-existent.



fig.08



fig.09



fig.10



fig.11



fig.12



fig. 13

Low voltage direct current is applied. This initiates an electrolytic reaction causing mineral crystals naturally found in seawater, mainly calcium carbonate and magnesium hydroxide, to grow on the structure. The steel is protected against corrosion and over time the structures gain in strength.

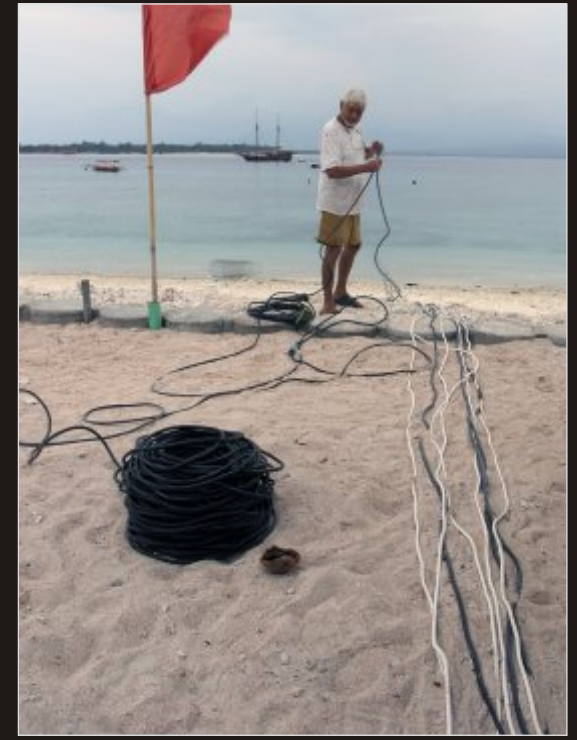


fig. 14



fig. 15



fig. 16



fig.17

Broken fragments of corals lying on the seabed are collected and fixed to the structures where they profit from the beneficial environmental conditions.



fig.18



fig.19



fig.20



fig.21

Due to the environmental changes at the steel frame, triggered by the electricity, corals on the *Biorock*® structures grow typically 2-6 times faster than under normal conditions.

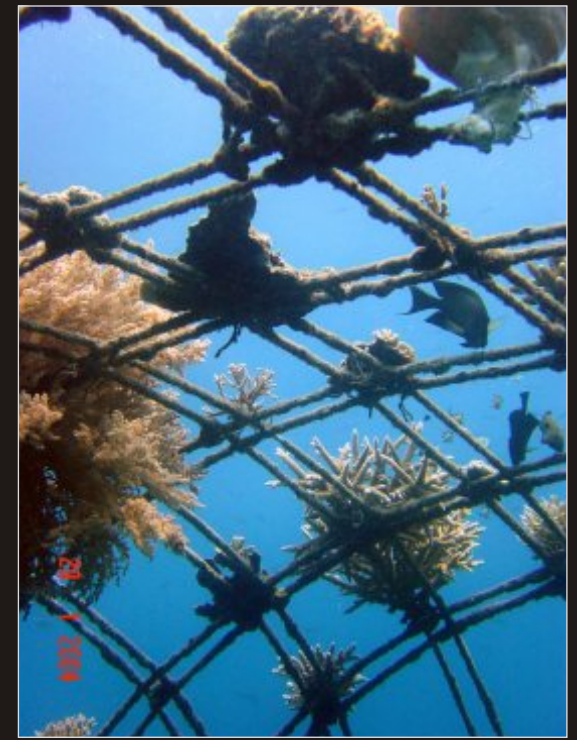


fig.22



fig.23

Pilot installations built with the *Biorock*® Technology in Jamaica, Mexico, Panama, Indonesia, Maldives, Thailand, Seychelles, Palau, Philippines, Marshall Islands, French Polynesia, St. Martin, Turks and Caicos, Tobago and Bahamas demonstrate rapid coral growth even in stressed environments.



fig.24



fig.25

Biorock[®] structures serve as fish attracting devices and host a wide range of marine life.



fig.26



fig.27



fig.28



fig.29

These rehabilitation platforms for corals can be designed in almost any shape and are therefore ideally suited for the development of quality tourist attractions. Unique diving and snorkelling trails can be devised by seascapeing the marine environment with Biorock[®] Technology.



fig.30



fig.31



fig.32



fig.33

Biorock® Technology
was developed by
Biorock Inc. (U.S.
Patent No. 5543034,
Hilbertz and Goreau,
1996)

Further Information on
the internet:
www.biorock.net
www.globalcoral.org
www.deep-scape.de



fig.34



fig.35



fig.36

	<i>photographed by</i>	<i>location</i>	<i>date</i>	<i>notes</i>
fig.01	Ari Spenhoff	Pemuteran, Bali, Ind.	Jan 04	2nd Biorock Workshop; Wolf Hilbertz explaining the design of a Biorock Reef module
fig.02	Ari Spenhoff	Florida, USA	Jul 07	Computer model of a Biorock Reef setup
fig.03	Ari Spenhoff	Seevetal, Germany	Apr 06	Visualization of a possible Biorock Reef in form of a turtle
fig.04	Ari Spenhoff	Pemuteran, Bali, Ind.	Jan 04	Dr. Thomas Goreau doing a video documentation of coral growth on Biorock Reefs
fig.05	Wolf Hilbertz	Gili Trawangan, Ind.	Nov 06	4th Biorock Workshop; welding of a Biorock Reef module
fig.06	Ari Spenhoff	Pemuteran, Bali, Ind.	Jan 04	2nd Biorock Workshop; welding of Biorock Reef module "Manta"
fig.07	Ari Spenhoff	Gili Trawangan, Ind.	Nov 06	4th Biorock Workshop; welding of a Biorock Reef module
fig.08	Wolf Hilbertz	Gili Trawangan, Ind.	Nov 06	4th Biorock Workshop; welding of a Biorock Reef module
fig.09	Wolf Hilbertz	Gili Trawangan, Ind.	Nov 06	4th Biorock Workshop; transportation of a Biorock Reef module by a small boat and divers
fig.10	Wolf Hilbertz	Gili Trawangan, Ind.	Nov 06	4th Biorock Workshop; transportation of a Biorock Reef module by participants of the workshop
fig.11	Ari Spenhoff	Gili Trawangan, Ind.	Nov 06	4th Biorock Workshop; floating of a Biorock Reef module to the right position in the reef
fig.12	Wolf Hilbertz	Gili Trawangan, Ind.	Nov 06	4th Biorock Workshop; floating of a Biorock Reef module to the right position in the reef
fig.13	Ari Spenhoff	Gili Trawangan, Ind.	Nov 06	4th Biorock Workshop; Biorock Reef module placed in 18 m depth
fig.14	Ari Spenhoff	Gili Trawangan, Ind.	Nov 06	4th Biorock Workshop; Wolf Hilbertz laying out cables to be connected with a Biorock Reef
fig.15	Ari Spenhoff	Gili Trawangan, Ind.	Nov 06	4th Biorock Workshop; a film crew documents the attachment of names from sponsors
fig.16	Ari Spenhoff	Gili Trawangan, Ind.	Nov 06	4th Biorock Workshop; diver connecting cables to Biorock Reef module
fig.17	Julia Jörgensen	Pulau Gaya, Malaysia	Apr 02	Ari Spenhoff; collecting broken coral fragments that would have otherwise most likely died
fig.18	Ari Spenhoff	Gili Trawangan, Ind.	Nov 06	4th Biorock Workshop; diver tying coral fragments to the Biorock Reef frame
fig.19	Ari Spenhoff	Pemuteran, Bali, Ind.	Jan 04	2nd Biorock Workshop; Julia Jörgensen tying coral fragments to the Biorock Reef frame
fig.20	Ari Spenhoff	Pemuteran, Bali, Ind.	Jan 04	2nd Biorock Workshop; divers have finished to tie corals to the steel frame of "Manta"
fig.21	Ari Spenhoff	Gili Trawangan, Ind.	Nov 06	2 years old Biorock Reef module
fig.22	Ari Spenhoff	Sambirenteng, Bali, Ind.	Jan 04	1 year old Biorock Reef module (electrified ca. 1 month)
fig.23	Ari Spenhoff	Pemuteran, Bali, Ind.	Jan 04	coral, tunicates and fishes at Biorock Reef module
fig.24	Ari Spenhoff	Pemuteran, Bali, Ind.	Nov 05	soft corals on Biorock Reef module "Ibu Bunga Karang"
fig.25	Ari Spenhoff	Pemuteran, Bali, Ind.	Nov 05	resident school of snappers that moved to the Biorock Reef garden shortly after implementation
fig.26	Ari Spenhoff	Gili Trawangan, Ind.	Nov 06	2 years old Biorock Reef module
fig.27	Ari Spenhoff	Pemuteran, Bali, Ind.	Nov 05	5 years old Biorock Reef module "Nautilus"
fig.28	Ari Spenhoff	Tulamben, Bali, Ind.	Dec 05	Fishes are attracted by shelter provided in Biorock Reefs
fig.29	Wolf Hilbertz	Pemuteran, Bali, Ind.	Nov 05	Ari Spenhoff doing a photo documentation of coral growth on the "Nautilus"
fig.30	Ari Spenhoff	Pemuteran, Bali, Ind.	Jan 04	Frequent visitors at Biorock Reefs are snorkelers and fish (at "Bumbung")
fig.31	Ari Spenhoff	Pemuteran, Bali, Ind.	Jan 04	Julia Jörgensen at "Ibu Karang" (= mother of corals)
fig.32	Wolf Hilbertz	Pemuteran, Bali, Ind.	Dec 02	2 year old Biorock structure "Nautilus"
fig.33	Ari Spenhoff	Pemuteran, Bali, Ind.	Nov 05	4 year old Biorock structure "Bumbung"
fig.34	Ari Spenhoff	Pemuteran, Bali, Ind.	Nov 05	1 year old Biorock Reef module "Manta"
fig.35	Ari Spenhoff	Seevetal, Germany	Jan 04	cut off piece from 2 years old Biorock structure
fig.36	Leong Sze Wong	Gili Trawangan, Ind.	Nov 06	4th Biorock Workshop; Biorock team members