

La Parguera Reef Monitor Update

A joint effort of ReefKeeper International and
Buzos Ecológicos de La Parguera
to monitor La Parguera's coral reefs

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La Parguera: Some of Puerto Rico's Finest Reef Sites

The island of Puerto Rico boasts lavish reef assemblages, especially off the southwestern coast. The coral reefs off La Parguera lie 28 km southeast of Mayaguez and are considered to be some of the best developed reefs surrounding the island. In an attempt to preserve these pristine reefs, ReefKeeper International in concert with the local group Buzos Ecológicos de la Parguera, began to monitor four reefs off La Parguera (Chimney, Media Luna, Turrumote I, and Hole in the Wall) in March 1996. These monitoring events have continued on a quarterly basis and are aimed at tracking prevailing conditions on these reefs.

This Reefmonitor Update summarizes the results obtained over 3 quarterly monitorings carried out through September 1997 for two nearshore (Media Luna, Turrumote I) and two offshore (Chimney, Hole in the Wall) patch reefs between Punta Parguera and Phosphorescent Bay, and within the La Parguera Natural Reserve.

Overall, the results show La Parguera's corals to be well developed and in good health. The reefs, on average, are strongly dominated by hard coral (49% average bottom cover) as opposed to algae (8% average bottom cover). The health indices for these reefs are high, with only an average of 7% of coral heads sick or bleached. There is, however, a probable warning sign of future weakness off La Parguera, particularly on Turrumote I reef, which features a relatively higher percentage (12%) of algal cover.

Nutrication from coastal development and many nearshore stilt houses, and sedimentation from coastal hill clearing may lead to future degradation of La Parguera's nearshore coral reefs.

Survey Locations:

Why Monitor These Reefs?

La Parguera coral reefs are considered to be some of the finest and best developed coral reefs off Puerto Rico. According to Goenaga and Cintron (1979), La Parguera reefs experience high productivity due to (1) limited rainfall, (2) minimal soil run-off, and (3) large quantities of organic matter contributed by the mangrove communities.

The La Parguera reefs have been subjected to little pressure from industry or development. However, increased deforestation of La Parguera's coastal limestone hills, resort development, domestic waste discharge

from numerous stilt houses in the bay, and proximity to major industrial areas could potentially damage these reefs. Therefore, reef monitoring for selected reefs off La Parguera (Chimney, Hole in the Wall, Media Luna, and Turrumote I) was begun in 1996 to watchdog against negative trends that may affect the quality of the reefs.

These four reefs, 2 nearshore and 2 offshore, are located off Puerto Rico's southwestern coast between Punta Parguera and Phosphorescent Bay, and within the La Parguera Natural Reserve. The 2 nearshore patch reef sites, Media Luna and Turrumote I, lie approximately 1 km from shore. They form a convex arc to the south, with depths of 7 to 8 meters, and each reef faces the incoming waves from the east-south-east. The 2 offshore

patch reef sites, Chimney and Hole in the Wall, lie approximately 5 km from shore and form part of the outer line of reefs with depths of 18 to 21 meters.



ReefKeeper's reef monitoring protocol uses 2 or more separate 50-meter transects laid out at each reef site studied using factory-marked fiberglass transect tape that follows the depth contour of the reef site. Point-intercept bottom cover data is noted at half-meter intervals along the 50 meters, producing 100 bottom cover data points for each transect. For hard coral colonies at data collection points, health condition is noted and species are identified when possible. If feasible, a visual record of each transect is made with photos taken every four meters along each transect and/or with a continuous video of each transect. This monitoring procedure is repeated every three months.

**Survey Results:
What Was Found**

The bar and pie charts illustrating this report summarize the March 1996 through March 1997 survey results for Chimney and Hole in the Wall reefs, and the March 1997 through September 1997 survey results for Media Luna and Turrumote I reefs.

Chimney Reef, one of La Parguera's offshore reefs, featured a hard coral bottom cover which averaged 53.3%. Algal bottom cover was negligible, averaging 0.4%, and the White Encrusting Zoanthid (*Palithoa* sp.) covered less than 1% of the reef surface. Coral species identification and coral health data were not recorded for Chimney reef.

The hard coral cover for Hole in the Wall, the second of the two offshore reefs, averaged 56.7%. Algal cover occupied 8.9% of the transects, and zoanthid coverage was negligible. Coral species identification and health data were not recorded.

Considered together, these offshore reefs show an average bottom cover of 55% hard coral, 4.7% algae, and less than 1% white encrusting zoanthid. These numbers indicate that the ratio of hard coral bottom cover to algal bottom cover was nearly 11-to-1 in favor of coral. Coral species and health were not recorded for either reef.

As for the nearshore reefs, Media Luna reef expressed a hard coral cover of 49.9%, an algal cover of 9.5%, and white encrusting zoanthid cover of less than 1%. Fourteen species of coral were observed, of which *Montastrea annularis* (Mound Star Coral) and *Colpophyllia natans* (Boulder Brain Coral) were most abundant. Coral health was good, with an average health index of 90.3%.

The hard coral cover for Turrumote I, the second nearshore

reef, averaged 36.4%. Algal bottom cover was high, averaging 21.7%, and *Palithoa* sp. covered less than 1% of the Reef's surface. Fourteen species of hard coral were identified along the transects, of which *Montastrea annularis* (Mound Star Coral) and *Porites porites* (Finger Coral) were most abundant.

nearshore (Media Luna, Turrumote I) reefs, the most significant difference noted was the ratio of hard coral to algal cover. While the ratio is a fantastic 11-to-1 on the offshore reefs, the ratio is a much more conservative 3-to-1 on the nearshore reefs. Since coral species identification and health data were not recorded for the offshore reefs, there is no comparison available for these factors.

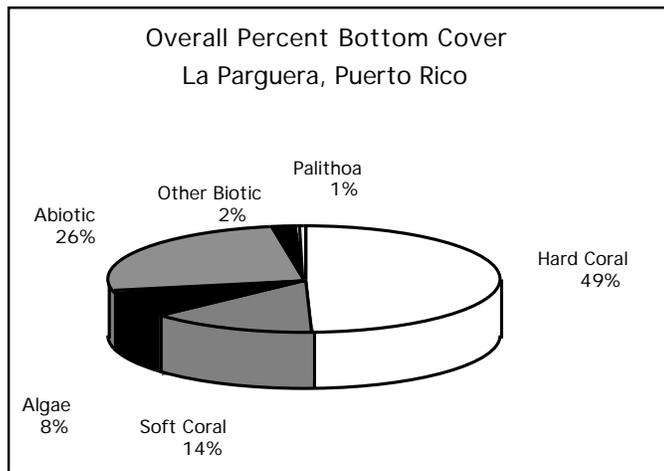
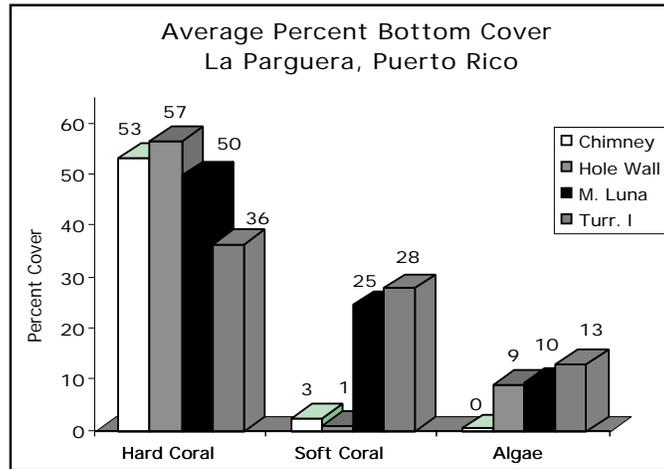
**Significance:
What Do the Results Mean**

Healthy, thriving coral reef systems are predicated on high coral growth and low algal encroachment, as well as a low incidence of sickness and/or disease. Thus it appears, and survey results suggest, that La Parguera's reefs may be at future risk of experiencing an unhealthy shift from coral reefs to algal reefs as they approach shore (Chimney to Turrumote I).

The offshore reefs have a coral to algae ratio of 11-to-1 in favor of coral, whereas the nearshore reefs express a much-reduced ratio of 3-to-1.

Possible explanations for this shifting trend include: 1) effluent from nearby resorts and stilt houses (carried on the currents from a south-easterly direction) causing nutrification and increased algal growth near the coast, 2) siltation due to coastal deforestation, shading corals and increasing turbidity closer to shore, and 3) the effects of recreational pressure, including bilge water from boats, prop wash, and anchor damage.

In addition to the possibility of algal domination, the health of the coral colonies on these nearshore reefs may be at risk. The same processes favoring algal growth may be leading to decreased coral health



Coral health was excellent, with an average health index of 91.2%.

Considered together, the two nearshore reefs averaged bottom cover of 43.1% hard coral, 15.6% algae, and a negligible cover of white encrusting zoanthid. These numbers indicate that there is a 3-to-1 ratio in favor of hard coral over algae bottom cover. Average coral health was excellent at 90.7%, and identified coral species averaged 14 per reef site.

Comparing the offshore (Chimney, Hole in the Wall) reefs to the

Why Monitor Reefs?

If you don't monitor the oil level in your car's engine, sooner or later you're going to be out of oil and out of an engine. The analogy strongly applies to coral reefs, and that's why ReefKeeper International sponsors reef monitoring by local volunteers. There's really no other way to catch problems before they become catastrophic — or even better yet, before they begin by having data to make a case against reef-threatening human action. These volunteer reef monitors watchdog significant coral reef sites for changes in coral health, coral cover and other key early warning signs of environmental impact. The gathered data is sent to ReefKeeper, where it's analyzed for use in conservation efforts. Most significantly, these monitoring activities act as a deterrent, serve as a catalyst for other local conservation action, and focus attention on the value of these reef sites.

and, as such, degrading these reef resources. Since health data was not recorded for the nearshore reefs, whether these processes are having an effect on the health of these reefs or not cannot be assessed.

Recommendations: Things to do

Much care and caution should be exercised to stave off human impacts and prevent algal domination of La Parguera's nearshore reefs. The time to act is now, while conditions are still favorable to coral development.

Some suggestions that may help maintain, or even increase, hard coral cover and coral health off Punta Parguera would be to: (1) stop the discharge of untreated sewage into Parguera Bay from stilt houses, (2) discharge treated wastewater from resorts downcurrent and offshore of the reefs, (3) assess hill clearing conditions and limit clearing wherever the runoff would affect nearshore marine habitats, (4) implement the use of turbidity curtains and silt screens during construction to reduce the amount of suspended matter in the water and avoid coral smothering, and (5) adopt La Parguera Natural Reserve regulations to protect all marine habitats from such impacts.

Continued monitoring of La Parguera's reefs is crucial to watchdog the potential for worsening reef conditions off and nearshore.

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Boat Use Generously Donated By:
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CORAL SPECIES PRESENT

Site	La Parguera	La Parguera
Species	Media Luna	Turrumote I
Acropora cervicornis (Staghorn coral)	x	x
Acropora palmata (Elkhorn coral)	x	
Agaricia agaricites (Lettuce coral)		x
Colpophyllia natans (Boulder brain coral)	x	x
Dendrogyra cylindrus (Pillar coral)	x	x
Diploria labyrinthiformis (Grooved brain coral)	x	
Diploria strigosa (Symmetrical brain coral)	x	x
Eusmilia fastigiata (Smooth flower coral)		x
Meandrina meandrites (Maze coral)	x	x
Millepora alcicornis (Branching fire coral)		x
Millepora complanata (Blade fire coral)	x	
Montastrea cavernosa (Great star coral)	x	x
Montastrea annularis (Boulder star coral)	x	x
Porites astreoides (Mustard hill coral)	x	x
Porites porites (Finger coral)	x	x
Siderastrea radians (Lesser starlet coral)	x	x
Siderastrea siderea (Massive starlet coral)	x	x
SPECIES TOTAL	14	14

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