

Lungsodaan Marine Protected Area monitoring results 2005-2006

I



Introduction to Coral Cay Conservation

CCC has carried out marine conservation projects all over the world, including in the Philippines, Belize, Honduras, Malaysia, Fiji and now in Egypt. CCC successfully set up Marine Protected Area's and provided scientific data that has been used to manage local marine resources. The project in Danjungan Island in the Philippines between the years 1996-1999 was particularly successful and the reefs around the island recently received the accolade of Best Managed Reef of the World. Since 1995, CCC has worked with the Philippine Reef and Rainforest Conservation Foundation Inc (PRRCFI) and local communities to survey and safeguard reef and rainforest areas in the Philippines. To date these have included coastal regions of the Southern Negros Occidental, Anilao, Palawan, Danjungan Island and the forests of North Negros. At the invitation of the Provincial Government of Southern Leyte CCC begun its survey work in Sogod Bay in September 2002. CCC is conducting a collaborative program to survey the region's coral reefs and provide training and conservation education opportunities for project counterparts. The aim is to develop local capacity and ensure the long-term protection and sustainable use of marine resources throughout Southern Leyte. We are hoping that we can build on our previous successes, extending our stay here in Southern Leyte.

The Philippines is renowned for its rich marine environment but with as much as 97% of its reefs at risk, immediate conservation action is needed. Children living in coastal areas are recognized as the future stewards of their marine resources and CCC is working closely with this local stakeholder group to raise awareness and increase understanding of the need for greater conservation efforts in the Philippines.

Lungsodaan MPA

In May of 2005, four Marine Protected Areas (MPA's) were installed in the

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municipality of Padre Burgos. The Barangays of Buenavista, Santa Sofia, Lungsodaan and Tangkaan have all set aside a small part of their coastal reef to allow fish stocks to recover and conserve the rich marine life that each of the areas support.

The MPA of Lungsodaan is approximately 4.5 ha large and is a community based MPA. This means that the Barangay community with an emphasis on the fisherfolk have been involved in setting up the MPA and their opinion and advice was used in the deciding on the location of the MPA. Furthermore, they were invited to a seminar about the importance of marine sanctuaries for sustainable fisheries and future livelihoods as fishermen. Municipal council members and other stakeholders, Barangay captains and representatives from CCC paid a visit to Apo Island Marine Reserve off the coast of Dumaguete to have a first-hand look at how a successful marine reserve operates and can be a major source of income and provide an alternative livelihood for the community. On the basis of this excursion, plans were developed to do something similar in Padre Burgos. Diving is restricted in the MPA's and a small

fee of 50 pesos has to be paid per diver. This income goes to managing the MPA. The increase in diving eco-tourism in Sogod Bay makes the MPAs a potential source of income in the near future. Already, the MPAs are proving their value, offering some fantastic diving. This more than anything else, may help continuing the momentum in preserving the rich marine resources of Sogod Bay in general and Padre Burgos in particular. The long term effects will lead to improved fish catch outside of the MPAs as has been shown in Sumilon Isl., the first community based MPA that saw local fish stocks doubling in 10 years time. Only with the full support of the community and upholding of the regulations and laws that apply within the sanctuary will the benefits become evident over the next years.

Marine Protected Areas

MPAs are an important management and conservation tool in protecting existing fish stocks and helping them to recover. In addition to this, they allow coral reefs to grow and pristine reefs are protected from harmful human actions. Over a few years we can already begin to see the benefits that properly managed MPAs provide. A ‘spill over’ of fish from within the MPA to outside the MPA allows fishermen to catch fish, often more so than was the case before and ensures that a healthy fish community remains in the protected area (see diagram below). Community based MPAs have proven to be an effective way in sustainable fisheries and maintaining peoples livelihoods. A third benefit is that they can provide an income from eco-tourism when divers pay a small fee to dive within the MPA. As long as the numbers of divers is restricted and diving is done without touching or interacting with the marine environment, the effects of eco-friendly diving have been proven to be minimal.

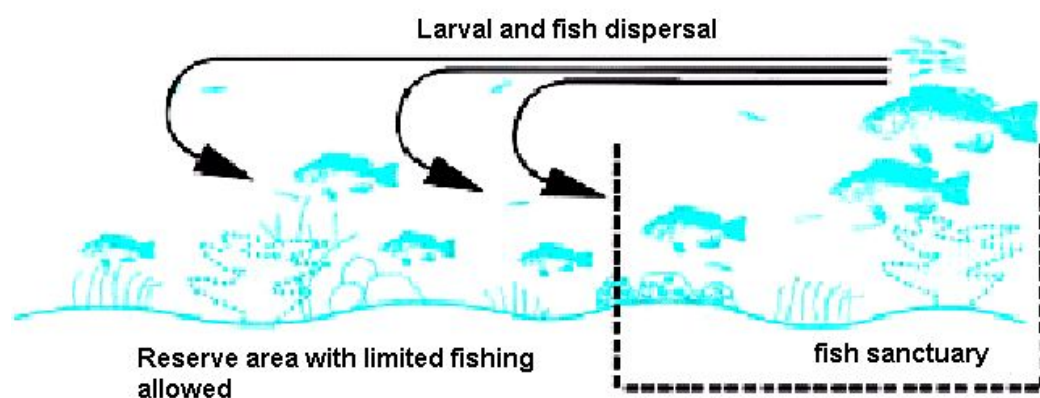


Fig. 1: Schematic diagram of MPA functioning. The large, protected fish within the MPA produce larvae which settle and grow outside the MPA where they can be caught by fishermen. In addition, the corals inside the MPA are not disturbed by direct human impacts. One square km of healthy reef can support over 20 tons of fish per year. One square km of destroyed reef can only produce 3 tons. Bohnsack, 1990

Methods

In 2005, several surveys were conducted within the MPA which are used as baseline data to compare with the more recent data collection, more than a year later. The survey method closely follows the one outlined in the ‘Coral Reef Monitoring for Management’ book put together by the Marine Science Institute of the University of

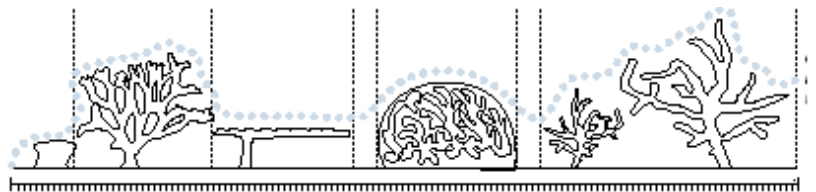
the Philippines, Diliman; the Guiuan Development Foundation Inc. and the Volunteer Service Overseas.

Results from inside the MPA were collected on the 18th of July 2006. Results from outside the MPA were collected on the 20th of July 2006. Results from before the installation of the MPA were collected on the 1st of March 2005. The surveys were carried out at depths of 12 and 6 meters. These depths were chosen because they usually have the highest coral diversity.

Point-intercept transect

For estimating the relative abundance of living and non-living on the reef bottom, a benthos point-intercept transect was used by SCUBA divers. A 50m transect line was laid out along a constant depth of either 6 or 12 meters depth. A note was made of the benthic cover every 25cm along the chain. The total number of points along the transect line was 200. Benthic categories were chosen as follows:

Live Hard Coral	Sponges
<i>branching</i>	Other animals
<i>massive</i>	Turf Algae
<i>flat/encrusting</i>	fleshy macroalgae
<i>foliose/cup</i>	Coralline algae
Soft coral	Seagrass
white dead coral	Rubble
dead coral w/ algae	Rock and block
	Sand/silt



Figures 2 & 3- Left: A Coral Cay observer estimating benthic cover every 25 cm along the transect line.

Right: Schematic diagram of a point intercept line laid over different coral lifeforms

From these results, the percentage cover of the various substrate types could be calculated. The results for the benthic surveys can be found in the following section.

Fish Visual Census

Fish families were counted and a note was made of their size within a defined area, along the same transect line as used to estimate benthic cover. Two divers swim side by side and count numbers of target fish 5m to either side of the 50m transect line. Swimming speed is controlled and there is a 15 minute waiting period after the line has been laid so as not to disturb the fish and let them come out of hiding. Fish

families that were observed were chosen on the basis that they are a) good indicator species for reef health or b) important fish for consumption and hence an indicator of overfishing if their numbers are found to be low or fishery recovery if their numbers are found to be relatively high. The following families were counted during the surveys:

Groupers (Epinephelinae)	Wrasse (Labridae)
<i>Barramundi Cod (Cromileptes)</i>	<i>Humphead wrasse</i>
Snapper (Lutjanidae)	Parrotfish (Scaridae)
Sweetlips (Haemulidae)	<i>Bumphead parrot</i>
Emperors (Lethrinidae)	Surgeonfish (Acanthuridae)
Jacks / Trevally	Rabbitfish (Siganidae)
Fusiliers	Rudderfish (Filefish) (Kyphosidae)
Coral Breams (spinecheeks) (Nemipteridae)	Damselfish (Pomacentridae)
Goatfish (Mullidae)	Anthias (Anthiinae)
Triggerfish (Balistidae)	<i>Moorish Idol (Zanclus cornutus)</i>
Butterfly fish (Cheatodontidae)	Anthias (Anthiinae)
Angelfish (Pomacanthidae)	<i>Moorish Idol (Zanclus cornutus)</i>

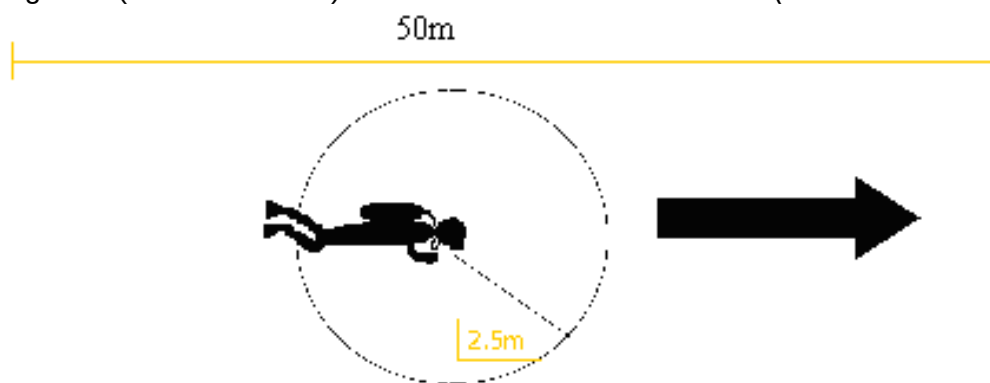


Fig. 4 - Fish visual survey method used to estimate fish abundance along the 50m line. The diver notes down any target fish seen 2.5m to either side and 5m above. The observer on the other side of the line does the same.

Human impacts and abiotic factors

In addition to the fish and benthic data, a fourth observer laid down the transect line for the other observer to follow and made a note of the following factors:

- Transect Orientation
- Depth
- Reef Zone
- Whether the site was sheltered or exposed
- Approximate steepness of the slope
- Horizontal and vertical visibility
- Weather
- Human and natural underwater impacts such as trash, nets, bleaching and coral breakage

A boat marshall made a note of human impacts and drew a sketch map of the area and locations of the transects with the aid of a Global Positioning System (GPS) for future reference.

Numbers of fishing boats, trash, gleaners and many other human influences were filled in on a form.

Results

What follows is a summary of the most important findings from the belt transect (fish abundance estimates), point intercept (benthic cover as a percentage) and general reef health and abiotic (non-living) factors.

Changes in fish abundance

FISH

Groupers (Epinephelinae)
Snapper (Lutjanidae)
Sweetlips (Haemulidae)
Emperors (Lethrinidae)
Jacks / Trevally
Fusiliers
Coral Breams (spinecheeks) (Nemipteridae)
Goatfish (Mullidae)
Triggerfish (Balistidae)
Butterfly fish (Cheatodontidae)
Angelfish (Pomacanthidae)
Wrasse (Labridae)
Parrotfish (Scaridae)
Surgeonfish (Acanthuridae)
Rabbitfish (Siganidae)
Rudderfish (Filefish) (Kyphosidae)
Damsel fish (Pomacentridae)
Anthias (Anthiinae)
Moorish Idol (*Zanclus cornutus*)

Visayan

lapu-lapu
maya-maya
lipti
katambak
talakitok
solid
silay
timbongan
pakol
alibangbang
adlo
labayan
molmol
indangan
kitong
ilak
palata
bilang-bilong
sanggowanding

Fish families observed on surveys in common English, latin and Tagalog name.

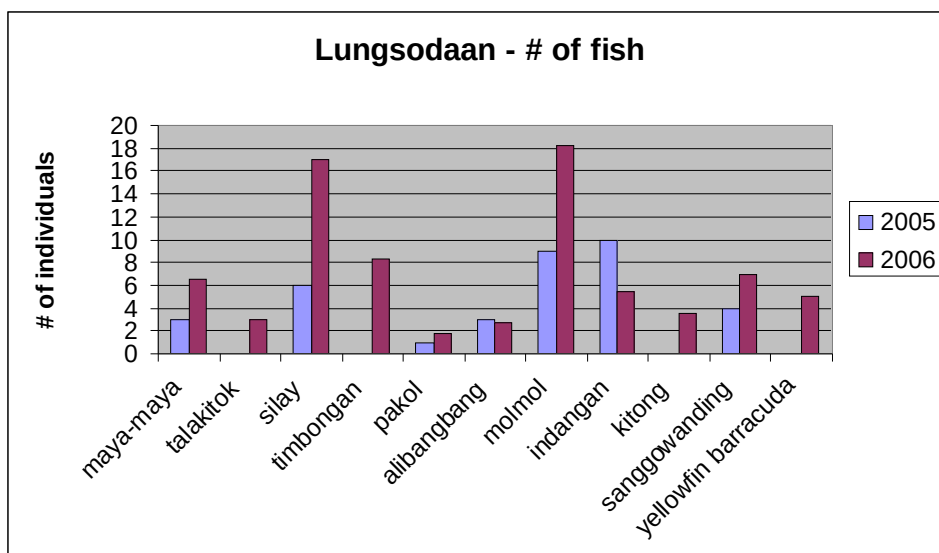


Fig. 5 - Changes in numbers of fish one year after the MPA instalment. Most fish numbers showed a slight increase, especially parrotfish (Molmol) and Coral Breems (Silay). Numbers of Butterflyfish were similar to 2005. Surgeonfish numbers decreased slightly

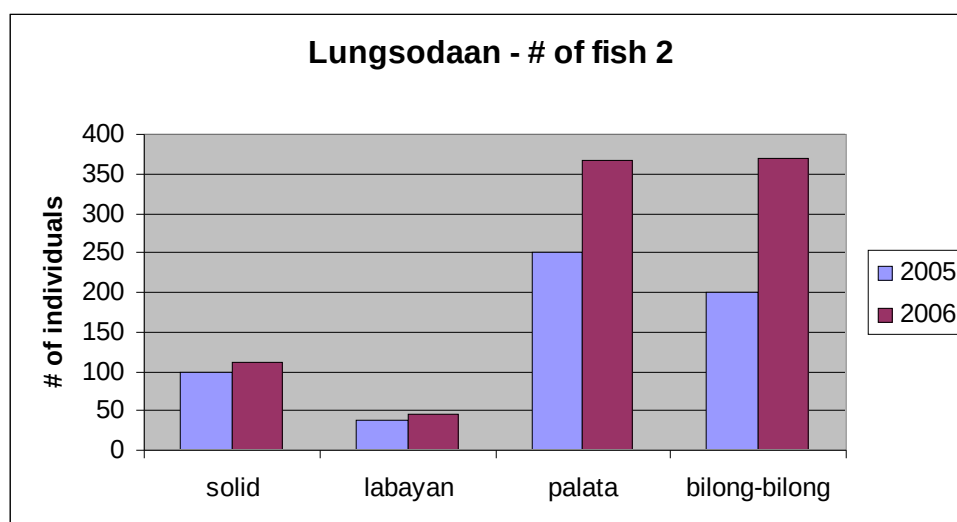
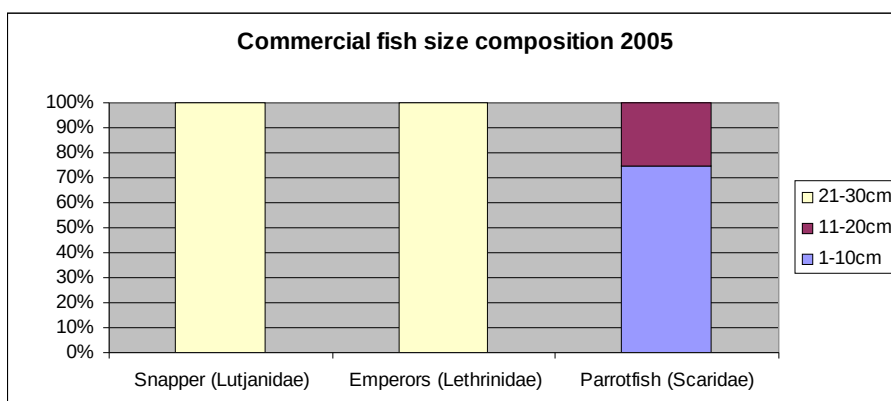


Fig. 6 -Changes in the numbers of more abundant, smaller fishes observed one year after MPA instalment. A large increase was found for both Damselfish (Palata) and Anthias (Bilong-bilong) families.



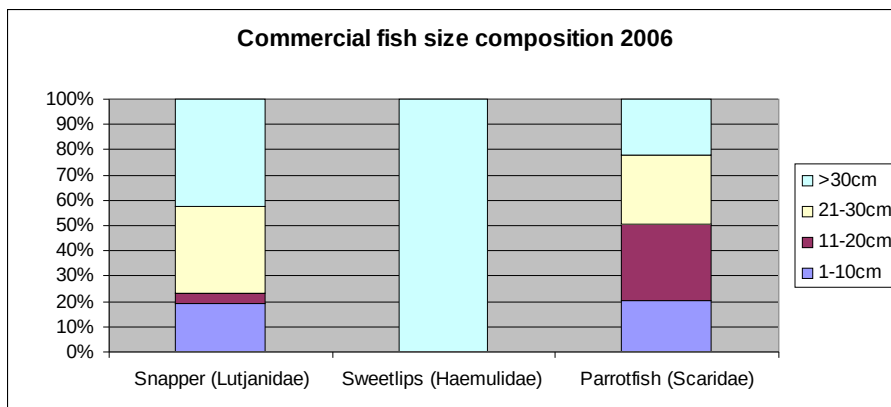


Fig. 7 - Composition of commercially important fish. One year after being protected from fishing, Snappers and Parrotfish show 40% and 20% respectively are over 30 cm. No Sweetlips were found in 2005. Large adults provide a lot more offspring than young adults and therefore it is important to let these adults grow to their maximum size.

Changes in benthic cover

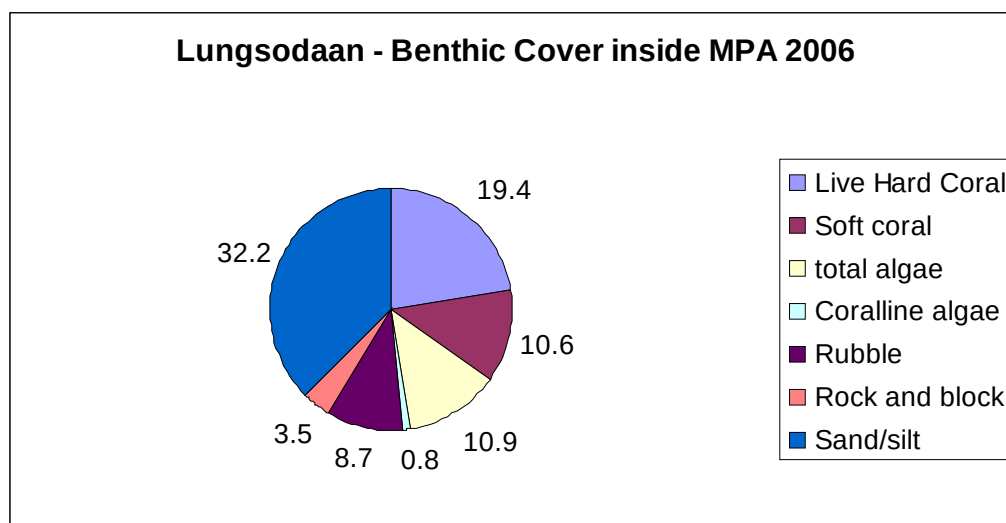
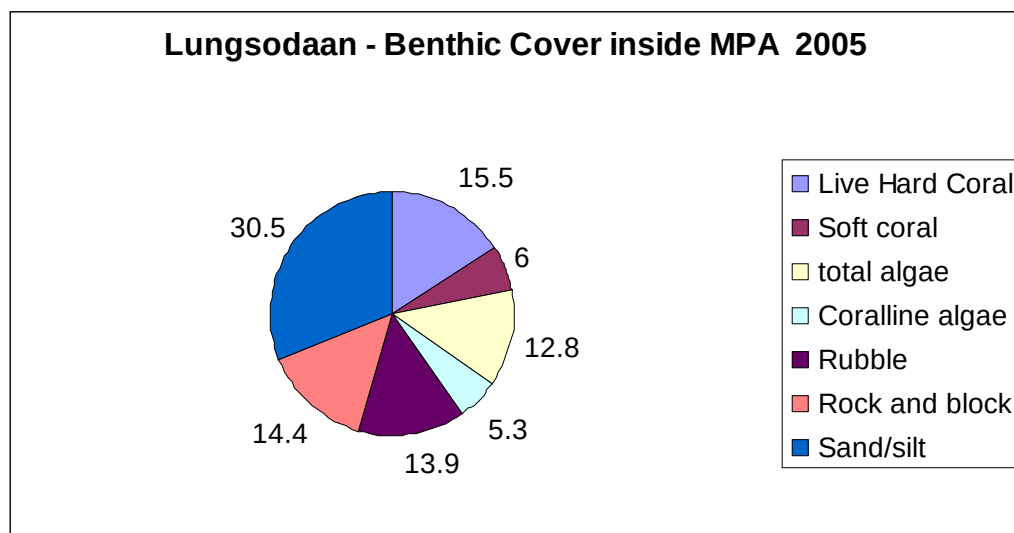


Fig. 8 - Changes in benthic composition within the MPA between May of 2005 and July of 2006. Live Hard Coral (LHC) cover increased slightly. There was an increase in soft coral cover which could imply the reefs are recovering as soft corals are usually the first corals to colonize areas of rubble and rock, substrates that both decreased.

Changes in invertebrate numbers

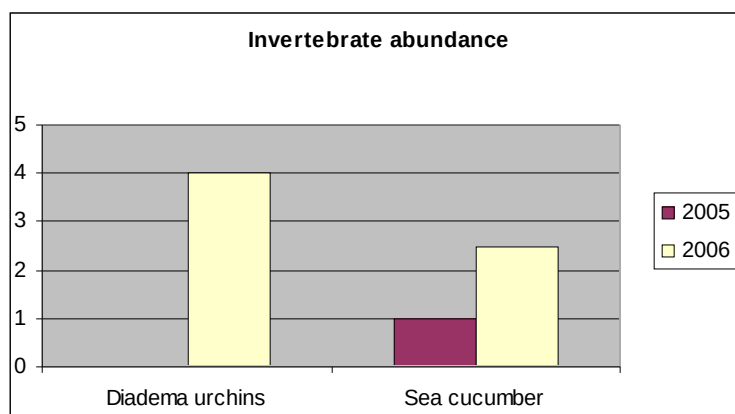


Fig.9 - Invertebrate abundance after one year within the MPA. Both the number of sea cucumbers and sea urchins increased.

Benthic cover and fish abundance inside and outside the MPA

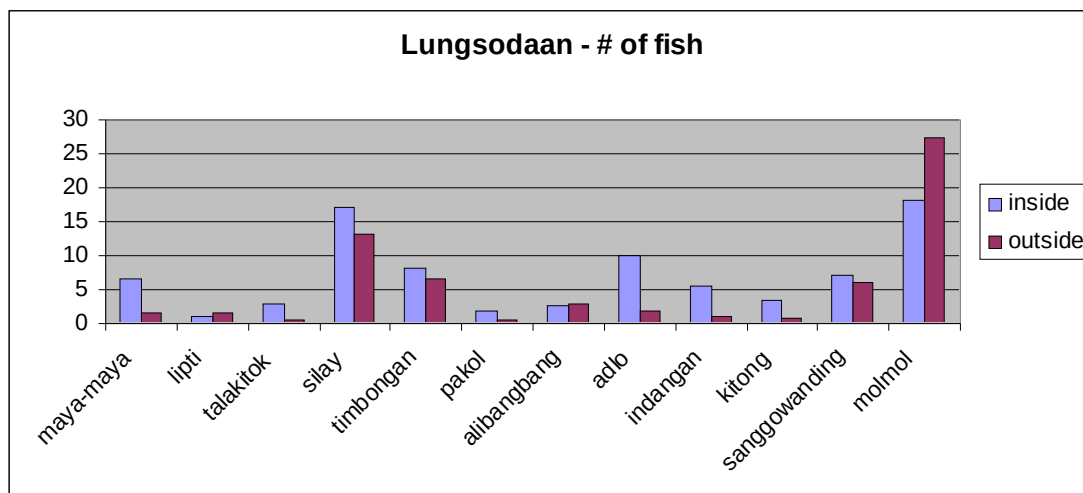


Fig.10 - Differences in fish abundance within and outside the MPA. Most families showed a slight increase in numbers. Particularly Snappers, Angelfish, Rabbitfish and Surgeonfish showed a significant increase. There was a higher abundance of Parrotfish outside the MPA.

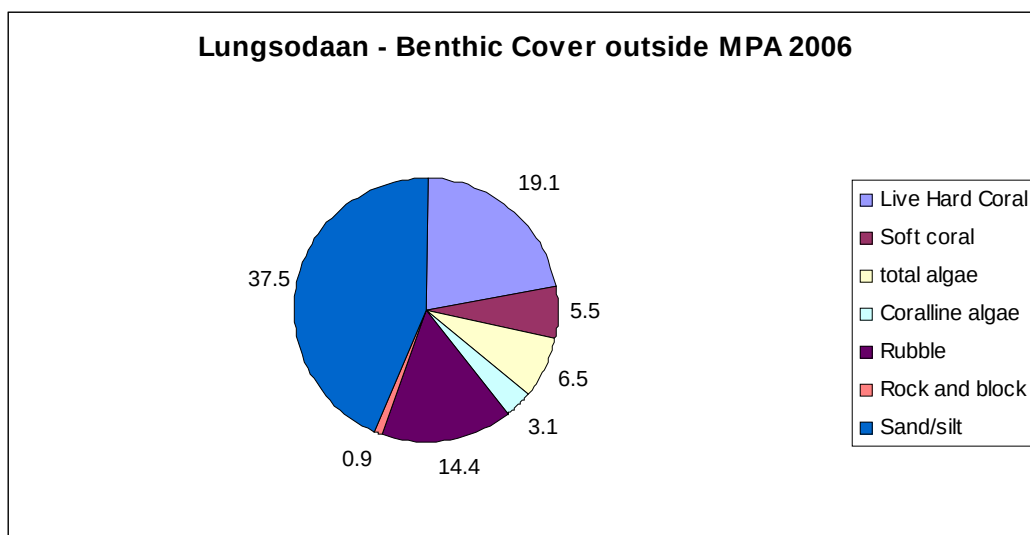


Fig. 11 - Benthic cover outside the MPA. Good coral cover was found outside the MPA. Results were very similar to that which was found in the MPA. No conclusions can be drawn from this data that would suggest any recovery. Considering the area is already has good reef health, any positive changes would take at least a few years to become apparent. This is supported by sightings of broken up fish traps, sedimentation, bleaching and rubbish and seaweed overgrowth in the area. Again, more data needs to be collected

Human impacts inside and outside the MPA

Causes of Coral Damage

Inside MPA

Sedimentation
Coral Bleaching
Other coral breakage
Plastics
Other trash

Outside MPA

Sedimentation
Coral Bleaching
Other coral breakage
Plastics
Seaweed Overgrowth
Broken fish traps

A summary of the coral damage found inside and outside the Longsodaan MPA

Visibility was found to be around 15m on all survey dives. The temperature was 3 degrees warmer for the surveys conducted in 2006. Changes to benthic and fish abundance and composition are expected to be minimal however.

Conclusion and recommendations



Good coral cover and diversity was found in much of the MPA. Large predatory fish are still scarce but the average size of these fishes was greater inside the MPA indicating a slow recovery in mature adults.

Results between March of 2005 and May of 2006 indicate an increase in coral cover (soft and hard) and fish abundance. These changes are only minimal as is to be expected. MPA's may take several years before significant changes can be seen. The trend is a positive one and hopefully the situation inside the MPA will continue to improve and provide a healthy fish stock that can be harvested outside the MPA. No significant differences can be found over one year of MPA establishment. The lack of data from last year (only one survey) makes accurate data comparison difficult.

Snappers, Emperors and Parrot fish all showed a size increase over the year. More surveys would have to prove that this is true.

Surveys between selected sites inside and outside the protected area indicate that there is higher fish abundance within the protected area. This is supported by personal observations from the observers who saw many commercially interesting fish (mainly Snappers *Maya Maya* and Sweetlips *Lipti*) inside the MPA. Such numbers were not yet found outside, most likely because they have will have been caught before reaching a mature size. It is interesting to note that a large Snapper of 12 kg will provide as many offspring as 100 1kg Snappers. This really underlines the importance of allowing fish to grow and reproduce in an undisturbed environment so that maximum offspring outputs can be attained.

The coral cover and benthic composition inside and outside the MPA was very similar as is to be expected. Corals are very slow growers, some growing no more than a centimetre per year. Any recovery to the reef will only take place after many years. In addition to this, it is believed that the reef is still in a fairly good state so there is only so much room of coral reef growth. What did become evident is that there were many human impacts found both within and outside the MPA. Sedimentation was one of these. Many corals were covered with a layer of silt that make it difficult for corals to catch food because they are spending their time and energy removing the sediment. Over time, these corals may die. Some anchor damage and general coral damage was found, mostly outside the MPA. More concerning was the presence of a fish trap within the MPA! CCC recommends the trap should be removed immediately. Broken fish traps were also found outside the MPA causing coral damage due to the movement of strong currents. An indication of nutrification (too many nutrients in the water from land runoff and pollution) was seen by many areas of algae and seaweed overgrowth. Seaweeds can outcompete and overgrow corals when there is an increase in certain nutrients in the water. This is a more complex problem that requires an integrated approach to the local coastal management. Proper waste disposal would be a good starting point for the Barangay.

Reef morphology (steepness and complexity) inside the MPA made surveying difficult in areas of healthy reef cover. Many crevices and drop offs provided rich reef cover and fish abundance (observers notes) but surveying them proved difficult. The fact that the local dive operators are regularly diving within the MPA proves this high aesthetic value of the area.

CCC believes now would be a good time to designate a 50m buffer zone around the MPA. It has been observed that many fisherfolk are fishing just outside the MPA, throwing their nets and lines into the MPA. The implementation of a buffer zone would prevent this. Boat and diver access within the core zone should be allowed but any fishing must be prohibited. The following image shows a buffer zone that is typical of many MPA's in the Philippines.

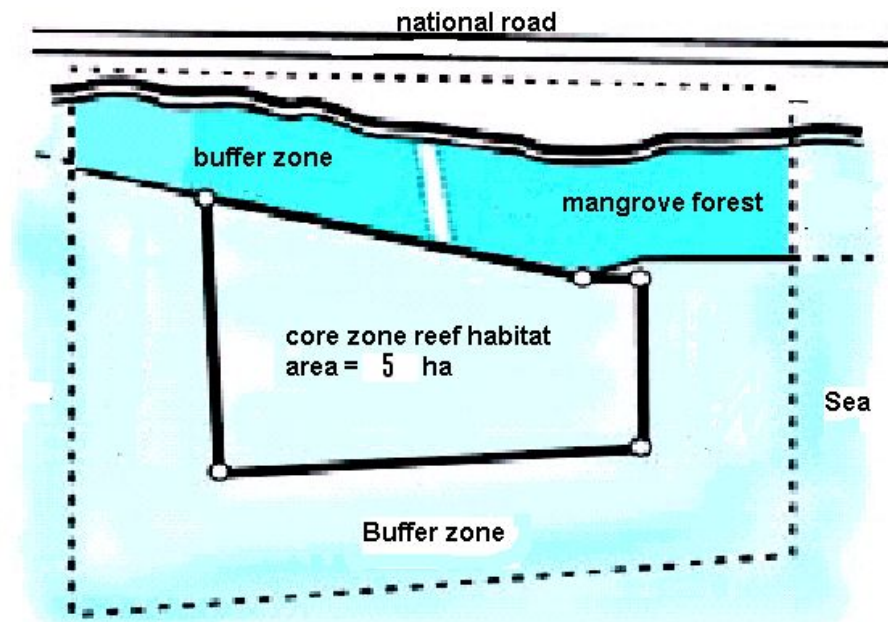


Diagram of 5ha MPA with buffer zone to prevent disturbance of fish from just outside the core zone. At this time, Lungsodaan has only a core zone and a buffer zone is recommended.

Social surveys would be valuable in order to get a better picture of community awareness, appreciation and opinions about the MPA. These surveys will be conducted by Coral Cay in August. Together with more MPA surveys, a more accurate picture can be made of the current status of the Lungsodaan MPA. For now, it is crucial that the MPA Wardens watch the area at all times and make sure there are no violations such as illegal fishing and passage inside the MPA. The community must remain involved in future decisions and their voice should be heard. Without community support, the MPA cannot work.

Acknowledgements

Coral Cay would like to thank all the CCC volunteers for their hard work and dedication to providing accurate survey results. We would also like to extend our gratitude to the Barangay council of Lungsodaan for allowing us to dive within the MPA and their continued support and motivation in creating a sustainable fisheries management in their Barangay. We also thank the Municipal office of Padre Burgos for assisting us in so many ways.