

Introduction

Coral Cay Conservation (CCC) is a U.K based N.G.O currently working in Padre Burgos, Southern Leyte at the invitation of and in partnership with the Provincial Government of Southern Leyte and the Philippine Reef & Rainforest Conservation Foundation Inc (PRRCFI), to assess and survey the marine resources and environments available in Sogod Bay. The *Southern Leyte Coral Reef Conservation Project* (SLCRCP) is a six-year collaborative project (2002-2008), to survey the coral reefs of Sogod Bay. The program provides training and conservation education opportunities for local Filipinos, as part of an integrated program to develop local capacity and ensure the long-term protection and sustainable use of marine resources throughout the region.

Using baseline survey techniques the program is designed to gather data about the biological and morphological standing of Sogod Bay. These data are combined with information on human and natural impacts on the reefs, along with oceanographic data, to ultimately produce a Geographical Information System 'map' of the various habitats of the bay. It is like a 'stock-take' of the current marine resources, which is being produced to provide policymakers and concerned institutions with information necessary to effectively manage those resources.

In May 2006, CCC worked closely with PLAN Int. in the Brgy. Biasong in Libagon, So. Leyte, to assess the marine resources available, in order set up a Marine Protected Area (M.P.A) in the Barangay. M.P.As, also known as Fish 'Sanctuaries' work by setting an area of reef aside, where no fishing or boat activity can take place, allowing for fish size and stock growth in the area (fig. 1). This allows juveniles to reach a reproductive age and spawn young in a safe environment: a single 12kg Snapper (locally known as *Maya-Maya*) will produce almost as many offspring as 100 1.1kg snapper, due to its reproductive cycle. The juveniles will eventually leave the sanctuary as young adults where they can be caught by fishermen. This means that in the long term, locals will eat larger fish, and have a more sustained stock for the future.

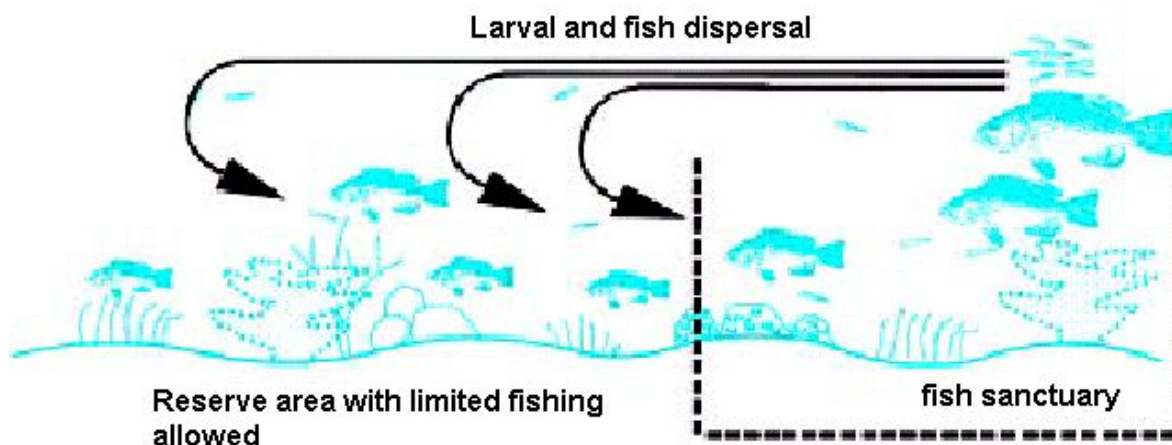


Fig. 1: Larval dispersal from an MPA to the fishing area

PLAN had discussed with the Brgy. Council the implementation of an M.P.A and its proposed site, and then approached CCC to carry out data collection and surveys around the proposed M.P.A site.

Methods

CCC sent three survey teams to Biasong over the 15th and 16th May 2006 to conduct both 'baseline surveys' and 'Rapid Reef Assessment' (RRA). Baseline surveys are conducted using 4 SCUBA divers per team. The team starts their survey at around 25m depth and swims on a bearing perpendicular/square to the shore. The team collects data on the physical aspects of the reef: temperature, salinity, topography, current, substrate types, and any underwater impacts from human activity; the fish families and species and their abundances, and the percentage cover of coral species, sponges, soft corals and abundances of invertebrates, such as crabs and lobsters. As the team swim perpendicular to shore the marine organisms are related to the ever decreasing depth in what is known as a habitat 'map'. This places an importance of depth on marine organisms, and their natural habitats. It took 2 dives per team to complete the surveying of each baseline survey, known as a transect, surveying from 25m up to 2m. The three teams were deployed at 50-100m apart along the reef to give an impression of changing habitats and reef structures along the Brgy. shoreline.

After Day 1, (15th) the CCC science team discussed the results as found that the baselines had shown very different habitats, with the central team of the 3, finding the best coral cover and fish abundance. Therefore, the second day saw the three teams undergo Rapid Reef Assessment (RRA) which collects the same data set as Baseline surveys, but the teams swim parallel to the shore line. RRA allows the teams to identify and 'home-in-on' the most diverse area of reef in quickly changing habitats. By swimming parallel to the shore at a set depth, the CCC team could find an area of good coral cover and fish abundance to identify as the best area for the proposed M.P.A.

Results

Baseline: The 3 surveys showed very different results, between them. The northern survey, led by the Project Scientist, Olly Wood, found poor coral cover with a mainly sandy, silty substrate with interspersed rubble and dead coral at depth. In shallow waters the 'reef' was almost >75% sand and silt substrate from a depth of 14m up to 4.5m.

The middle survey, led by Science Officer, Katie Dann, found the most biologically diverse area with the highest percentage cover of corals and economically valued fish abundances of the 3 three surveys. There were a large number of invertebrates, sponges and soft corals along this transect.

The most southern most transect, on the edge of the Brgy. boundary, led by Expedition Leader, Inge Smith and Education Co-coordinator, Karen Holman, found similar results to that of the northern survey, with a large percentage of sand and silt cover, with few commercially viable fish; however, there seemed to be a greater number of invertebrates, soft corals and sponges in this area.

Both the North and Southern transects were rated as aesthetically and biologically poor compared to the mid sector which was rated as average for the Sogod Bay area.

Transect	North	North	Mid	Mid	South	South
Depth	24-14m	13.5-4.5m	24-13m	12-2m	23-15m	15-7m
Sector no.	1	2	3	4	5	6
Butterflyfish	1		1	1	1	2
Angel Fish				1		
Fusilier	2	2		1	1	
Damselfish	4	4	4	4	4	4
Wrasse	2	1	2	4	2	2
Grouper	1			1	1	1
Parrot			1	2		1
Spinecheek		1	1	2	1	1
Snapper			1	1		1
Anthias		3	3	3		4
Sweetlips	1					
Moorish Idol				1		
Lionfish				1		1

Table 1: Fish abundances for each section of the 3 transects completed using baseline survey techniques.

The table above shows fish abundances for the 2 dives per transect on a scale from 0-5; known as the DAFOR scale which rates abundances on a semi-quantitative scale, with 0 being absent, 1 being 'Rare' up to 5 being 'Dominant'. We can see that each sector of each transect had abundant damselfish, which shows little between the sites; however, the sector no. 4 has scores for nearly all the fish families found in the area. Butterflyfish, Angelfish, Moorish idols and Lionfish show good reef health; all of these fish were found in this sector. Also the commercially important fish, Wrasse, Groupers, Parrotfish and Spinecheeks were also found in their greatest numbers in these sectors in the region.

Transect	North	North	Mid	Mid	South	South
Depth	24-14m	13.5-4.5m	24-13m	12-2m	23-15m	15-7m
Sector no.	1	2	3	4	5	6
Algae	1	1	1	1	1	1
Seagrass	0	2	0	1	0	0
Live Hard Coral	1	1	1	1	1	2
Soft Coral	1	1	1	1	1	1
Sponges	1	1	1	1	1	1
Mobile Inverts	1	2	1	2	3	2

Table 2: to show abundances of hard and soft corals, sponges, algae and invertebrates found in each transect sector.

The table above shows the abundances of hard and soft corals, sponges, algae and invertebrates on the DAFOR scale. In this case the scale measures the percentage covers of sessile (non-mobile) organisms as well as abundances of mobile organisms. Live hard corals covered less than 10% in each sector except sector no. 6. The mobile invertebrates were found in greatest abundance in the southern transect (5&6) and both the shallow sectors of the other transects (2&4). However, the species of invertebrate recorded in some cases were different: Sector showed a high number of Nudibranchs (sea slugs), sectors 4 and 6 had many feather stars, and sector 5 also had feather stars but also many long spine *Diadema* sp. Urchins (local:

Tuyom). All of these invertebrates show different factors of health and state of the reef environment.

RRA: The RRA results showed that the best section of reef was found just to the south of the middle transect with larger corals and some commercially viable fish such as Sweetlips and groupers (local: *Lapu-lapu*). This small section was missed using baseline techniques but was highlighted using RRA and parallel surveying. The results for other marine organisms showed similar results as the baseline techniques, with the southern end having more sessile invertebrates, sponges and soft coral cover than the north. The mid section still showed the highest levels of hard coral cover and highest fish abundances.

Discussion

The results, when collaborated, show that the reef in Biasong is in poor to average health. The section outlined by both the Barangay Council of Biasong and PLAN int. is the healthiest section of reef in the small Brgy. bay and the proposed M.P.A site is the best site for it. The whole area is sand dominated with small to medium coral 'bommies' or outcrops.

The section to the south of the small guard tower and lookout point down to the boundary tree is the most diverse biologically and shows the greatest cover of invertebrates, sponges, soft corals and hard corals. The numbers of the DAFOR scale show little variance in hard coral cover, however this semi-quantitative scale is inaccurate on the low end of the scale, grouping all corals with <10% cover in the 'rare' rating. This means anything from a single small coral head of 10cm² cover will be rated the same as 4m² of coral for each sector. Therefore we must rely on the CCC divers' impressions of the sites as well as the true numerical values for each site. The DAFOR rating for other substrates: rock, rubble, dead coral, sand, silt/mud, should also be taken into account for the evaluation of baseline site. The northern end of the bay showed increased levels of sand and silt compared the southern and mid sections. This would be due the increased sedimentation brought on by the river outflows. The sediments brought down by the rivers and streams, clogs coral heads and kills the micro-algae, zooxanthellae, which live in the coral. This micro-algae is needed for photosynthesis, which provides almost 80% of the corals energy which is required to feed. Corals larvae are spawned into the water column and disperse on ocean currents. When they settle they require a hard substrate to form and grow; the increased sedimentation from river outflows, covers any hard rocks and prevents juvenile corals from forming. Further south in the Brgy. of Biasong sedimentation is less dominant and corals are more abundant. A further discussion could include the use of an artificial reef substrate such as hollow blocks, tyres or concrete blocks to increase the substrate available for use by coral larvae as a settlement area. The other possibility which was discussed was the use of a purposely sunk boat as an artificial reef environment within the M.P.A. This has been successfully done in Malitbog and Lungsoda'an, Padre Burgos. Corals, sponges, and invertebrates have all settled and grown on these 'wrecks' which also house and provide protection for juvenile fish. Malitbog wreck has now been designated its own M.P.A status and Lungsoda'an although only 8 months old shows large growth and is home to some rare angelfish. It could be worth placing a large old banca boat in the Biasong region to help the fish stocks and coral cover increase.

With corals in low abundance in the area, the M.P.A needs to be set up to accommodate these, and the proposed site does include the area of greatest coral cover. As fish and many invertebrates rely on these corals for food, protection at the

smallest level is needed. An M.P.A is an effective way of preventing further damage to these few corals. The M.P.A also includes all the areas where the large commercial fish were sighted; protecting these areas will not only increase commercial fish stocks but also catch size in the long term.

CCC have also been reliably informed by local officials (Dag Navarette, Neil Pretencio) that large pelagics, such as rays, sharks and whale sharks can be and have been seen in the area of Biasong. An M.P.A in the area will only gain coral cover, fish stocks and then the more regular sightings of large pelagics. These animals when common become a large tourist attraction, and as Southern Leytes' attraction to SCUBA diving tourists increases, Biasong could become a regular dive site.

Conclusion

Although Biasong, Libagon does not have the best reef, with CCC survey divers only rating it a poor to average site, and the substrate being mainly sand and rubble, the area will definitely gain from the introduction of an M.P.A. The area should have limited boat access and strictly no fishing. Many M.P.As have a central core where no boats may pass, but divers may enter for a fee, and an outer border where boat access is limited to those with a permit i.e. dive boats to pick up divers and where fishing is still prohibited.

The limited corals in Biasong need protection from future fishing practices and the fish levels are very low and an M.P.A can only help to increase these levels. The introduction of an artificial growth area, such as a 'wreck' will again help and speed up the process of increasing the fish stocks which may take months, if not years to increase in such a sand derived area.

The protection from sedimentation and pollution from river run-off needs to be addressed on a long term scheme which could include re-forestation of the upland areas and greater control over sewage treatment and waste disposal.

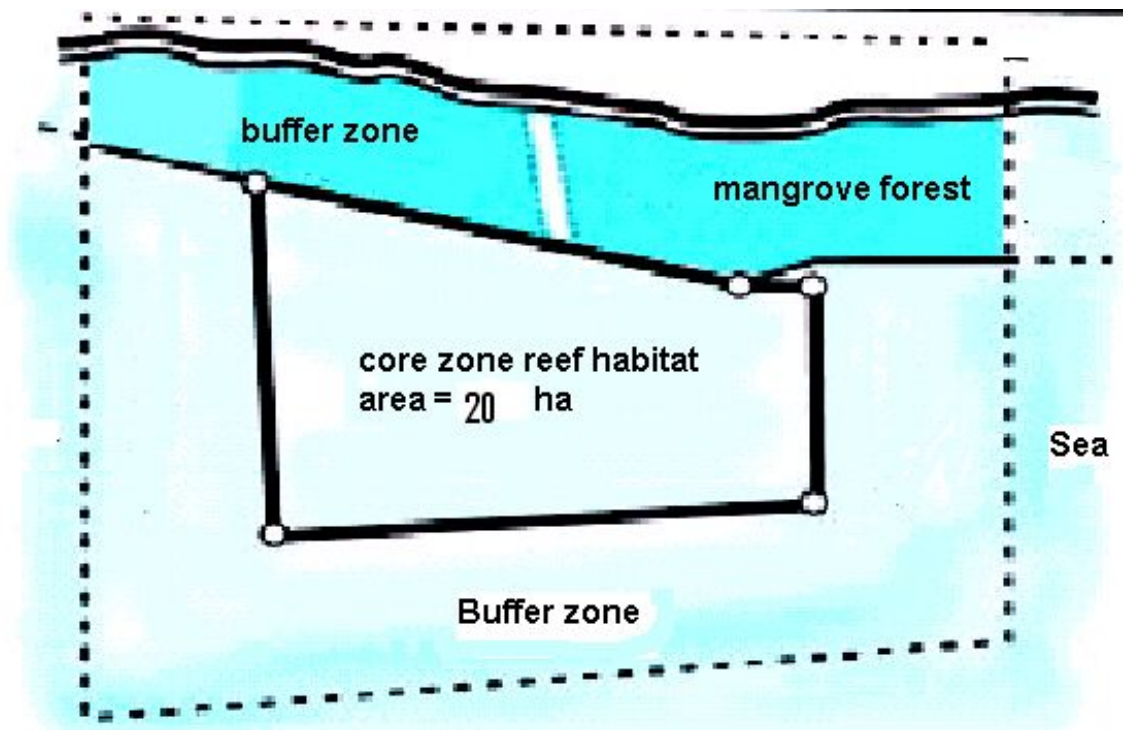


Fig. 2: A schematic diagram of what an MPA in Biasong might look like. A core zone, where there is no fishing or boat passage, is supported by a buffer zone where there is limited access but no fishing.

Final Note

CCC would like to thank PLAN International and the Barangay of Biasong for this opportunity to help in the protection of the marine resources available. Please do not hesitate to contact Coral Cay at the following address:

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