REEF CURRENTS

NEWLETTER FOR THE NORTHERN MARINE RESERVE MANAGEMENT UNIT

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Editor's Note: Coral Reef of Northern Belize

World Wide coral reefs are in decline due to natural and human induced threats. This is perfectly exemplified by the drastic reduction of coral cover of over 50% in the Mesoamerican reef.

In the 1980s the Belize Barrier Reef witnessed large scale impact from disease and coral bleaching. The long spine sea urchin (*Diadema antillarum*) suffered widespread mortality throughout the Caribbean. The disease wiped out 95% of the *Diadema* population and gave way to an accelerated algal growth.

Ocean warming events are thought to be the cause of coral bleaching and since the early 80s we have had several such events. The most severe one was recorded in 1998 which coupled with hurricane Mitch caused the greatest impact to our coral reef.

Impacts are further compounded by local threats such as unsustainable development, pollution, overfishing and direct impacts from recreational use. That is why the Northern Marine Reserve Management Unit implements a coral reef monitoring program. Through this program we can determine the current status of our reef and look at trends over time.

This Issue will focus on Corals; highlighting the work being carried out in the north and provide information on current threats to the reef.

INSIDE THIS ISSUE

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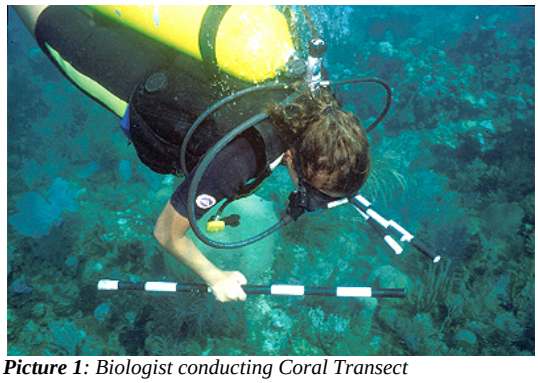
Benthic Cover Monitoring (Corals)



***Picture 1**: Biologist conducting Coral Transect*

The Belize Barrier Reef is under increased pressure from human induced stressors such as coastal and tourism development; pollution for point and non-point sources; tourism recreational activities and other unsustainable uses. Added to this we also experience periodic, natural phenomenon, including storms and hurricanes.

Therefore an adequate monitoring method is essential to answer important questions of reef health and assist in management of this unique resource.

Corals are sampled using thirty meter transects as developed under the Synoptic Monitoring Program of the Mesoamerica Barrier Reef System Project. First a diver lays down the thirty meters line following the contour of the reef. The diver then proceeds to conduct a point intercept transect by identifying and recording what is under the line at every 25 centimetres interval. At the end of each transect the diver should have recorded a total of 120 points. This method will allow for the computation of percent cover for each substrate type.

Once the Point Intercept swim is completed the diver swims back along the line to conduct a characterization of this coral community. Each coral colony over 10 cm in diameter is recorded down to species. Height and width is measured as well as recent or old mortality. The coral colony is also analyzed for any disease and bleaching.

A total of four sites are sampled in each Marine Reserve; two on the back reef and two in the fore reef. Surveys are conducted in April and August of each year.

Coral Monitoring Results

Hol Chan Marine Reserve

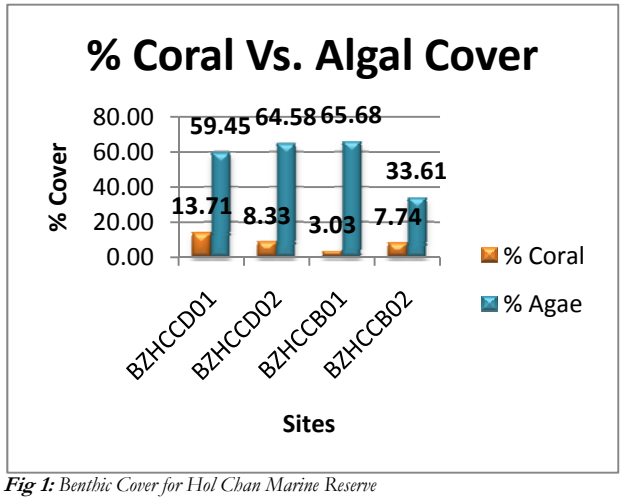


Fig 1: *Benthic Cover for Hol Chan Marine Reserve*

The Hol Chan Marine Reserve (HCMR) had a coral cover of 8.2%, algae cover was 55.8% and other substrate was 33% for 2008. The HCMR has experienced a drastic reduction in coral cover since the bleaching event in 1998.

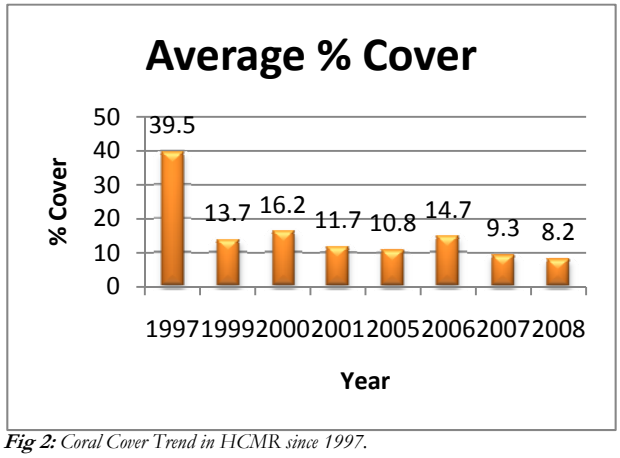


Fig 2: *Coral Cover Trend in HCMR since 1997.*

The graph above clearly illustrates the decline in coral cover. In 1997 we recorded a coral cover of 39.5%. Today this figure is below 10%. Coral mortality appears to have stabilized. In 2008 we recorded only 1.4% of recent mortality compared to 18.6% of old mortality.

Caye Caulker Marine Reserve

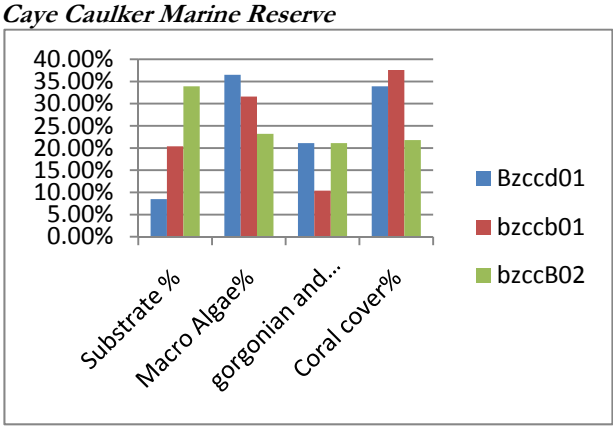


Fig 3: *Benthic cover for Caye Caulker Marine Reserve*

Due to bad weather only three sites were surveyed in Caye Caulker in 2008. Coral cover recorded an impressive 31%, while macro algae was 30% and other substrate was 39%. Recent and old coral mortality appears to be low in Caye Caulker with 0.3% and 9.2% respectively.

Bacalar Chico Marine Reserve

There is little available data for Bacalar Chico Marine Reserve. However the average coral cover is approximately 34%, algal cover 36% and other substrate 30%.

Summary

In 2007 the Mesoamerican Barrier Reef System Project produced a report title "Status of the Coastal and Marine Monitoring Activities in Belize". This report found that the Mesoamerican Reef Region has an average coral cover of 23.47%. The lowest mean percent coral cover ws reported from Gladden Spit, Port Honduras and Hol Chan Marine Reserve. The Highest were recorded at South water Caye, Caye Caulker and Bacalar Chico Marine Reserve.

In 2008 the Healthy Reef Initiative produced a report that used an 'Integrated Reef health Index'. The study found that 53% of Belize's coral reefs are in poor condition, 39% Fair, 5% Critical and only 3% in good condition. The report also highlighted that the main threats include coastal development and marine dredging; inland clearing and agriculture; overfishing; rising temperatures and storms.

Fisheries Regulation, 2009 (Species Designation and Protection)

A new fisheries regulation was passed in September to protect the bone fish, Tarpon and permit. The new regulations specify that:

- No person shall have in his possession any bonefish, permit fish or tarpon or any of its product forms, save and except in the act of catch and release.
- No establishment shall have in its possession any bonefish, permit fish or tarpon or any of its product forms.
- Every person who contravenes these Regulations commits an offence and is liable on summary conviction to a fine of fine of five hundred dollars or to imprisonment for a term of six months, or to both fine and imprisonment.

Reef Facts: Coral Bleaching

Picture 2: *Bleached Coral*

Corals obtain nutrients and energy from two sources. They capture planktonic organisms using their tentacles as well as having a symbiotic relationship with a single cell algae called Zooxanthellae. Zooxanthellae are Autothrophic microalgae, meaning that they manufacture their own food using solar energy through a process called photosynthesis. This symbiotic relationship provides the coral with nutrients produced through the photosynthetic process of the algae which is used for energy, enhance calcification and to mediate elemental nutrient flux. In return the coral polyps provide the algae a protective environment on which to live and carbon dioxide form respiration.

This allows the corals to feed by day through photosynthesis and by night through predation allowing it to have a competitive advantage over faster growing multicellular algae.

Coral reef bleaching occurs as a stress response of corals to environmental disturbances such as increased sea surface temperature. Coral live within a narrow temperature margin and will frequently bleach if there is a 1-2 C degrees increase in water temperature for 5-10 weeks duration.

During bleaching events the symbiotic Zooxanthelae is expelled for within the polyp. When this happens the coral turns white since the polyp alone is clear and the calcium carbonate skeleton is white.

If the bleaching is not severe and prolonged the coral will usually regain its Zooxanthellea and survive. If the stress causing bleaching is prolonged the coral will eventually die.

To monitor bleaching event the Northern MPA Management Unit has a total of eleven temperature logger deployed in Bacalar Chico, Hol Chan and Caye Caulker. Additionally, if bleaching was to occur an assessment would be conducted following an already established protocol especially designed to determine the extent and effect of a bleaching episode.

Coral Spawning At Caye Caulker

Picture 2: *Healthy M. faveolata observed at Carrie Bow, releasing gametes (photo by N. Fogarty)*

A coral spawning group was formed in CCMR for two nights to monitor Elkhorn spawning at the North Channel Mini Reef. The team went out on the second night of the full moon on the 8th August 2009. The team was in the water at 8:30 p.m until 10:30 p.m. The elkhorn was observed but no sign of egg bundles were seen. The team prepared to go out on Sunday August 9th but the rough weather did not permit to check on the spawning. On the third night, August 11th 2009, another attempt was made but no spawning was observed.

On September 6th-8th 2009 Coral spawning was once again monitored in the North Channel of Caye Caulker. On all three consecutive days no spawning was observed. All three days, from the 6th-8th, the team observed corals from 8:30 p.m to 10:30 p.m but no egg bundles were observed on any corals.

The staff of CCMR would like to extend a big thank you to Tsunami Tours, Anwar tours, Hicaco Tours, for their support to this project, to the Fisheries Department for technical support, to the community of Caye Caulker especially FAMRACC, Siwaban and Ocean Academy for assisting us during the monitoring.

The Caribbean Coral Reef Ecosystems (CCRE) team stationed at Carrie Bow Caye in the South Water Caye Marine Reserve, embarked on a similar monitoring from the 7th to the 12th of August 2009. On the 7th the team observed *Acropora cervicornis* (Staghorn) and *Acropora palmata* (Elkhorn) spawning from 8:54-9:10pm. The 8th, 9th and 10th of the month no spawning activity was noted by the team. It was not until the 11th of August that two colonies of *Montastraea annularis* (Boulder Star Coral) and two colonies of *Montastraea faveolata* (Mountainous Star Coral) were observed spawning at 10:45-11:15pm.

Corals can reproduce both asexually and sexually. Asexual reproduction occurs when the parent polyp reaches a certain size and divides or is simply broken off. The fragment then continues it growth. Sexual reproduction occurs in two ways: the sperm of a coral swims to the polyp and fertilizes the egg internally; or the coral may spawn. Coral spawning is a natural occurrence where multiple coral release their gametes into the water column at the same time.

Environmental Education Corner

Responsible Tour guiding Seminar

Picture 3: *Responsible Tour Guiding Seminar at Caye Caulker*

It's here again! Hol Chan is once again hosting its yearly Responsible tour guide session here in San Pedro Town and Caye Caulker Village. Invitation letters were given to each dive shop and they will later be contacted by phone to set up a time and date for us to visit their dive shop. These sessions will be starting on September 30th through to October 22nd, for Caye Caulker the dates will be October 16th and 17th.

This year's sessions will include information on the expansion of Hol Chan to include the Cangrejo Shoals, as well as its rules and regulations.

For the first time, this year Caye Caulker and Bacalar Chico Marine Reserve will be included in the session. Staff of these two Marine Reserves will be providing presentations in the seminar. This is an effort from the Northern Marine Reserve Management Unit to expand and improve our education and outreach program.

It is important that all dive shops participate since this is a voluntary program that will benefit the knowledge base of guides and improve the quality of tours. Therefore, all dive operators are encouraged to arrange a session with the Hol Chan Office in San Pedro as soon as possible. You can do so by contacting Ms. Mariela Archer, Environmental Educator at 226-2247.

Turtle Monitoring Program Update

Picture 5: *Inspecting Turtle nest after hatching*

The turtle nesting season is approaching its end. So far we have identified a total of 18 nests. Sixteen were found in the one kilometre stretch of beach in Robles point. Two were found on the 50 meter beach at north Rocky point. Seven nests are for the Green turtle (*Chelonia mydas*) and nine are from Logger head turtles (*Carreta carreta*).

All nests have hatched except three nests that are projected to hatch on Thursday October 8. A total of 1539 eggs were laid in the 16 nests that have hatched so far. Of this total 57% have been live hatchling, 13% dead hatchlings and 30% of undeveloped eggs. It is important to note that two nest were spoiled by sea water inundation due to high tidal influx.

Making Waves

With the Belize Fisheries Department

Making Waves is radio show sponsored by the Fisheries Department to discuss issues related to fisheries management as a whole. Each week the show's hosts bring new guest from various sectors to share in the discussion. It is an interactive show were the public is given the opportunity to call in an ask questions or voice their opinion. Making Waves is hosted by Mr. George Myvett and Ms. Kirah Forman every Tuesday at 7 pm on Love FM radio frequencies: San Pedro 98.1 & Caye Caulker 88.9. Numbers to call in: 203-2098/0528/2281/2247

REEF HUMOR