

2.9. CALAGCALAG MARINE RESERVE, AYUNGON, NEGROS ORIENTAL

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1. Biophysical Setting

The Calagcalag Marine Reserve was established in 1988, within the municipality of Ayungon, Negros Oriental. Within the 10.4-hectare reserve, a small offshore platform reef exists, approximately 750 meters offshore. The reef is separated from the nearshore reef flat and beach by a deep channel. The reef flat has been reduced to bare rock by gleaning activities, exposure during low tide and breaking waves. Blast fishing was practiced until the mid-1980s, prior to its declaration as a marine reserve. The central top portion of the platform, an area approximating 2,400 m², has been reduced to rubble showing little sign of recovery ever since dynamite fishing stopped. Mangroves have been preserved along the coastline and the community planted seedlings within this area to speed up the recovery of the forest and prevent siltation over the reef.

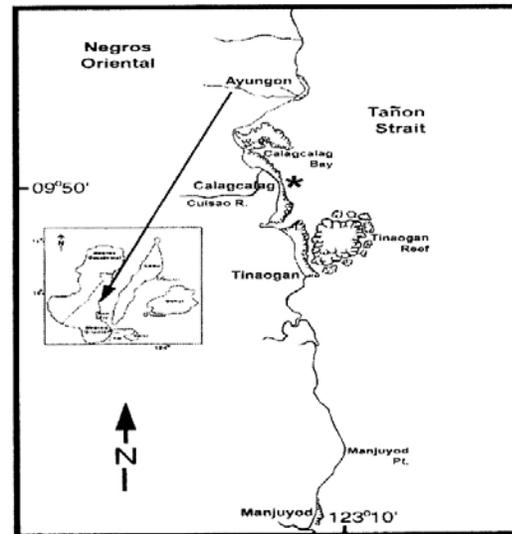


Figure 1. Map of Negros Oriental coastline, showing the Calagcalag Marine Reserve marked as *.

2. Socio-economic Setting

Calagcalag is a rural coastal barangay within the municipality of Ayungon, Negros Oriental. As such, families rely almost exclusively on fishing and farming. Pollnac *et al.* (1996) reports that 40% of the 249 households interviewed are involved with farming, and 12% are fishers. However, many families rely seasonally on a combination of both. Families are typically fairly large, and incomes are low. The reef is used extensively for extractive fishing which is the major source of protein. No aquaculture is practiced in the area. The reef is not a tourist destination due to its distance from Dumaguete (2 hours north) and lack of infrastructure. Transportation links for marketing of agricultural goods and fish are adequate. Central Visayas Regional Project (CVRP) has initiated several alternative livelihood projects, among them, goat and chick rearing. However, the goat project was deemed largely unsuccessful.

3. Management

Establishment of the Calagcalag Marine Reserve was formalized by a municipal ordinance in 1988. This move was initiated largely by the CVRP of the Resource Management Division (RMD) and the Center for the Establishment of Marine Reserves in Negros Oriental (CEMRINO), an NGO created by the European Commission (Pollnac *et al.* 1996). CVRP began a mangrove reforestation project along the coastline landward to the MPA in 1984. This project has at least been partially successful where the mangrove forest appears healthy and saplings are extending seaward. Mangrove stewardship contracts have been awarded by the Department of Environment and Natural Resources (DENR) to families involved

with the reforestation project. CEMRINO was tasked in setting up a string of MPAs along the coast of Negros Oriental from 1996-1998, the management of which was later turned over to RMD. At this point, mangrove and MPA projects were united into a single effort to assist the Calagcalag community in managing their coastal resources.

Management of the Calagcalag MPA is governed by a local community group, Calagcalag-Bakhawan Fishermen Association (CABFA). CABFA has combined several groups involved in various management activities, such as the mangrove reforestation project and the *Bangus* Fry Catcher Association. A building was constructed on the shoreline fronting the reserve to act as a watch house and meeting venue and marker buoys are provided by the local DENR office in Dumaguete City. However, due to political conflicts with the incumbent mayor, the local government withdrew its support so CABFA therefore receives no financial support for the MPA at this time. Furthermore the patrol boat which was previously used for enforcement activities no longer has an engine, so patrolling is no longer possible.

The initiation by Silliman University of a rehabilitation project within the MPA has provided technical support and a small monthly honorarium for the management organization. The rehabilitation project is testing a novel approach in stabilizing rubble substrate. It combines rubble stabilization with coral transplantation to improve fish habitat and provide recruitment substrates using locally available materials (Figure 2). An initial assessment of the reserve noted a depauperate fish community, with target species showing low biomass and small body sizes. The benthic composition survey showed 31% hard coral, 28% rubble and 8% rock/turf algae, with much of the top portion of the reef a bare rubble flat (Raymundo *et al.* in prep). It was selected as the pilot site to test the substrate stabilization approach because of the large size of the rubble patch and the enthusiasm of the community toward involvement.

4. Issues and Threats

Fishing grounds in the area appear overfished and poaching still occurs within the reserve.



Figure 2. CABFA members with SUML researchers displaying fish habitat rock piles they constructed for deployment on rehabilitation plots.

This is understandable given the lack of alternative sources of income among the population and lack of government support for enforcing the no-take regulation. Unless a patrol boat is available, it is unlikely that poaching can be completely eliminated. However, the president of CABFA stated that fishing within the reserve has been reduced through their efforts to avoid anchors being dropped on the rehabilitation plots. This increased vigilance may explain the increased biomass and body sizes of target species observed during fish visual census surveys (see below). Cyanide fishing may occur in the area but it is difficult to quantify. Dynamite fishing has been eliminated since the mid-1980s.

The presence of mangroves along the shoreline suggests that a silty substrate along the coast was probably historically its natural state. Sedimentation is seasonally noticeable, but the distance of the reef offshore and additional mangrove planting will probably continue to protect the reef from damaging effects of siltation. The reef is reasonably well-protected from severe weather, due to the deep lagoon separating it from shore, where the waves break.

5. Monitoring, Evaluation and Feedback

In connection with the rehabilitation project, Silliman University researchers visit periodically to monitor the fish community using fish visual census and examine coral transplant survival and coral recruitment on rehabilitation plots. First year results indicate that transplant survival has averaged 50-60 percent (varying between species) and recruitment of fish and coral on constructed rock piles began almost immediately after deployment (Raymundo *et al.*, in prep). Periodic updates on the improvement of the reef to CABFA through informal dialogues were provided. SUML researchers were also requested to assist in formulating the MPA management plan during the annual planning meeting, and to give a formal presentation of the status of the MPA during this meeting.

Fish visual census has been carried out on a section of reef with 50-70 percent cover within the marine sanctuary at depth of 7-8 meters (Raymundo *et al.* in prep). Fish density and biomass were estimated along 50 x 10 meters replicate (n=5) transects. Mean fish densities for all recorded species (221.8 ± 33.2 fish/500m²), target fish (43.4 ± 13.8 fish/500m²) and target fish biomass (1811 ± 450 grams/500 m²) were very low. Acanthuridae showed a significantly higher density (23.4 ± 6 fish/500m²; Table 1) and biomass (923 ± 340 g/500 m²; Table 1) compared to all other fish families (Figure 3, Table 1). In addition, most of the acanthurid species recorded were the smaller herbivorous species such as *Ctenochaetus binotatus*, *C. tominiensis*, *C. binotatus* and *Zebrasoma scopas*. Occasionally, larger species such as *Acanthurus nigricauda* were noted. Scarids were also dominant in the area although they were small sized (11-20 centimeters). The largest scarid recorded was

Table 1. Results of One-way ANOVA of fish density and biomass between families ($\alpha=0.05$; Raymundo *et al.* in prep).

Variable	1-ANOVA (0.05)		Bonferroni <i>post hoc</i>
	F	p	
Density	10.408	≤0.0001	Acanthuridae > other families
Biomass	6.009	0.001	Acanthuridae > Scaridae > Serranidae = other families

Ayungon, Negros Oriental

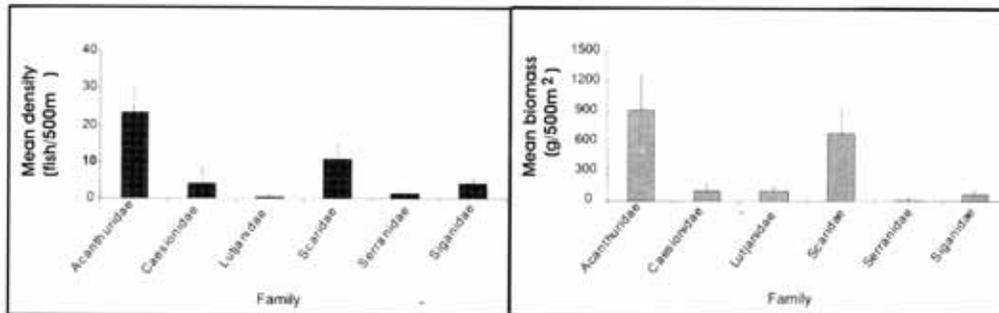


Figure 3. Fish density (n=5 transects) and biomass (n=5 transects) of target fish families recorded in Calagcalag MPA from February 2003 to February 2004.

Chlorurus bleekeri, at 21 centimeters. The very low density, biomass and relatively small sizes of target fish species indicate a fairly high fishing pressure outside the MPA and prior to its establishment, and probable poaching within the MPA.

6. Future Directions, Gaps and Recommendations

The primary challenge for the Calagcalag MPA is the lack of government support, both politically and financially. *Bantay Dagat* members receive no honorarium and have no funds with which to repair their patrol boat and deploy an appropriate number of marker buoys. In spite of this, the commitment of the core group members of CABFA remains high. RMD continues to provide support when requested, and Silliman University will remain involved in research as long as funding is available and providing technical advice when requested. But the lack of local government support must be reversed, as it will affect the long-term success of this MPA.

The Calagcalag community would benefit from a broad-scale effort to improve conservation awareness to identify alternative livelihood projects, and to educate families regarding reproductive health. Such holistic approach to coastal conservation is gaining widespread support and proving to have greater long-term success than a simple emphasis on reef protection.

7. References

- Pollnac R, Pomeroy R, Predo C, Mayordomo J, Gorospe M (1996) Post evaluation of the Calagcalag Community-Based Coastal Resource Management Project. Anthropology Working Paper No. 53, University of Rhode Island, U.S.A.
- Raymundo LJ, Maypa AP, Cadiz P, Gomez ED (In prep.) Substrate stabilization in a Marine Protected Area in the Central Philippines: A novel approach to reef rehabilitation. To be presented at the 10th Int'l. Coral Reef Symp., Okinawa, 2004.