Tropical Technology Journal
Volume 13, January – December 2013
ISSN: 1656-0264

CORAL LIFEFORM STRUCTURE IN SELECTED MARINE PROTECTED AREAS IN SOUTHERN CEBU

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ABSTRACT

Marine protected area or marine reserve was first conducted in Central Visayas in 1974 as a tool to manage coral reef. It was then replicated throughout the Philippines. The marine reserve of the following; Casay of Argao, Cawayan of Dalaguete, Daan-Lungsod Guiwang of Alcoy, North Granada of Boljoon and Sta. Cruz of Ronda has been established between the year 2000 to 2007. These MPAs were assessed to gather baseline information on its coral lifeform structure. Point-intercept transect (PIT) method was used in the observation. Benthic life form and reef substrate at each 0.25m point interval were identified and recorded along 50 meters transect line both inside and outside of these MPA's. It has been observed that massive, branching and digitate form of corals dominated among the five sanctuaries. Percentage of Live Hard Corals were much higher inside than outside to all sanctuaries. Common to all these sanctuaries were noticeable presence of Dead corals with algae and coral rubbles indicating its exploitation. Casay, Cawayan and Daan-Lungsod MPAs had some Crown of thorn starfish which may pose threat to its coral community. It has been recommended that there should be strict implementation of rules among the Local Government Unit; more policing and a long term monitoring to continuously conserve and protect coral reef.

Keywords: live hard coral, point-intercept transect

INTRODUCTION

Coral reef plays a vital role both land and in water. It served as home to a vast of marine life. It also provides mankind with many resources and natural services, fishes are one of these resources (Alcala, 2000).

Intense fishing pressure especially the use of destructive fishing methods such as the use of explosives and drive nets on coral reef rapidly deteriorate the abundance and richness of corals, fishing then was considered to be one of the major causes of corals destruction. Seventy percent of the Philippines' coral reef was damaged due to fishing; only five (5) percent of coral reef today remains in excellent condition (Ingles et al, 2001). Implementation of marine protected area or no-take zone was introduced as a tool to manage fisheries and conserve corals. It was first established in South of Cebu after Sumilon Marine Reserve establishment in 1974. As of 2008, at least 985 MPAs had been established in the Philippines (Weeks et al, 2009). Among these marine reserves were Casay of Argao, Cawayan of Dalaguete, Daan-Lungsod Guiwang of Alcoy, North Granada of Boljoon and Sta. Cruz of Ronda. These marine reserves have been established less than a decade yet its baseline information as to benthic lifeform, diversity of fishes and other invertebrates are yet to be defined.

 ISSN: 1656-0264

This study aimed to find out the benthic lifeform of corals present among the six MPAs. Percentage of Live hard corals was assessed as bases in determining the present condition of coral reef. Dead corals incorporated with either bleached or rubbles were recorded as basis for its exploitation. The output of the study will be shared to the Local Government Unit for potential reference to its further management and conservation of their coral reef resources.

MATERIALS AND METHODS

Site Description

The MPA sites are located in the southern part of Cebu. These MPAs have shallow to approximately 12 meters depth. Boundary coordinates of the marine sanctuaries were obtained using a hand-held Global Positioning System (GPS). Surveys were conducted last July 4 – 14, 2012.

Table 1. MPA Site Description and Information on the Five (5) MPA Sites (Source: Alcala et al. 2008)

MPA Site	Area (ha)	Year Established	Legal Basis
Casay Marine Sanctuary, Argao	11	2003	Mun. Ord. No. 65 Series 2003
Cawayan Marine Park and Sanctuary, Dalaguete	10	2006	Mun. Ord. No. 2006-145
Daan-Lungsod and Guiwang Marine Sanctuary, Alcoy	22.71	2002	Mun. Ord. 2002-12 and 2002-18; Mun. Ord. No. 19 Series 2002
North Granada Marine Sanctuary, Boljoon	9.35	2001	Mun. Ord. No. 04 Series of 2001
Sta. Cruz Marine Sanctuary, Ronda	9.2	2002	Mun. Ord. No. 89 Series of 2002

 ISSN: 1656-0264

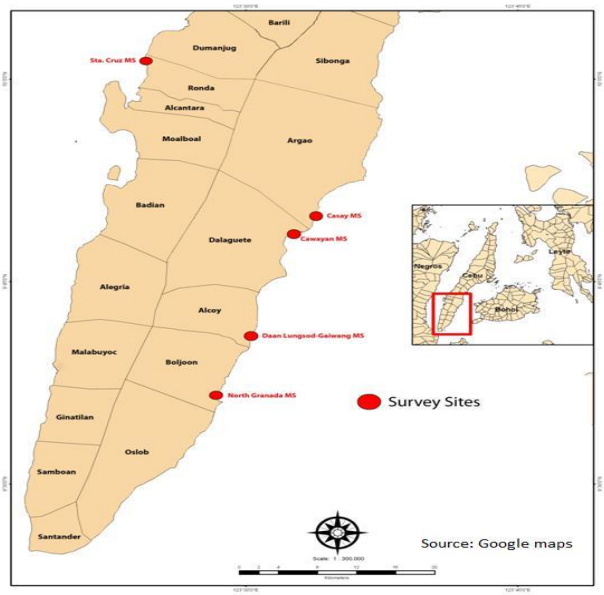

Figure 1. Map of Cebu Province showing the Locations of the MPAs

Biophysical Sampling

The point-intercept transect (PIT) method designed and recommended by English et al. (1997) was used to determine the coral condition through percent live cover. Benthic life forms and reef substrate beneath the 0.25 m interval were identified and recorded along a 50-m transect line both inside the outside of the MPA. This was done using six (6) replicates of 50 m transect with 10 m interval between two (2) transects laid parallel to the shoreline. Lifeform categories and codes modified after UNEP (1993) and English et al. (1997) was used. Substrate was categorized into live hard coral (branching, massive, encrusting and foliose), soft coral, rubble, non-living substrate (dead coral with algae, dead coral, rock, sand and silt) and others (sponges, algae and seagrass). Percent cover of live hard corals was translated into coral reef status categories based on Gomez, 1991: Excellent (75-100%); Good (50-74.9%); Fair (25-49.9%); Poor (0-24.9%) using the formula:

$$\frac{Number\ of\ recorded\ points\ per\ benthic\ category\ or\ lifeform}{Total\ number\ of\ recorded\ points}\ X\ 100$$

Statistical Analysis

Data were analyzed using descriptive statistics including mean frequencies, totals, standard deviation and standard error of the mean. It was subjected to distribution of normality test (Shapiro-wilk test) prior to t-test at five (5) percent level of significance to determine if there was a significant difference between the percentage of live hard corals inside and outside of the sanctuaries.

 ISSN: 1656-0264

RESULTS AND DISCUSSION

Benthic Lifeform

Dominant Coral growth forms in Casay MPA were branching, massive, digitate and foliose corals. A low percentage of dead corals with algae and rubbles were also observed. Sta. Cruz MPA, a non functional MPA for three (3) years from 2007-2010, were dominated by branching, massive and encrusting coral growth forms. Among the five sanctuaries assessed, it has the highest percentage of coral rubbles both inside and outside. Dead corals with algae were observed to be higher in Cawayan and Daan-Lungsod Guiwang Marine MPAs both obtained 32.33 percent than in North Granada with only 14 percent.

Table 2. Percentage of Benthic Coral Lifeform

	Cawayan		Casay	Daan-Lungsod Guiwang		North Granada		Sta. Cruz	
	Inside	Outside	Inside	Inside	Outside	Inside	Outside	Inside	Outside
Hard Corals									
Branching Corals	2.4	0	20.8	3.7	0.3	10.1	6.0	14.3	8.8
Massive Corals	10.5	4	10.4	8.9	5.8	15.1	12	10.3	6.5
Encrusting Corals	0.9	0	4.4	1.4	0.6	2.5	2	9.1	1.6
Foliose Corals	0.3	0	12.7	0.4	0.2	1.8	2	4.3	1
Digitate Corals	10.1	8	10.5	17.6	3.3	4.7	4	6	5.2
Solitary	0.7	0	1.1	0.8	0.0	0.0	0.4	0.6	1.6
Tabular	0	0	0	0.0	0.0	0.2	0.5	0.8	0.3
Soft Coral	0.4	0	0.4	2.2	2.0	0.6	0.5	0.2	0.15
Non-Living									
Dead Corals	0.42	0	0	0.2	0.0	0.2	0	0	0
Dead Corals with algae	32.9	48	26.5	32.3	12.3	14.5	17.5	15.5	21.4
Rubble	23.2	11	9.3	27.4	9.5	22.6	25.3	33.5	44.8
Rock	0	0	0	0.4	0.8	0.1	0	0	0
Sand/Silt	8.3	8	0	1.2	18.8	20.3	24.4	1.9	5.4
Others									
Algae	3	14	0.4	0	1.0	2.3	1.7	0.1	0
Seagrass	2.5	1	0	0	41.8	0.0	0	0	0
Sponge	4.1	5.75	3.1	3.5	3.6	5.1	3.1	3.2	2.8
Other organism	0.4	0.75	0.4	0	0.2	0.0	0	0.3	0.6

Common hard coral forms that dominated the MPAs assessed were massive, branching and digitate. Massive coral lifeform forms were slow growing yet they are able to withstand wave action. Branching and digitate however were fast growing corals but they are sensitive to strong waves hence easily fragmented.

Coral predator such as Crown-of-Thorn Starfish (*Acanthasterplancii*) were observed in Cawayan MPA, these could be a factor why high percentage of dead corals where observed in

 ISSN: 1656-0264

Cawayan MPA since this MPA was mainly composed of branching corals like *Acropora*species, and such corals were the preferred diet of the said predator.

Coral Condition

Shapiro-Wilk Test and homogeneity test showed that the data were normally distributed. T-test at five (5) percent level of significance revealed that there was a significant difference between the reef conditions outside and inside the sanctuaries (t=4.98; p-value 0.0000947). It was found out that there was a higher percentage of live coral cover inside the MPA (34.375) compared to the outside MPAs (18.458).

Among the MPAs Casay MPA had the highest live hard coral cover at 60 percent. Casay MPA is the only MPA among the five which obtained a "good" coral cover rating. Sta. Cruz MPA obtained the second highest coral cover of 45 percent, The rest of the MPAs which include Daan-Lungsod Guiwang, Cawayan and North Granada had 33 percent, 25 percent and 34 percent coral cover respectively, all four obtained the rating of "fair" condition.

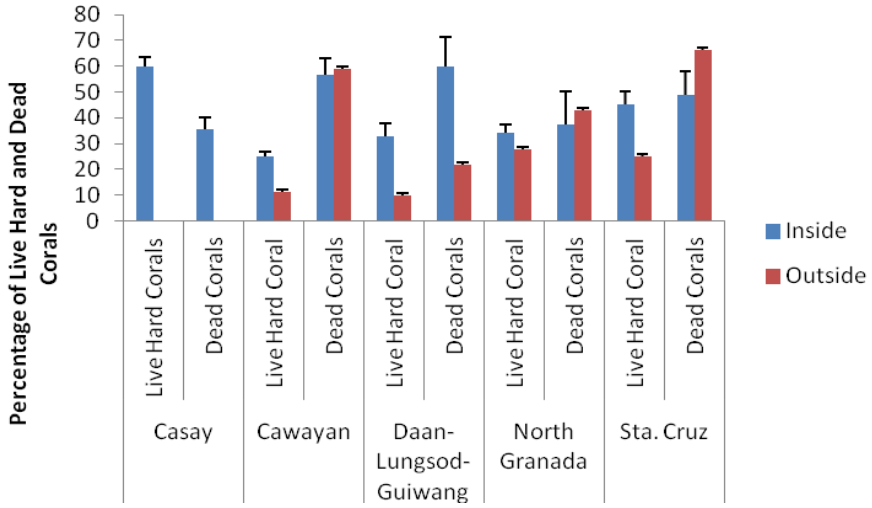

Figure 2. Percentage of Live and Dead Corals Inside and Outside of the Assessed MPAs.

All coastal barangay of Argao had its own marine reserve, Casay was one of them. Among the MPAs assessed only Casay had no outside portion due to its reef slope situation. Its "good" rating as to its coral condition could be attributed to an active protection of the marine reserve, free from any human exploitation.

There have been reports that Sta. Cruz became non functional for three years due to conflicts among the fisherfolk and the management of the said sanctuary, assumed that human exploitation since these years prevent the coral communities to flourish. As observed by the fisherfolk several damaged corals occurred after the earthquake hit last February 6, 2012. Combined factors caused the high percentage of dead corals observed on this MPA.

MPAs which include Daan-Lungsod Guiwang, Cawayan and North Granada obtained the "fair" coral condition reportedly to have a decrease of live hard coral cover from year 2005-2010. Coral communities on these sanctuaries will recover once threat such as exploitation will be neutralized.

A coral cover with "poor" to "fair" condition may not be able to provide a good shelter for fish and other marine organisms. But nevertheless, it is still evident that high percentage of hard coral cover was observed inside the five (5) MPAs compared to the outside. This is a good indication; hence, the call for a need to continuously protect and conserve.

CONCLUSION

It was found out that the spot where MPAs was situated was properly selected. Findings suggested that a decade of having an MPA was not enough to make coral reef recover and they are in good condition.

It was recommended that there should be a sound legislative and regulatory framework to the management of the MPA. There should be research and monitoring programs to provide information for better future directions.

For further studies, connections of current patterns among these MPAs should be properly understood to determine the distribution and dispersal of fish and other macro invertebrates larvae for the establishment of a network.

ACKNOWLEDGMENT

The authors are grateful to Siliman University, Bureau of Fisheries and Aquatic Resources – 7 (BFAR-7), Department of Environment and Natural Resources – 7 (DENR-7), most especially to CTU R & D family for the skillful and intellectual support towards the success of the study.

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