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## **Establishment of a community-based Marine Protected Area in a highly industrialized zone**

### **Introduction**

The Philippines being surrounded by the sea is blessed with diverse ecosystems ranging from tropical rain forests to coral reefs. However, intense anthropogenic stresses have reduced these vital ecosystems in a very critical level contributing to the decline in environmental quality. The thrust of the Philippine government and its society is the restoration of these ecosystems. One such area is the village of Lasang in Davao City in the south of the Philippine islands.

The primary objective of this project is to determine an appropriate area where to establish a Marine Protected Area (MPA), given various considerations from biophysical, social and institutional factors. Together with the representatives from the fishermen organizations and the BFARMC (Barangay Fisheries and Aquatic Resources Management Council), an area of roughly 300 ha was considered as study area. This study included the various habitats such as coral reefs, sea grass beds and mangroves of the said village.

The foremost attraction of this site is the regular presence of the endangered whale shark (*Rhincodon typus*). Anecdotal evidences point to the regular feeding of juvenile whale sharks in the area. In addition, regular sightings of marine turtles have been recorded. In fact, a number of marine turtles have already been tagged and released. However, much is needed to be done to protect these species and the habitats they rely on.

Currently, there is an active and registered Peoples Organization (PO) in the area that is actively involved in mangrove rehabilitation as well as fishery law enforcement. A locally-managed MPA was planned and will be implemented in three cycles. The first cycle, which is partly completed, is the establishment of the MPA and the capacitation of the community. The second cycle includes the establishment of a community-based sanitation system that would help improve the water quality of the area considering the absence of such a facility. And the third cycle is the implementation of a community-based whale shark ecotourism to augment local income and to sustain and generate support for the management of the MPA.

## Profile of the area

Barangay Lasang is geographically located at 7°15 N and 125°40 E. It is the northernmost coastal barangay (village) of Davao City under the district of Bunawan having a land area of 604 ha and a population of 7,462. This village is situated within the northern portion of the Davao Gulf (Fig.1) and is influenced by many stresses ranging from destructive fishing, overfishing and effluents. Furthermore, being within the industrial zone of the city, its coastal resources are in severe threat.

The marine area of the barangay is sheltered having a 5 – 45 degrees reef slope and a low topographic complexity.

To obtain data on the current status of the area several field survey methods were applied. By a combination of manta tows (an observer pulled by a small boat), SCUBA point intercept transects and application of the Global Positioning System (GPS) it was possible to obtain a map of the area and its habitats in a Geographical Information System (GIS). To assess the pressure by fishing, visual fish censuses and fishing gear surveys were conducted. A stakeholder analysis assessed the interests in the area and its resources.

Using the GPS, a perimeter survey of the existing habitats in the area was undertaken to give spatial information that could help determine the boundaries of the marine protected area. Approximated areas of 12 ha for mangrove, 65 ha for seagrass and 3 ha for coral reef were generated (Fig. 1). It is interesting to note the extensive fishpond (50 ha) and build-up areas (51 ha) that affects the water quality within the coastal and marine habitats in the area. The core or inside zone of the future MPA, which will be the no activity zone, will encompass all the boundaries of the coastal ecosystems and the buffer or outside zone (regulated zone) would be the area outside the bounds of the coral reef and seagrass bed towards deeper water.

An initial data gathering of the reef habitat was conducted by 6 transects laid in representative areas of the coral reef. The mean live coral cover is 46% suggesting a fair condition. It is dominated by non-acroporan species with an average of 23% but is also made up of a promising 15% of the faster growing *Acropora*. However, it should be noted that there is a considerable portion of rubble (13%) in the reef that would indicate heavy destructive fishing from the past. Moreover, bottom substrate consisted mostly of silt that would indicate sedimentation from the floodplains of the region. Solid wastes were likewise observed during the study that would indicate problems in solid waste disposal. Recent breakages of the corals were mostly from anchors of subsistence fishermen from the area.

Fish visual census revealed a dominance of damselfish (Pomacentridae) with a mean fish abundance of 64 individuals per 500 m<sup>2</sup> area followed by cardinalfishes (Apogonidae) [60], fairy basslets (Anthiinae) [19] and wrasses (Labridae) [10]. It is interesting to note the dominance of herbivorous fish families presumably because of the high cover of algae in this area.

The fish population of the area can be considered to be in poor condition based on the ratings from Hilomen et al. However, it can be noted that the number of

benthic fish families that could be found is remarkable considering the immense pressure these ecosystems are under being within the industrial zone of a big city.

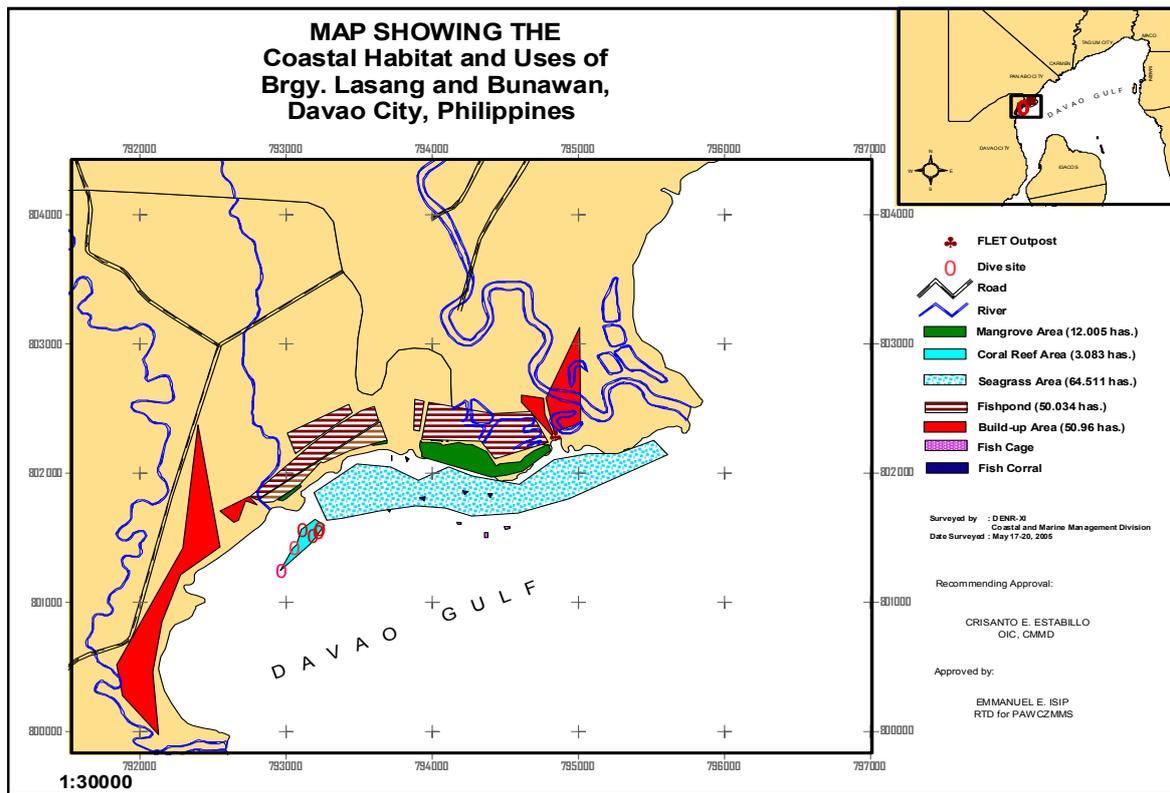


Fig. 1 Study area

In addition, interviews through focus group discussions with fishermen and fish traders was also undertaken to determine the type of fishing gears used, kinds of fish caught and the weights of the fish caught per fishing trip to determine the catch per unit effort (CPUE) of the fisher folks. Based on the responses, the CPUE is 1.25 to 5 kg/hr. for seines using motorized boats, 1-2.5 kg/hr for fishnets using motorized boats and 1-1.67 kg/hr for hook and line.

The relatively expansive seagrass area represents a habitat for highly abundant shrimps. This may be the reason why juvenile whale sharks frequent the area. Furthermore, because of the expansive seagrass beds, 2 species of marine turtles (*Chelonia mydas* and *Eretmochelys imbricate*) can also be found in the area.

Although the sharks are afforded temporary protection due to publicity, there is a great need to establish or institutionalize a protection and conservation program for these gentle giants. There is pressing need to conduct massive education outreach as well as protection of its critical habitat, not to mention advocacy to the local government to institutionalize local protection of the animals.

Currently, there is an active and registered Peoples Organization (PO) in the area that is actively involved in mangrove rehabilitation activities as well as fishery law enforcement. These organizations have professed interest in establishing an MPA in their area thus the initial studies were conducted. However, much is still

needed to capacitate this PO leading to effective and efficient management of such an MPA to be established.

In order to augment from the continuous anthropogenic impact, it is necessary to implement waste water management (cycle 2) with the construction of a community based sanitation system that includes cooperative action with the local government and local water district that would support the infrastructure. The design of a user-pay system shall generate revenue to sustain the operation of such system.

In cycle 3 the community shall be given the opportunity to earn a living by soft whale shark tourism rather than by overexploiting the system. The implementation will include infrastructure development programs (e.g. road signs, shark friendly boats, visitor center), habitat management programs (MPA, closed seasons), an education program together with monitoring and scientific research.

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