

Conservation practices at Agojo Marine Park and Sanctuary in Catanduanes, Philippines: Convergence of initiatives for eco-governance

S.R. Vargas¹, A.V. Asetre²

ABSTRACT

The Philippines has gained international recognition and respect as a country giving high premium to natural resources management. In the Bicol Region, the most popular strategy for coastal resource management is the establishment of marine protected areas (MPAs). The oldest of this is the Agojo Point Fish Sanctuary and Marine Reserve (APFSMR) strategically located along the Lagonoy Gulf of the island province of Catanduanes. The establishment of the MPA in 1993 has holistically addressed the management and conservation issues in the area. Substantial recovery from the previously damaged conditions of the fragile coastal ecosystem has restored biodiversity of its natural resources and has significantly contributed to the enhancement of the quality of life of the stakeholders on the adjoining communities in the municipality of San Andres, Catanduanes. This tangible reward experienced by the residents brings forth dramatic positive change in their attitudes to support the management and conservation initiatives of local government units (LGUs), other government organizations, non-government organizations, people's organizations, and academic institutions, actively advocating for environmental conservation and protection, building partnerships for the sustainable development of marine resources, and promoting empowerment of coastal communities. Different interventions in the MPA under consideration were employed by the different sectoral groups composed of LGUs, the Philippine Department of Agriculture (DA), mangrove organization, the US Embassy/US Peace Corps Volunteer Program, the Catanduanes State Colleges, Youth Science Clubs, Republic of the Philippines (RP) KR2 Program and the Philippine Bureau of Fisheries and Aquatic Resources (BFAR). The convergence of initiatives in the MPA (established in 1993) from these sectors ranging from legislations, development and livelihood projects, capability building, advocacy and development of IEC materials, on-site field research and extension services have eventually shaped-up the environmental governance of MPA in the island province of Catanduanes.

Keywords: Marine Protected Areas, MPA, coastal resources, sanctuary, Philippines

¹Associate Professor & Director for Extension Services, Catanduanes State Colleges, Philippines

²College Professor & SUC President III, Catanduanes State Colleges, Virac 4800, Catanduanes, Philippines

INTRODUCTION

Marine reserves/parks or Marine Protected Areas (MPAs) are relatively new developments in conservation (Alcala 1995). These are also referred to as sanctuaries or marine fishery reserves-sanctuary or MFR-S (see Bradecina & Nieves 2006, Soliman et al. 2004) depending on the wide range of goals and objectives of its creation. MPAs in the Philippines have been established for conservation and protection of fishery resources/biodiversity, for cultural and historical purposes, for aesthetic reasons, and for research and educational concerns (Miclait & Ingles 2004). For most (70%), however, the major objective is to protect resources within the MPA to enhance fisheries production in neighboring waters (Campos & Alino 2008, Alcala & Alino 2009). Extractive activities in an MPA are totally prohibited, but with the approach of balancing management in MPAs (see Jones 2009), the issues on protection and extraction/exploitation are being reconsidered. In practice, marine sanctuary is 20-25% of the total ecosystem comprising coral reef, seagrass bed, or mangrove forest. Its maintenance is usually done by organized communities such as people's organizations (PO), fishermen organizations and mangrove associations. These MPAs created in the Philippines are being devised within the context of coastal resource management (CRM), Integrated Coastal Zone Management (ICZM) and more recently the Ecosystem-Based Management (EBM), a policy-based approach anchored on science and knowledge. Hence, MPA management is a very potent avenue for convergence of efforts and implementation of sustainable mechanism for coastal resource management in the Philippines and elsewhere in the world.

A review on MPAs in the Philippines by Campos & Aliño (2008) reveals that in terms of management, only about 10 to 15% of these more than 1,300 MPAs had been managed effectively. A more recent report of Weeks et al. (2009) on effectiveness of Philippine MPAs for biodiversity conservation reveals that despite the success of community-based approaches to MPA management in the country, the strategy will not be able to meet the conservation targets. In relation to these reports, this paper attempts to present an example of a marine fish sanctuary and reserve (APFSMR or Agojo MPA) as to eco-governance for maximizing efficiency and effectiveness of conservation practices within the context of initiatives in "converging institutional arrangements". The question - *Can convergence of initiatives in MPAs really assist in maximizing effectiveness as to management approaches and to meet the conservation target?*

This paper discusses the convergence of initiatives for eco-governance* as to management approaches/conservation practices in Agojo MPA in San Andres, Catanduanes, Philippines (Figure 1) that revolve within the lens on how the convergence of initiatives address the socio-economic and ecological threats to the coastal population of San Andres, Catanduanes with the intervention and support accorded by different line agencies. Specifically, this report intends to: 1.) Describe the geophysical characteristics and biological importance of the MPA under study; 2.) Describe and analyze the management approaches governing its operation,

interventions employed by concerned line agencies; and the effects of the convergence of the interventions on the stakeholders along the dimensions of social, economic, political and ecological perspectives; and 3.) Propose new interventions of an academic institution for LGU-NGO-PO-Academe Partnerships.

Figure 1. Catanduanes Island, Philippines



METHODOLOGY

A reconnaissance is usually made to gather data by directly observing the geo-physical characteristics and biological importance of the MPA. Actual interviews were made to key informants in the barangay (village) within the 3 km radius of the sanctuary to gather information on the socio-demographic characteristics and other socio-economic parameters. Scanning and analysis of selected documents at the Municipal Agriculture Office (MAO) of the Municipality of San Andres and the office of the Catanduanes Provincial Agriculture, paved the way to documentary analysis of collected data.

The study covered only the management and conservation practices at the Agoho MPA that primarily focused on the convergence of interventions from local, regional, national and international agencies which are responsive to the advocacy for natural resources conservation. The concerted efforts of the LGU of San Andres, Catanduanes and the MFARMC, support for the sustainability of the management and operation of the sanctuary were drawn from the following: Department of Agriculture (DA), Bureau of Fisheries and Aquatic Resources (BFAR), US Peace Corps Volunteer Program, Agojo Community Oriented Mangrove Development Organization (ACOMDO), Catanduanes Agricultural Program (CATAG) funded by the European Union (EU), Department of Environment and Natural Resources (DENR), Catanduanes Provincial Fisheries Office, the Catanduanes State Colleges (CSC), San Andres Vocational School (SAVS) and the Embassies of USA and Japan.

RESULTS AND DISCUSSION

Socio-demographic and geo-physical characteristics of Agojo MPA in San Andres, Catanduanes

In 1993, a protected area known as Agojo Point Fish Sanctuary and Marine Reserve (124.0514 Longitude, 13.6014 Latitude) or APFSMR (called here as Agojo MPA) was established through Presidential Decree 704 under the Fisheries Sector Program (FSP) of the Philippines. Another MPA in Catanduanes was established in Batalay, Bato in 2001 within the Fisheries Resource Management Program (FMRP) by virtue of Republic Act No. 8550 or the Agriculture and Fisheries Modernization Act. These MPAs follow the LGU/NGO-PO concept (see Bradecina & Nieves 2006) as to institutional arrangement, now reviewed by Masagca (2010, paper meant for presentation in EMECS 9 Baltimore, USA) as to the role of higher education institutions (HEIs) in the efforts to balance stakeholders participation and LGU-Academe-PO partnerships. MPAs in the province have been noted in the earlier works of Soliman (1999), Soliman et al. (2004), David et al. (2004), Bradecina & Nieves (2006), Masagca (2006, 2008) and on mangroves biobelting/biowalling and marine protected areas (Masagca & Masagca 2009).

The MPA under consideration is around Agojo Point in Catanduanes island, Philippines in the Northeastern Pacific Seaboard (Alino & Gomez 1995). The areal coverage is approximately 3 km long and 1.5 km wide peninsular region protruding into the northern waters of Lagonoy Gulf from the coastal areas of Barangay Agojo in the municipality of San Andres, Catanduanes. It is located on the southwest portion of the island of Catanduanes, a medium-sized island (total land area of 1,430 km²) off the east coast of southern Luzon in the near center of the Philippine archipelago. Fifty percent of the peninsula along the northern shoreline is a mangrove swamp. The remaining shoreline is a long stretch of white beach, while the interior is an area of farm and residential land (Fig. 1).

There are two coastal villages or *barangay*, the basic political unit (BPU) of the Philippines located at the Agojo peninsula: the villages of Agojo and Tominawog with a combined population of about 25,000 people. Approximately, one-third of the male population is full-time fishermen and the remaining two-thirds are part-time fishermen. Majority of the fishermen in the surrounding villages rely heavily their fishing activity on the area. Because 70% of the entire population of San Andres live in the coastal villages, which rely heavily their source of food and livelihood from the harvests at the municipal swamps, estuaries and coastal waters, using fish gears (hook & line, gillnets, spear guns, fine mesh nets, deep sea spear guns with compressors), the fishing activity puts pressures on the coastal area. These practices deplete the coastal resources of the municipality which threatened to decreased fish availability. With this scenario, the population appears to be nutritionally and economically-threatened.

In order to avert the situation in the study area, resource conservation initiatives were undertaken, hence the adoption of the Coastal Resource Management (CRM) plan, and the declaration of the Agojo MPA which has a core zone of 72 hectares (ha) located at Barangay Agojo and an expanded reserve extending to 386.625 ha of coastal areas of the adjoining Barangay Bislig, Cabcab, Bagong Sirang and Catagbacan in the island province of Catanduanes.

Mangroves and seagrass

The most extensive mangrove forest stand in San Andres occurs between barangay Agojo and Catagbacan. As of 1993, there are about 35 ha partially-divided mangroves forests host to 21 true mangrove species which is a high representation of the 26 species known to exist in the Philippines. Masagca (2009) reported a total of 37 mangrove vascular flora (major, minor and associated species). As noted by Mendoza (1999), the extensive mangrove forest in Agojo fish sanctuary, the largest mangrove area in the region, is a major reason for the abundant supply of mudcrabs in the sanctuary. On the associated mangrove fauna, Masagca (1999, 2000, 2006, 2008) and Masagca, Mendoza & Tribiana (2010, in press) published the various species of fishes, crabs, shrimps and mollusks found in the Agojo mangrove area. The recent conference paper of Masagca & Masagca (2009) presented during the East Asian Seas Congress (PEMSEA 2009, 2010) reported aspects on the importance of mangrove biobelting in the province for tidal surges and tsunamis that put emphasis on the MPAs in the province for the land and sea-use planning within the integrated coastal zone management program following climate change vulnerability models.

Table 1 shows the mangrove area (in hectares) in Agojo MPA (=Agojo Point Fish Sanctuary and Marine Reserve) from 1960 to 2003. From the base data of 200 ha in 1960, there was a significant decrease up to 35 ha in 1993 and continued until 1995 with 31 ha and suddenly increased to 162 ha in 1999 and slightly decreased in 2003 to 147 ha.

Table 1. Mangrove areas in Agojo MPA, Catanduanes

<i>Year</i>	<i>Forested area (in ha)</i>
1960	200
1993	35
1995	31
1999	162
2003	147

Source: Philippine Bureau of Fisheries and Aquatic Resources (BFAR), undated

Analyzing the entries in Table 1, reveals that way back in 1960 mangrove forest adjacent to the sanctuary is extensive. The sudden decline in mangrove area coverage in 1995 indicates unwanted degradation of this coastal resource due to the construction of fish ponds and anthropogenic pressures in the areas having uncontrolled gathering or cutting of economically important trees for fuels and other purposes. The recognition of MFARMC in 1997 paved the way for the regeneration and reforestation of the mangrove areas. This was propelled by the Agojo MPA in 1999. Rehabilitation of the deteriorating mangroves brings forth a multiplier effect on the regeneration of the flora and fauna in the coastal areas and sea level beds including all benthic forms.

On the seagrasses, the resource assessment in the area carried out in 1999 by a team of researchers from the Bicol University and ICLARM reveals that among the

sanctuaries and marine parks in Bicol region, Agojo MPA has the highest mean frequency of seagrass that extends to 6 ha with the highest number of seaweed species (10 species identified) although the percentage of live corals (29.69%) is still the lowest in the region. As of 1999, the resource assessment indicates that the seagrass at the sanctuary is about 200-300 meters from the reefs and about half to a km from the mangroves. The same assessment identified 7 species of seagrass and 10 species of seaweeds with the highest in terms of diversity in the number in all sanctuaries of the Bicol region (Soliman 2000).

Corals and Fishes

Coral reefs occur along approximately 60% of San Andres coastline. They are primarily of fringing type. Assessment of 2003 (BFAR), shows that 54%, 17.4 % and 68.2% of the reefs are encrusting , branching and massive corals respectively.

The fish visual census of the 2003 rapid resource assessment conducted in the sanctuary area showed that there 37 species of fish hovering the reefs of Agojo point sanctuary with size range diversely scattered. It was also noted that the presence of Haemulids, Scariids, Engraulids, Carangids and Chaetodontids that thrive in the area indicates that in general, the reefs are in good condition.

2.0 Management approaches and conservation practices in Agojo MPA

The declaration of Agojo MPA was through the Municipal Ordinance No. 3, s. 1993 under the conservatory project of the Fishery Sector Program (FSP). After the termination of this sector program, the local government unit (LGU) of San Andres assumed up to the present time, the support of the management and conservation programs through the people organization, ACOMDO. The LGU employs at least eight (8) Deputy Fish Wardens as caretakers including surveillance activities in the sanctuary, under the supervision and management of the management of the MAO. Funding of the honoraria/salaries of the DFWs are charged against the funds of the Department of Agriculture, but at present, the LGU in San Andres provides the remuneration of these DFWs in Agojo MPA.

Series of legislative amendments through public hearings and the initiatives of the San Andres Municipal Fishery and Aquatic Resource Management Council (MFARMC) reduced the core zone of sanctuary to 72 ha and expanded the reserve to 386.625 ha to include all its adjoining coastal Barangay of Bislig, Cabcab, Bagong Sirang and Catagbacan.

Barangay Agojo is the focal barangay that is responsible for the protection and management of the fish sanctuary. The Agojo Community Mangrove Development Organization (ACOMDO) through the Mangrove Stewardship Agreement (MSA) awarded by DENR of the Philippines is the main people's organization (PO) operating as steward of the 143 ha of mangroves along the perimeter of the core zone.

Interventions and effects of the convergence on the stakeholders status (social, economic, political and ecological perspectives)

Substantial efforts had been made between 1991 to 2004 to stop the degradation of coastal resources at the Agojo MPA. In 2001, CARE Philippines organized and developed the organizational capacities of PO and cooperatives of the municipal fisherfolks in the coastal communities of San Andres (particularly those from Agojo) to implement new livelihood, develop understanding and awareness and the status of their coastal resources and mobilize them to undertake coastal resources management activities.

Trainings conducted includes coastal environmental awareness and coastal resources management plans formulated, resource information management system, fishers folk and fishing gear registry system, organizational management skills, feasibility studies and business planning for supplemental livelihood and establishing networks and building alliances (CarePhil 2001). In these various trainings, the *Bantay Dagat* (Guarding the Sea) members of the adjacent barangays were also involved.

Table 2 shows the different intervention of line agencies intended for the Agoho MPA in San Andres. A document on CRM was prepared for the municipality of San Andres with the assistance of Care Philippines. This ensured the framework for implementation and management of the MPA under consideration. It is pertinent to note that the Office of the Municipal Agriculture (MAO) is the rightful office to manage and facilitate the different programs and projects this MPA in coordination with the different line agencies. The Agricultural Technician for Fisheries at the MAO in San Andres, Catanduanes was designated as the project manager. Deputized Fish Wardens (DFWs) were hired by the LGU of San Andres. In support of the establishment of the MPA, the Development of Sustainable Technology and Livelihood System was incorporated in the management and conservation program. This livelihood system has included the Mari-Culture, Aqua-Silvi Culture and Seaweed Processing projects for the local communities.

On policy approach related to governance, the municipality of San Andres approved village resolutions and ordinances in support of the MPA in Agoho Point. Examples of these policy interventions are: (1) Ordinance authorizing 60% of fine/penalty paid to LGU by violators at the sanctuary (Agoho MPA) to go to the apprehending officer (Municipal Ordinance #4 s. 1999); (2) amending and approving sets of rules and regulations covering the conduct of ethics of members of ACOMDO (Resolution # 1 s. 2001); (3) ordinance prohibiting illegal acts in the sanctuary; (4) village ordinance declaring the last Sunday of the month of December as "People's Day" and conduct of "Atag" System. This indigenous system occurs when the BPU constituents offer free labor in support to the conservation programs and projects at the sanctuary.

On corrective programs, site survey and resource assessments at the Agoho MPA had been conducted by BFAR, Care Phils., ICLARM and Bicol University which were made available to the local communities through the MAO in San Andres. Likewise, the Comprehensive and Sustainable Development CRM Plan was prepared by MAO based

Table 2. Selected management intervention from the different line agencies involved in the Agojo MPA, San Andres, Catanduanes, Philippines.

<i>Year</i>	<i>Agency/Institution</i>	<i>Nature of Support</i>	<i>Tangible Outputs</i>
1994	US Embassy and Women's Club and DENR	Technical and financial assistance to the sanctuary	24 hectares of mangrove areas reforested
1999	KR2 Program (RP-Japan Increase Food Production Program)	Funding support of 130,000 pesos	Acquisition of a patrol boat used in surveillance and construction of a watch house
1998-2006	CSC Graduate School, Doctoral Program	Approved and conducted a doctoral research that included/focused on educational implications for mangrove conservation in Catanduanes (featuring Agoho Point Marine Protected Area with ACOMDO as the people's organization)	Identification of 37 major, minor and associated flora plus macrofaunal elements; published doctoral dissertation that included computer-assisted instruction (CAI) draft and Creation of a Website known as "A View of Mangroves in Catanduanes Island, Philippines) uploaded on trial at De La Salle University-Dasmariñas portal; presented in the International Mangroves 2003 Conference, Bahia, Brazil, International EMECS Conference in Bangkok, Thailand, etc; published in Colombia Journal of Science Education, Southeast Asian Journal of Tropical Biology, etc.
2000	BFAR Regional Office 5	Technical and financial assistance	Reforestation of 5 ha of mangrove areas
2000	BFAR Regional Office 5	Provided 500 kg of seedling materials for the establishment of Seaweed Nursery Project	The nursery provided seaweed seedlings to MFARMC members operating a seaweed farm project
	ACOMDO	Maintenance and production of the Agoho MPA mangrove area	PO awarded the Stewardship Agreement of Agoho Mangrove areas representing MFARMC in the area
	San Andres Vocational School, a public secondary technical vocational school	Spearheads/participated in People's Day Celebration	Advocacy level on coastal clean up among students improved
	Sea Lion Organization	Mud crab culture	Provided livelihood to 32 members involved in mud culture
	Catanduanes State Colleges (CSC), an academic institution	Through the NFE project assisted by Asian Development Bank, an Eco-Tour for the NFE Learners at the Sanctuary	Awareness on conservation of MPS among NFE learners
	CSC Laboratory High School	Through the Youth Science Club participation in massive mangrove reforestation initiated by the US Peace Corp Volunteers	Extensive mangrove reforestation in the MPA, Education on the ecology and importance of mangroves, students appreciation of community service, volunteerism and networking with US PCV
2002	CSC	Developed the Agoho Fish Sanctuary & Marine Reserve website through the assistance of CICT students and faculty members	Worldwide advocacy for the conservation and operation of the Agoho Marine Park through the website; education in the socio-economic and ecological importance of marine park and sanctuary
2003	CSC	Conducted research on <i>Eucheuma striatum</i> in Catanduanes in coordination with the R& D Office	Parameters of the coastal waters identified for potential seaweed farming site
2003	CSC College of Arts and Sciences	Conducted research studies of undergraduate BS Biology students and faculty on the topics population and distribution of mangroves in Agoho	Identification of 17 mangrove species
2005	CSC College of Business and Accountancy	Conducted coastal clean-up in coordination with International Maritime Alliance (IMA)	Students level of awareness on conservation of the Agoho MPA

on the framework produced by Care Phils was submitted for the action/implementation of BFAR.

Projects on Environmental Awareness Campaign were carried out with the support of the Catanduanes State Colleges, a publicly funded higher education institution in the province. This college carried out various initiatives in support of the MPA in Agojo Point: (1) maximizing use of IT and ICT integration through website development for MPAs; the work of Masagca (1999) contained a draft on computer assisted instructional (CAI) materials and a website draft for the mangroves in Catanduanes that highlight Agojo MPA (see dissertation); (2) created a website for the Catanduanes State Colleges Cyber Fair Project which won in the International Cyberfair competition Platinum; (3) Coastal Clean-Up Program for Agojo and San Andres, Catanduanes; (4) conduct of Researches/Investigatory projects of BSc Biology students, masters and doctorate programs; (5) Science Club Activities that include eco-science activities, etc

The biological importance of the Agojo MPA lies in the completeness of its ecosystem. The presence of coral reef, reef flats, seagrass beds and sand flats, mangroves and open beaches creates a rich ecosystem of diverse flora and fauna in the MPA area that provides 85 % of the food fish caught in the near off shore waters of Agojo, San Andres and adjacent coastal villages. Resource assessment carried out reveals that each of the habitats though possibly suffering from varying degrees of over-utilization is still healthy enough to sustain/maintain its important populations.

Management approaches of the sanctuary vary to a wide extent along prevention. Policy approaches that enhance local governance in the form of ordinance and resolutions are evident and enforced. Interventions from line agencies strongly support and strengthen the corrective program management. On-site survey and resource management conducted by BFAR, CARE-PHIL, ICLARM, and BU provide the data and information on the actual status of the ecosystems. These results were significant inputs in the development of the comprehensive CRM Plan of the LGU of San Andres. Financial and technical support from national and local line agencies paved way for the acquisition of surveillance equipment and the construction of a guard house for the fish wardens (FWs) employed as caretakers of the Agojo Point MPA.

Academic institutions support is in the advocacy and information dissemination field. Website development, conduct of researches on the parameters and coastal resources characteristics, educational trips, institutionalize the information, education and communication (IEC) of the biological and ecological importance of the MPA. These processes however, should become part of the capability build-up and information knowledge of the fisherfolks who are the key players and who have the largest stake in the conservation initiatives for the Agojo MPA. Education for the fisherfolks is an overall strategy for effective MPA management (Soliman 2000). Natural phenomenal pressures affecting the Agojo MPA come during typhoons, floods, during heavy downpour of rains that aggravates the siltation adversely damaging the coral reefs. Man-made threats are in the form of illegal fishing and pollution of the coastal waters which could be attributed to the poor solid waste management practices on the residents in the village.

Proposing new interventions of an academic institution for LGU-PO-Academe Partnerships

On capacity building, priority assistance to strengthen the knowledge and skills capacity on coastal resource management for fisherfolks and the FARMC's in the 6 adjoining villages of Agojo MPA area. The need to emphasize on the provisions for training on making development plans where monthly activities and organizational processes are integrated to give clear directions in managing and implementing conservation activities or projects.

The LGU-PO-Academe (Catanduanes State Colleges & others) partnership through ACOMDO (the main PO operating in the area should work for the formation of the co-management body that will handle the Agojo MPA with the fish sanctuary and mangrove project.

Additional team effort should be generated to fast tract organizing work relative to fisheries resource management and income diversification particularly among illegal fishers in the adjoining villages of the MPA, specifically Barangay Bislig, San Andres. Increase in the number of livelihood programs for the fisherfolks through the various agencies necessitates the

Assistance to fisherfolk organization from Barangay Catagbakan in reverting the abandoned fishpond areas into public domain to avail stewardship of the mangrove area through MSA from DENR and develop silvi-aquaculture projects in the area.

As an important component in community-based programs for MPAs, POs such as ACOMDO must be assisted by DOLE and TESDA for accreditation to avail of trainings and support for self employment, sustainable livelihood among the members, thus redirect presence from the fishery resources.

Academic institutions like CSC, San Andres Vocational School near the Agojo MPA and the Pacifictech must design intensive advocacy programs on the biological and ecological importance of the MPA among the adjoining villages. Biodiversity Meeting (BIOME 2010) in Catanduanes island, which is a collaborative national scientific meeting between Catanduanes State Colleges and Pacifictech (Pacific Island Institute for Pedagogy, Technology, Arts and Sciences, Inc.) is a venue for sharing experiences about management of MPAs. As a flagship project on water resources management program in the province, Agojo MPA becomes a model in convergence of initiatives for institutional arrangements to enhance effectiveness in addressing marine biodiversity conservation. Likewise, national meetings on MPAs back to back with BIOME 2011 can be arranged by the through the CSC Institute of Environmental Governance and the Office of Extension Services. Agojo MPA fits in to be a case presentation for LGU-PO-Academe Linkage in addressing issues and concerns related to biases in the representation of bioregions and target priority areas for marine conservation as

reported by Weeks et al. (2009) and the other paper review paper of Campos & Aliño (2008) on management of MPAs in the Philippines.

On the production of IEC materials in the vernacular language, the CSC CIMC can partner with San Andres Vocational School in assisting the LGU San Andres and the PO, ACOMDO to further enhance the use of materials as formal/informal mechanism for information dissemination. Although findings of the study of Masagca (1999) and the published report in Colombia (Masagca 2006) that the perceptions and attitudes of “mangrovellers” in Catanduanes (including those of the members of ACOMDO) do not differ from the science teachers of the province on the ecologic and economic values of mangroves in marine protected areas, initiatives on information dissemination must be further carried out and to be sustained for the younger generations in the area under study and the whole country as well. The support of Philippine government agencies (DENR, DA and BFAR) and the print and broadcast media are most needed now in order to achieve the desired results on effecting changes in the behavior of the local communities about marine coastal resources. In sum, convergence of initiatives to manage an MPA with various institutional arrangements is found to be important in achieving the systematic designing and intervening in managing MPAs through the PO that address fisheries sustainability and marine biodiversity conservation.

ACKNOWLEDGEMENT

We wish to express our gratitude to those who shared their valuable assistance to the completion of this study specifically to the Local Government Unit of Barangay of Agojo and the Municipality of San Andres, Catanduanes, the ACOMDO officers and members as well as the Bantay Dagat (MPA Wardens) members. We also acknowledge the efforts of Dr. Jimmy V. Masagca, President, Pacifictech Inc. and Prof. Estrella T. Tribiana, former Director, Research Services, Catanduanes State Colleges, for sharing valuable experiences and insights learned from their related research studies. Lastly, we thank our families for the inspiration and unstinted support.

LITERATURE CITED

- Alcala, A.C. and G.R. Russ. 2006. No-take marine reserves and reef fisheries management in the Philippines: a new people power revolution. *Abio* 35:245-254.
- Aliño. P.M. and E Gomez. 1995. Philippine coral reef conservation: its significance to the South China Sea. In: Yamazato K, Ishijima S, Sakihara S, Taira H, Shimabukuro Z, Teruya F, Nishishira F (eds) *Development and Conservation of the Asia-Pacific Region*, pp 222-229. Proceedings of the Regional Conference of East-West Center Association: Regional Development in the 21st Century, Think Globally. Act Locally, Okinawa 1993. Okinawa: The East-West Center Association Okinawa Chapter.
- Brandecina, R.G. 2008. Socioeconomic conditions and governance in the Atulayan marine protected area. *Kuroshio Science*, 2(1):85-92.
- Brandecina, R.G. and P. Nieves. 2006. Institutional arrangements and processes in marine fishery reserves-sanctuaries establishment in Lagonoy Gulf. *Science Diliman*, 18(2):47-56. July-December.

- CARE Philippines and CERD, Inc.2001. Final report: community organizing and livelihood development component-FRMP Catanduanes.
- Campos, W.L. and P.M. Alino. 2008. Recent advances in the management of marine protected areas in the Philippines. *Kuroshio Science*, 2(1):29-34.
- David, N.D., A.P. Camaya, R. Buella, A. Mendoza and V. Soliman. 2004. Status of key coastal habitats of the marine fishery reserves in Lagonoy Gulf, Bicol Region. In: Rapid Resource Assessment Phase of the Lagonoy Gulf Post-Resource and Socioeconomic Assessment (Inception Report).
- Jones, G.P., et al.2008. Connectivity and the design of marine protected area networks in the coral triangle. Coral Triangle Initiative, Townsville, Queensland.
- Masagca JT, A Mendoza, ET Tribiana. 2010 (In Press). Diversity of mollusks and environmental setting of mangroves in Catanduanes island, Philippines. *Southeast Asian Journal of Tropical Biology (BIOTROPIA)*, 17(2).
- Masagca JT. 2008. Occurrence and Distributional Range of Mangrove Vascular Flora of Catanduanes Island, Luzon, Philippines. *Southeast Asian Journal of Tropical Biology (BIOTROPIA)*, 15(2):1-10.
- Masagca JT. 2006. Science teachers' and coastal dwellers' perceptions on mangrove biodiversity conservation/*Percepciones de los maestros de ciencia y habitantes costeros sobre conservación de la biodiversidad de manglar. Revista de Educacion en Ciencias (Journal of Science Education), Colombia.* <http://www.highbeam.com/doc/1P3-978202641.html>
- Masagca, J.T and M.T. Masagca. 2009. Distributional range of mangroves in Catanduanes Island, Philippines: inputs to biobelting and biosheltering program for typhoons, tidal surges and tsunamis. Proceedings of the 2009 East Asian Seas Congress, PICC, Manila, Philippines, 27-30 November, PEMSEA.
- Masagca JT, SR Vargas, ET Tribiana.2010. The BIOME National Meeting in Catanduanes, Philippines: Enhancing Schools and Students Partnerships for Mangroves and River-Estuarine Protection Programs. EMECS 9 Conference, Baltimore Maryland, USA. August 28-31, 2011
- Soliman, V.S., R. Dionela, and N. Pelea. 2004. Rapid resource assessment Phase of Lagonoy Gulf post-resource and socio-economic assessment. (Unpublished Inception Report).
- Tavora, F.B., et al. 2006. Marine protected areas in the Philippines Geographic Information Systems (GIS) Database: mitigating impact from aquaculture in the Philippines.
- Weeks, R., G. Russ, A.C. Alcala and A.T. White. 2009. Effectiveness of marine protected areas in the Philippines for biodiversity conservation. *Conservation Biology*, 2009.