Community Awareness and Perception of the Implementation of the Coastal Resource Management Programs in Bolinao, Pangasinan, Philippines

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Community knowledge, involvement, and support are all essential in the implementation of coastal resource management programs for sustainable resource use and economic development. This study aimed to identify the coastal resource management (CRM) programs implemented in Balingasay, Arnedo, Victory and Binabalian in Bolinao, Pangasinan, Philippines, CRM related issues and problems, and the recommended solutions for better management strategies of coastal resources and to determine the extent of community awareness and involvement and perceived government and non-government interventions in the implementation of these programs in these barangays. Marine protected areas and community based mangrove conservation projects were observed to be protected and managed by the local government units and non-governmental organizations.

The respondents had moderate awareness and moderate perceived level of implementation on information, communication and education programs for CRM programs, fisheries and CRM legislation. Similarly, the local communities had moderate awareness and moderate perceived level of implementation of the CRM programs. The perceived level of community participation and involvement in CRM and perceived level of government intervention were found to be occasional. Moreover, the perceived level of interventions of the NGO, academic and research institutions in CRM of Bolinao, Pangasinan were seldom.

Low catch by the fisher folk, poverty, overfishing, illegal fishing,

pollution, squatting, waste disposal and climate change were the major problems identified. These were caused by different human activities in the coastal area. Provision of alternative livelihood and effective enforcement of fishery laws and ordinances are suggested in order to solve these problems.

KEYWORDS: coastal areas, coastal resource management, awareness, implementation, perception, poverty

INTRODUCTION

Community Based Coastal Resource Management (CBCRM) is rooted in the belief that community knowledge, involvement, and support are all essential in the creation of sustainable resource use and economic development. Views of the conditions of resources and program implementation shape the community's response to conservation attempts, as do their views of their own situation, and their relationship to resources and to other resource users. The need to understand these perceptions is especially strong in the case of community level coastal resource management programs that seek not only to protect the environment, but also to improve the lives of the coastal community that depend on it. Perceptions of resource conditions and trends reveal needs of the community, and the perception of a crisis is a key predictor of community participation in management efforts (Baticados, 2004; Pollnac, Crawford, & Gorospe, 2001a). Their understanding of the problems may reveal points of disagreement with the diagnoses of the experts. But, perceptions of management efforts are similarly important, especially concerning program objectives relating to human wellbeing, which is often subjective and difficult to measure (Pomeroy et al., 1997). As with resource conditions, positive program evaluations can be seen as a measure of program success (Pollnac et al., 2001; Pomeroy et al.,1997; Webb, Maliar, & Siar, 2004).

Community views are also key predictors of program support, compliance and sustainability. With Marine Protected Areas (MPAs), McClanahan (2005) suggested that positive perceptions may be impacted by the type of management restrictions, the degree of degradation, the failure of management to live up to promises and ineffective or preferential enforcement. Therefore, it is imperative to understand perceptions of communities in the implementation level

of coastal resource management programs to determine management efforts as well as attitudes within a program area. Objectives and quantitative measures are undoubtedly relevant as well as essential for evaluation of impacts. Nonetheless, they are proxies for more contextual, subjective, experience ideas such as quality of life and marginalization, which may be better measured through perceptions (Pomeroy et al., 1997).

Bolinao is one of the coastal municipalities of Pangasinan that has experienced the challenges of degrading resources in its coastal areas. To maintain these valuable resources, the local people in Bolinao have taken the initiative to conserve their resources through coastal resource management programs like the establishment of marine fish sanctuary and mangrove management areas. This kind of intervention started in 1998 and has been adopted by some of the coastal barangays of the municipality. Through the years, they have managed to slowly deal with the problems on the degradation of their coastal resources in hopes of reviving and saving resources and biodiversity.

The coastal resource management plans and their implementation in this municipality have gone through many challenges such as acceptance and cooperation of the people on the conservation practices of their coastal resources as well as intervention from government and non-government institutions. As such, believing that exploring perceptions may reveal subtle, more abstract impacts of the coastal resource management (CRM) programs that are difficult to measure, but nonetheless important, this study was conceptualized to enhance the effectiveness of the implementation of CRM in coastal areas. This study documented the awareness of the community on the present CRM programs and their perception on the implementation level in selected barangays: Balingasay, Arnedo, Victory, and Binabalian in Bolinao, Pangasinan. Specifically, the aim was to identify CRM related issues and problems and the recommended solutions for better management strategies of coastal resources and to determine the extent of community awareness and perceived government and non-government interventions in the implementation of CRM programs in these barangays.

METHODS

The four coastal barangays of Bolinao, Pangasinan—Arnedo, Balingasay, Binabalian, and Victory—have had an active coastal

resource management program for the past few years; marine protected areas have been established and mangrove ecosystems are managed.

The respondents were the residents of the four coastal barangays, the municipal and barangay officials, and cooperators of the coastal resource management programs (or the implementing organizations of the program). The sample size was determined using the formulas in Cochran (1977):

[a] $n_o = t_\alpha^2 \, pq/d^2$

where n_o = initial estimate of the sample size
t_α = Students' t-distribution with a level of significance of α
p = probability or proportion of "successes"
q = probability or proportion of "failures"
d = desired degree of precision

[b] $n = n_o/[1 + (n_o - 1)/N]$

where n = final estimate of the sample size
n_o = initial estimate of the sample size
N = total population size

With a total sample size of 351, the respondents per coastal barangay were selected through random sampling with sample size proportional to the population size of the coastal barangay (Table 1).

Table 1.

Barangay Population Size and Respondent Sample Size.

Coastal Barangay	Population Size	Sample Size
1. Balingasay	976	120
2. Binabalian	655	81
3. Arnedo	928	114
4. Victory	292	36
Total	2851	351

Interviews and questionnaires, in English and the vernacular, were used to gather data on the socio-economic status of the residents of these areas, their awareness and perceived implementation levels of

CRM programs, the problems/issues encountered, and their proposed solutions. Supplementary information was gathered through probing questions. Informal interviews were also done through focused group discussions using guide questions. The data gathered were tallied, analyzed, and interpreted. Frequency counts, percentages, weighted mean and ranking were used for the descriptive analysis.

RESULTS

Socio-economic Profile of the Respondents

Majority of the respondents from the four barangays were male and married. The average age was 38 in Arnedo, 40 in Balingasay and Binabalian and 39 in Victory. In terms of educational attainment, less than half in Arnedo (45.61%), Balingasay (43.33%), Binabalian (40.74%) and in Victory (27%) have their elementary education. Only 21.05 percent in Arnedo, 21.67 percent in Balingasay, 20.99 percent in Binabalian and 11.11 percent in Victory have completed their secondary education. Very few have reached the college level. In all the four barangays, the respondents depend on fishing as their major source of living. Their average number of children was four or they have six household members on the average. The mean monthly income of the respondents in Arnedo was only PhP 3,245.61, while PhP 2,995.61 was in Balingasay, PhP 1,859.65 in Binabalian and only PhP 1,241.23 in Victory. These results indicate that the respondents from the coastal areas live below the poverty line and have very low educational attainment. This result conformed with findings of an earlier study by Hilomen and Jimenez (2001) in the Lingayen gulf, which revealed that the low educational attainment of the fishermen was a factor that caused the meager average income of PhP 3,000.00 per month.

For fishing facilities, the results show that there were 13 types of fishing gears operated by the respondents in their coastal areas (Table 2). Of these fishing gears, hook and line topped the list (45.61%) in Arnedo, 23.33% in Balingasay, and 72.22% in Victory. Spear gun topped the gears (25.93%) in Binabalian. Multiple handline, spear gun, compressor with net, drift gill net, fish net, trawl, petromax, bottom set gill net, tuna drift gill net, beach seine net, ring net and sky lab were also used by the respondents in fishing. Skylab were the least used. The motorized boat was the next popular fishing

Table 2.

Fishing facilities of respondents in the four barangays of Bolinao, Pangasinan.

Household Gears	Arnedo		Balingasay		Binabalian		Victory	
	f	%	*f*	%	*f*	%	*f*	%
Fishing Gears*								
Multiple handline	38	33.33	19	14.17	7	8.64	12	33.33
Drift Gill Net	11	9.65	4	3.33	1	1.23	6	16.67
Hook and line	52	45.61	28	23.33	11	13.58	26	72.22
Tuna Drift Gill Net	3	2.63	1	0.83	0	0.00	2	5.56
Bottom set gill net	6	5.26	2	1.67	0	0.00	4	11.11
Beach Seine net	3	2.63	1	0.83	0	0.00	2	5.56
Ring Net	3	2.63	1	0.83	0	0.00	2	5.56
Compressor with net	9	7.89	11	9.17	5	6.17	0	0.00
Fish net	8	7.02	5	4.17	3	3.70	3	8.33
Spear gun	7	6.14	24	20.00	21	25.93	2	5.56
Petromax (light fishing)	4	3.51	7	5.83	6	7.41	0	0.00
Trawl	7	3.51	3	2.50	2	2.47	2	5.56
Sky lab	2	1.75	1	0.83	1	1.23	0	0.00
Boat								
Motorized	103	90.35	68	56.67	34	41.98	34	94.44
Non-motorized	2	1.75	42	35.00	42	51.85	0	0.00
None	9	7.89	10	8.33	6	7.41	2	5.56

transport. Table 2 shows that among the respondents, 90.35% in Arnedo, 56.67% in Balingasay, 41.98% in Binabalian and 94.44% of the respondents in Victory were operating motorized boats and 1.75% in Arnedo, 35% in Balingasay and 51.85% in Binabalian used non-motorized boats. These findings indicate that most fishermen used passive type of gears rather than active gears. The higher number of hook and line operators may be attributed to the lower cost and easy operation. Silvestre and Hilomen (2004) noted that hook and line was the second commonly used gear in the Lingayen Gulf, accounting to 12.21%.The use of motorized banca in the coastal area is an advantage to fishermen to have higher catch. The higher number of motorized banca may be linked to the fisherman's priorities. Since fishing is the major source of living, the purchase of motor engine is one of the top priorities aside from the gear. This is similar to the findings of Mcglone and Villanoy (2001) where there was a higher number of motorized banca operating in the Lingayen Gulf rather than non-motorized ones.

Coastal Resource Management Programs

The municipality of Bolinao established several programs and projects in order to manage its coastal resources. Some of these are found in Barangay Arnedo, Balingasay, Binabalian, and Victory where marine areas are protected and mangroves are managed by the LGU and NGOs or people's organizations (Table 3).

Barangay Balingasay has 14.77 hectares of marine protected area (launched in 1998); Victory has 4.8 hectares (since 2002) while Arnedo has 19.47 hectares (since 2004). The newest of the four study areas is the 10.8 hectares in Binabalian which started in 2006 (Figure 1).

Community-based mangrove conservation projects were also observed in the four barangays. The mangrove management area in Arnedo with 8.65 hectares started in 2004 whereas the 8.8 hectares in Binabalian commenced in 2004. The widest mangrove management area is 15 hectares located in Victory (started in 1999). Meanwhile, mangrove conservation also naturally occurs along Balingasay River (Figure 1).

Marine protected areas and mangrove management areas in these barangays are part of the coastal resource management programs implemented by the local government units. These were established to bring back the integrity of the coastal resources that were degraded since the Lingayen Gulf was declared an environmentally critical

area. The marine protected areas were established as "no take" zone—fishing and other activities are prohibited to ensure species replenishment in the area.

Table 3.

Coastal Resource Management Programs in Arnedo, Balingasay, Binabalian, and Victory Bolinao, Pangasinan.

Programs	Activities	In-Charge of Management
Mangrove Planting and Management	- Mangrove planting - Coastal clean-up - Nursery development and management - Replenishment and planting - Monitoring and evaluation - Patrolling and protection	LGU KAISAKA Federation SAPA SAMMABAL SAMMABI SMMV
Marine Protected Areas	- Planning workshops and consultations - Guarding and patrolling in cooperation with the community - Deputized "bantaydagat" - Regular monitoring	LGU KAISAKA Federation SAPA SAMMABAL SAMMABI SMMV

Figure 1. Marine protected areas and mangrove management areas in Bolinao, Pangasinan.

Information campaigns and consultation with the community are regularly done to ensure the progress of the program. Guarding and patrolling in the form of deputizing "bantaydagat" are included in the activities in the area.

In the mangrove management areas, additional activities included nursery development, replenishment and planting of mangroves, coastal clean-up, monitoring and evaluation as well as patrolling and protection. These activities were supported by the local government units through the leadership of the municipal mayor and its staff in-charge in cooperation with the people's organization. The allotted budget for all the coastal resource management programs for the coastal areas of Bolinao was PhP 1,105,000 in 2009 and PhP 500,000 in 2010.

All of these programs were launched and managed by the local government units (LGUs) in partnership with the people's organization (PO), the Kaisahan ng mga Samahan Alay sa Kalikasan, Inc. (KAISAKA) Federation. Management of these projects was specifically given to the member organizations of the KAISAKA in every barangay. These members are the "Samahang Pangkalikasang Arnedo" (SAPA) in Barangay Arnedo, "Samahan ng mga Mangingisda at Mamamayan ng Balingasay" (SAMMABAL) in Barangay Balingasay, "Samahan ng Mangingisda at Mamamayan ng Binabalian" (SAMMABI) in Barangay Binabalian and "Samahan ng Maliliit na Mangingisdang Victory" (SMMV) in Barangay Victory.

Issues and Problems in Coastal Areas

The eight issues and problems along the coastal areas of Bolinao, Pangasinan (Table 4) were ranked by the respondents from 1 to 7 as to its seriousness where 1—in this case, low catch—is considered to be the most serious issue/problem while No. 7 was considered the least serious. Bolinao, being regarded as an environmentally critical area, suffers from the degradation of fish catch. With the establishment of the "no take zone," the area for fishing was reduced, thereby limiting the catch for the fisherfolk.

Causes of the Identified Issues and Problems in Coastal Areas

The low catch (Table 5) was caused by overfishing in the municipal

Table 4.

Issues and Problems of the Respondents in the Coastal Areas of Bolinao, Pangasinan.

Issues and Problems	Rank
Low Catch	1
Poverty	2
Overfishing	3
Illegal Fishing	4
Pollution	5
Squatting	6
Waste Disposal/Climate Change	7

waters (82.34%), illegal fishing (52.71%), influx of transient fisherfolk (38.46%), and increasing number of fisherfolk (34.47%). The continuous illegal fishing within the municipal waters of Bolinao, Pangasinan resulted in the rapid depletion of fish stock and the destruction of the coastal and marine resources. These caused the low catch and poverty in the area. This was also the problem of the whole Lingayen Gulf as stated by White and Cruz-Trinidad (2000) and Domingo (2001). As to the poverty problem, four causes were identified: low income (86.89%), low educational attainment (75.50%), lack of employment opportunities (47.01%), and high population growth rate (37.61%). Poverty is a major problem particularly in the coastal areas of Bolinao. This was also found by Domingo (2001), who claimed that residents in fishing villages had an average monthly income of PhP 2,658.00, way below the poverty threshold of PhP 6,195.00 for a family of five to survive (NSCB, 2007). The residents as well as the labor force could not be gainfully employed due to low educational attainment. On the other hand, overfishing was mainly caused by poverty (81.2%). This was followed by high dependence on fishing as primary source of income (47.86%), continuous increase of fishing efforts (38.46%) and weak fishery law enforcement (15.95%).

People continue to resort to overfishing because they have no other source of income. Whatever law is enforced, implementation is always difficult if the stomach is empty. Moreover, illegal fishing is mainly caused by poverty (92.59%). Other causes were limited number of "bantay dagat" law enforcers/volunteers (85.47%) and lack of alternative livelihood (81.20%). One reason for the use of fishing methods destructive to fish populations and habitats is the "cost efficiency" of these methods. Dynamite fishers are known to

Table 5.

Causes of Identified Issues and Problems in the Coastal Areas of Bolinao, Pangasinan.

Isssues and Problems	Identified Causes	*f*	%
Low catch	1. Overfishing in the municipal waters	289	82.34
	2. Illegal fishing	185	52.71
	3. Influx of transient fishermen	135	38.46
	4. Increasing number of fishermen	121	34.47
Poverty	1. Low income	305	86.89
	2. Low educational attainment	265	75.50
	3. Lack of employment opportunities	165	47.01
	4. High population growth rate	132	37.61
Overfishing	1. Poverty	285	81.20
	2. High dependence on fishing as primary source of income	168	47.86
	3. Continuous increase of fishing efforts	135	38.46
	4. Weak fishery law enforcement	56	15.95
Illegal fishing	1. Poverty	325	92.59
	2. Limited number of Bantay Dagat law enforcers/volunteers	300	85.47
	3. Lack of alternative livelihood	285	81.20
Pollution	1. Excess feeding and fecal matters from mariculture operation	175	49.86
	2. Improper disposal of industrial and domestic wastes	155	44.16
Squatting	1. No housing facilities	254	72.36
	2. Increasing number of coastal immigrants	135	38.46
	3. Population growth	125	35.61
Waste Disposal	1. Lack of discipline among the residents in disposing wastes	256	72.93
	2. Lack of information on solid waste management implemented by the LGU	138	39.32
Climate Change	1. Lack of discipline among the residents in waste management	155	44.16
	2. Continuous burning of wastes	135	38.46

spend shorter working hours with a maximum of eight hours at sea compared to bottom sea gill net and dredge net fishers who work 12 hours or more. Thus, short term financial profitability and labor productivity are relatively higher for dynamite fishers.

On the pollution problem, excessive feeding and fecal matter from mariculture operation could cause pollution (49.86%). Also, improper disposal of industrial and domestic waste was pinpointed by 44.16% of the respondents as cause of pollution. All development activities contribute to coastal marine pollution. People all over the world have long thought of the ocean as vast and limitless. As a result, the ocean has been used as a dumping ground for all kinds of waste-hazardous waste, sewage, and solid waste. Uncontrolled population growth and increasing urbanization and industrialization have overwhelmed the capacity of the ocean and coastal waters to dilute and disperse this growing volume of wastes. Furthermore, urban and industrial pollutants such as heavy metals, petrochemicals, sediments, sewage and solid waste have degraded the country's coastal waters, impacting the health of coral reefs, fisheries and the communities that depend on them (DENR et al., 2001).Squatting along the coastal areas is caused by absence of housing facilities (72.36%), increasing number of coastal immigrants (38.46%), and population growth (35.61%).

On waste disposal, the main causes identified were lack of discipline among the residents in disposing wastes (72.93%) and lack of information on solid waste management implemented by the LGU (39.32%). Solid waste, though managed by the local government units, still contributes to the problems in the coastal areas.

Solutions to the Identified Issues and Problems in Coastal Areas

Solutions recommended by the respondents to the issues and problems in Bolinao coastal areas (Table 6) are resource rehabilitation program (85.75%) and controlled fishing (92.59%). Poverty could be solved if there are employment (84.05%) opportunities for all and livelihood (72.93%) programs. To avoid overfishing, effective enforcement of fishery laws (16.52%) and alternative livelihood (69.80%) were also recommended. On the other hand, squatting could be resolved if housing programs (56.41%) are offered to the residents and the development of the coastal area as eco-tourism zone (16.24%) is done.

Table 6.

Recommended Solutions to the Issues and Problems in Bolinao Coastal Areas.

Isssues and Problems	Identified Causes	*f*	%
Low Catch	1. Resource rehabilitation programs	301	85.75
	2. Controlled fishing	325	92.59
Poverty	1. Employment	295	84.05
	2. Livelihood programs	256	72.93
Overfishing	1. Effective enforcement of fishery laws	58	16.52
	2. Alternative livelihood	245	69.80
Illegal Fishing	1. Strict enforcement of fishery laws	167	47.58
	2. IEC campaign	120	34.19
Pollution	1. Cleaning of coastal area	190	54.13
	2. Regulation of mariculture operations	135	38.46
Squatting	1. Housing programs for squatters	198	56.41
	2. Development of coastal areas for eco-tourism	57	16.24
Waste Disposal	1. Implementation of Solid Waste Management program	143	40.74
	2. Solid waste management to lessen climate change impacts	132	37.61
	3. IEC campaign	123	35.04

Meanwhile, waste disposal could be minimized if the solid waste management programs are implemented (40.74%); the same program can also help lessen the impact of climate change (37.61%). Proper knowledge through IEC (35.04%) campaign on solid waste management could minimize problems on waste disposal in the coastal areas.

Awareness Levels of Respondents and Their Perceived Implementation Levels of CRM Related Activities and Projects.

A study of the awareness of respondents and their perceived implementation levels on the information, education and

communication program for CRM programs in Bolinao (Table 7) showed that respondents are moderately aware of the implementation of this program. This awareness was due in part to the distribution of pamphlets like the "Gabay hinggil sa pagpapatupad ng batas ng sanktuwaryo" (2.72) and pamphlets for ecologically friendly aquaculture (1.88) and RA 8550 (1.82). The respondents were aware of the posters posted on fish sanctuary (2.7) and on human activities that affect the coastal zone. In trainings and seminars, respondents claimed to be moderately aware of the training programs on mangrove plantations and nursery project (1.92) and trainings on the fish sanctuary establishment and management (1.99). According to the perceptions of respondents: these were moderately implemented (2.09 and 2.19), respectively. For the training programs on solid waste management (1.84) and environmental governance (1.79), majority were not aware but were perceived to be moderately implemented (2.10 and 2.13), respectively.

Also, respondents were aware of the public hearings on the establishment of sanctuary and management (2.94) and the consultation and planning for mangrove reforestation (2.72). These were rated 2.83 and 2.86, respectively in their perceptions on implementation level. However, on the conduct of school orientation programs on CRM, respondents claimed to be moderately aware (2.26) of the program. Thus, this was rated also to be moderately implemented (2.45).

Overall, the rating for the awareness of the respondents on the information, communication and education programs for CRM in Bolinao was 2.26—moderate in awareness—while in the perceived level of implementation of the programs it was rated to be moderately implemented (2.25).

The awareness levels of respondents and their perceived implementation levels of the CRM programs in Bolinao (Table 8) shows that the respondents were aware of the coastal resource management programs in Bolinao, Pangasinan. In terms of resource rehabilitation, protection and enhancement, respondents were aware of the establishment of mangrove reforestation (2.78) and its implementation (3.17) while mangrove nursery (3.43) was perceived to be moderately implemented (2.53). Also, respondents were aware of the establishment of the marine fish sanctuary and rated it as well implemented (3.45). They were moderately aware of the establishment of mangrove reserve and deployment of artificial reef. Overall the conduct of resource monitoring and evaluation

Table 7.

Awareness Levels of Respondents and Their Perceived Implementation Levels on the Information, Education, and Communication Program for CRM Programs in Bolinao.

Information, Education, and Communication Programs	Awareness		Implementation	
	Mean Rating	Descriptive Rating	Mean Rating	Descriptive Rating
A. Distribution of pamphlets				
1. Pamphlets on ecologically-friendly aquaculture practices	1.88	MA	2.24	MI
2. Pamphets on R.A. 8550 or the Philippine Fisheries Code	1.82	MA	2.39	MI
3. "Gabay Hinggil sa Pagpapatupad ng mga Batas ng Sanktwaryo sa Bolinao, Pangasinan"	2.72	A	2.73	I
B. Posters, slogan, streamers				
1. Posters on fish sanctuary	2.70	A	2.91	I
2. Posters on man's activities that affect the coastal zone	2.68	A	2.91	I
C. Trainings and seminars				
1. Trainings and seminars on mangrove plantation and nursery project	1.92	MA	2.09	MI
2. Trainings and seminars about fish sanctuary establishment and management	1.99	MA	2.29	MI
3. Trainings and seminars on solid waste management	1.84	MA	2.09	MI
4. Trainings and seminars on environmental governance	1.79	NA	2.13	MI
D. Conduct of dialogues				
1. Public hearing on fish sanctuary establishment and management	2.94	A	2.83	I
2. Consultation and planning on mangrove reforestation projects	2.72	A	2.86	I
E. Conduct of school orientation programs	2.12	MA	1.91	MI
Overall Rating	2.26	MA	2.25	MI

Legend:

1.00-1.80 - Not Aware (NA)	1.00-1.80 - Not Implemented (NI)
1.81-2.60 - Moderately Aware (MA)	1.81-2.60 - Moderately Implemented (MI)
2.61-3.40 - Aware (A)	2.61-3.40 - Implemented (I)
3.41-4.20 - Much Aware (McA)	3.41-4.20 - Well Implemented (WI)
4.21-5.00 - Very Much Aware (VMA)	4.21-5.00 - Fully Implemented (FI)

Table 8.

Awareness Levels of Respondents and Their Perceived Implementation Levels of Implementation on the CRM Programs in Bolinao

Coastal Resource Management Programs	Awareness		Implementation	
	Mean Rating	Descriptive Rating	Mean Rating	Descriptive Rating
A. Resource rehabilitation, protection, and enhancement				
1. Establishment of mangrove reforestation	2.78	A	3.17	I
2. Establishment of mangrove nursery	3.43	A	2.53	MI
3. Establishment of mangrove reserve	2.05	MA	2.53	I
4. Establishment of fish sanctuary	3.01	A	3.45	WI
5. Deployment/installation of artificial reefs	2.48	MA	2.38	MI
B. Conduct of resource monitoring and evaluation				
1. Conduct of participatory coastal resource assessment	2.30	MA	2.14	MI
2. Conduct of rapid resource appraisal	2.16	MA	2.09	MI
3. Conduct of resource ecological assessment	2.12	MA	2.08	MI
C. Implementation of waste management				
1. Conduct of barangay coastal clean-up	3.18	A	3.24	I
2. Implementation of solid waste management plan	3.11	A	2.84	I
Overall Rating	2.66	A	2.66	I

Legend:

1.00-1.80 - Not Aware	1.00-1.80 - Not Implemented (NI)
1.81-2.60 - Moderately Aware (MA)	1.81-2.60 - Moderately Implemented (MI)
2.61-3.40 - Aware (A)	2.61-3.40 - Implemented (I)
3.41-4.20 - Much Aware (McA)	3.41-4.20 - Well Implemented (WI)
4.21-5.00 - Very Much Aware (VMA)	4.21-5.00 - Fully Implemented (FI)

obtained moderate awareness from the respondents while the perceived implementation levels on the conduct of participatory coastal resource assessment (2.14), rapid resource appraisal (2.09) and resource ecological assessment (2.08) got ratings of moderate implementation.

In the implementation of waste management, the respondents were aware of the conduct of coastal clean-up (3.18) and solid waste management plan (3.11) while they rated these as 3.24 and 2.84, respectively in terms of perceived level of implementation, meaning that waste management programs were being implemented in Bolinao. Overall, the awareness of the respondents on the coastal resource management programs was 2.66 (aware) and their rate of implementation was 2.66 (implemented).

The awareness of respondents and rate of implementation on the fisheries and coastal resource management legislations and regulations (Table 9) seems to show plain recognition of the existence of these laws. Legislations, laws or rules on CRM showed little effect on the awareness of the respondents as most of them were moderately aware of the R.A. 8550, Ecological Solid Waste Management Act (R.A. 9003), (1.94), Clean Water Act (R.A. 9275), (1.89) and Code of Practice for Aquaculture (FAO 214) (1.86). All these were rated to have moderate implementation. Seemingly the respondents did not feel the impacts of these laws in their life. This could be the reason for its low rating of implementation. As for the regulations (Table 9), respondents were aware of the registration of municipal fisher folk (2.63) and inventory and monitoring of fishing structure and fishponds (2.82). On fisheries licensing, the respondents claimed to be well aware (3.18). All of these were rated as moderately implemented.

In terms of law enforcement, respondents were aware of the conduct of seaborne patrol operations (2.69), establishment of community-based enforcement (2.66), conduct of surveillance and operation and coming–up with master list of suspected illegal fishers (2.90), presence of bantay dagat volunteers and fish warden (2.95), provision of incentives to active law enforcers (2.68) and strengthening of Barangay Fisheries and Aquatic Resource Management Council (BFARMC) (2.73). All of these rules, regulations and law enforcement activities were rated as moderately implemented by the local government units.

Table 9.

Awareness Levels of Respondents and Their Perceived Implementation Levels on the Fisheries and Coastal Resource Management Legislations and Regulations in Bolinao

Fisheries and Coastal Resource Management Legislations and Regulations	Awareness		Implementation	
	Mean Rating	Descriptive Rating	Mean Rating	Descriptive Rating
A. Legislations/laws/rules				
1. R.A. 8550	1.91	MA	1.94	MI
2. Ecological Solid Waste Management Act (R.A. 9003)	1.91	MA	1.89	MI
3. Clean Water Act (R.A. 9275)	2.06	MA	1.88	MI
4. Code of Practice for Aquaculture (FAO 214)	2.13	MA	1.86	MI
B. Regulation				
1. Registration of municipal fisherfolks	2.63	A	2.60	MI
2. Inventory and monitoring of fishing structure and fishponds	2.82	A	2.23	MI
3. Fisheries licensing	3.18	MA	2.61	I
C. Law enforcement				
1. Conduct of seaborne patrol operations	2.69	A	2.47	MI
2. Establishment of community-based enforcement	2.66	A	2.46	MI
3. Conduct of surveillance and operation and coming up with masterlist suspected illegal fishers	2.90	A	2.39	MI
4. Presence of Bantay Dagat volunteers and fish warden	2.95	A	2.40	MI
5. Provision of incentives to active law enforcers	2.68	A	2.29	MI
6. Strengthening of Barangay Fisheries and Aquatic Resource Management Council (BFARMC)	2.73	A	2.32	MI
Overall Rating	2.55	MA	2.3	MI

Legend:

1.00-1.80 - Not Aware	1.00-1.80 - Not Implemented (NI)
1.81-2.60 - Moderately Aware (MA)	1.81-2.60 - Moderately Implemented (MI)
2.61-3.40 - Aware (A)	2.61-3.40 - Implemented (I)
3.41-4.20 - Much Aware (McA)	3.41-4.20 - Well Implemented (WI)
4.21-5.00 - Very Much Aware (VMA)	4.21-5.00 - Fully Implemented (FI)

Table 10.

Perceived Level of Community Involvement in the Implementation of the CRM Programs.

Variables	Mean Rating	Descriptive Rating
1. The community members organize themselves into an organization as partner in coastal resource management	2.88	OC
2. The community assists in the planning of training and plans to protect the coastal resources	2.87	OC
3. The organizations in the community actively participate in the protection and conservation of their coastal resources	2.78	OC
4. The community members assist in the formulation of coastal resource management ordinances	2.53	S
5. The community members strictly follow the fishery laws, rules and regulations enforced by the LGU	2.64	OC
6. The youth and women in the community participate in the management of coastal resources	2.40	S
7. Community members assist in the mobilization of workgroups to implement the plans and programs in CRM	2.48	S
8. The fisher folks and community members assist in the sourcing of local and external financial and technical assistance to be used in the management of coastal resources	2.56	S
9. The community members willingly report to the concerned authorities illegal fishing activities in their area	2.62	OC
10. The community members assist in the monitoring of fishing related activities in the area	2.72	OC
Overall Rating	2.65	OC

Legend:
1.00-1.80 - Never (N)
1.81-2.60 - Seldom (S)
2.61-3.40 - Occasional (OC)
3.41-4.20 - Always (A)
4.21-5.00 - Often (O)

Perceived Level of Community Involvement in the Coastal Resource Management Program Implementation

The overall rating of the respondents' perception on the community involvement in the implementation of the coastal resource management programs in Bolinao, Pangasinan (Table 10) showed that the members of the community occasionally participate and involve themselves in organizing themselves as partners in coastal resource management. Plans for training and to protect the coastal resources (2.87), protection and conservation of their coastal resources (2.78) and monitoring of fishing related activities in the area (2.72) were also rated as occasional.

Their involvement and participation on the formulation of coastal resource management ordinances (2.53) was seldom. Similarly, participation of youth and women in the community in the management of coastal resources (2.40), assistance in the mobilization of workgroups to implement the plans and programs in CRM (2.48), sourcing of local and external financial and technical assistance to be used in the management of coastal resources (2.56) were also seldom. As such, the overall community participation and involvement in coastal resource management were occasional (2.65).Occasional participation of the people in coastal resource management contributed to the low effectiveness of the program. Since, the program requires people's cooperation towards its success, the program must get the people' support; otherwise it will likely fail. Therefore, the government should cater to the needs of the people, particularly in the augmentation of their livelihood, for them to participate in the CRM programs of the government.

Perceived Government Intervention

The government intervention in the implementation of coastal resource management (Table 11) was also occasional. Government interventions were also rated as occasional participation. These were in the preparation and approval of barangay ordinances on CRM (2.72), preparation and approval of the Local Government Unit (LGU) municipal ordinances in CRM (2.82), extension of necessary assistance from the national government agencies for necessary technical and financial assistance to the LGU's in CRM project implementation (2.69), and strict enforcement of the fishery and CRM laws, rules, and

Table 11.

Perceived Government Intervention in Coastal Resource Management.

Variables	Mean Rating	Descriptive Rating
1. The barangay council prepared and approved barangay ordinances on CRM	2.72	OC
2. The Local Government Unit (LGU) prepared and approved municipal ordinances in CRM	2.82	OC
3. The provincial government actively involved in the preparation of CRM plans and implementation in the province	2.31	S
4. The National Government agencies have extended the necessary technical and financial assistance to the LGU's in CRM project implementation	2.69	OC
5. The LGU strictly enforce the fishery and CRM laws, rules, and regulations in the coastal area	2.88	OC
6. The government reviewed and updated plans and programs to further improve the management of coastal resources	2.59	S
Overall Rating	2.67	OC

Legend:
1.00-1.80 - Never (N)
1.81-2.60 - Seldom (S)
2.61-3.40 - Occasional (OC)
3.41-4.20 - Always (A)
4.21-5.0 - Often (O)

regulations in the coastal area (2.88).

According to the respondents, the government seldom reviewed and updated plans and programs to further improve the management of coastal resources (2.59); active involvement of the provincial government in the preparation of CRM plans and implementation (2.31) were also seldom. Overall, the rating on the government interventions for the coastal resource management in Bolinao was 2.67 (described as occasional). According to the respondents, government interventions were occasional, meaning that the people did feel the presence of the government in the implementation of the programs. This can be attributed to their lack of awareness as well as their occasional participation in government programs. This implies that cooperation between the government and the people is a requisite for a program to succeed.

Perceived Intervention of the NGO, Academic and Research Institutions in Coastal Resource Management of Bolinao, Pangasinan

The intervention of the NGO, academic and research institutions in coastal resource management of Bolinao, Pangasinan was rated as seldom (Table 12). The respondents stated that there was seldom intervention in all the categories assessed. Empowerment of NGOs/ SUCs to the community members through training and capability building was rated 1.99, assistance of the community members to organize themselves into associations was 1.98, information, education and communication (IEC) materials from NGOs and SUCs for advocacy and networking for coastal community organizations was rated 2.03.The conduct of research and development programs relevant to the present needs of the coastal communities was rated 2.00. The close working relationship of the NGOs/SUCs with the LGUs in implementing CRM activities was rated 1.99; the assistance of the NGOs/SUCs to the coastal communities in finding viable alternative livelihood projects, and so on was given a rating of 2.00 and the NGOs as a go-between or as a chaperon to community leaders also obtained a rating of 2.00.

The local governments of Bolinao have established partnership with supporting agencies and organizations in order to implement the CRM programs. These include the Kaisahan ng mga Samahan Alay sa Kalikasan Inc. (KAISAKA, Inc), Bolinao Marine Ecological

Fund Foundation Inc. (BOMEFFI), UP-Marine Science Institute and MERF, HARIBON Foundation, UP College of Social Work and Community Development, Foundation for Philippine Environment, United Nations Development Program, Royal Netherlands Embassy, United Nations Environment Programme-Global Environment Facility, Philippine Tropical Forest Conservation Foundation Inc., Asian Social Institute, Glaxo-Smith and Kline, Pangasinan State University-Institute of Environmental Governance, DA-BFAR, DENR, DILG, DOST, OPAg ,PNP, PCG and other line agencies. However, even with the presence of these partner agencies, people still rated their intervention in the CRM programs as seldom. This could be attributed maybe to the non-participation of people in the implementation, monitoring and evaluation of the projects; hence, people did not understand the purpose, outputs, and benefits of the projects.

DISCUSSION

Marine protected areas and mangrove management areas in the four coastal barangays are part of the coastal resource management programs implemented by the local government units. These were established to bring back the integrity of the coastal resources that were degraded since the Lingayen gulf was declared to be an environmentally critical area. The marine protected areas were established to be a "no take" zone where fishing and other activities are prohibited to ensure the freedom of the species to replenish in the area. Regular consultation with the community and information campaigns are being done to ensure the progress of the program. Guarding and patrolling have been included in the activities in the areas in the form of deputizing "bantay dagat."

Ranking first in the problems of the respondents was low catch, followed by poverty, overfishing, illegal fishing, pollution, squatting, waste disposal and climate change. Bolinao, regarded as an environmentally critical area, suffers from the degradation of fish catch. With the establishment of the "no take zone," the area for fishing was reduced thereby limiting the catch for the fisherfolk. Although the goal of the " no take zone" is to increase the fish species in the future and provide a breeding ground expected to spill over to the fishing areas and increasing their catch, this goal has not been realized up to this date because the effectiveness of MPAs is still in

Table 12.

Perceived Intervention of the NGO, Academic, and Research Institutions in Coastal Resource Management of Bolinao, Pangasinan.

Variables	Mean Rating	Descriptive Rating
1. The NGOs/SUCs empowered the community members through Training and capability building 1.98	S	
2. The NGOs assisted the community members to organize themselves into associations	1.99	S
3. The NGOs and SUCs provides Information, Education and Communication (IEC) materials, advocacy and networking for coastal community organizations	1.98	S
4. The NGOs/SUCs conducted research and development programs relevant to the present needs of the coastal communities	2.03	S
5. The NGOs/SUCs work closely with the LGUs in implementing CRM activities 2.00	S	
6. The NGOs/SUCs assisted the coastal communities in finding viable alternative livelihood projects	1.99	S
7. The NGOs acted as the unifying agent and facilitated the consolidation of the community as manager of their coastal resources	1.99	S
8. The NGOs acted as a go-between or play the part of chaperon to community leaders	1.99	S
9. The NGOs/SUCs served as consultant of LGUs in CRM	2.00	S
Overall Rating	2.00	S

Legend:
1.00-1.80 - Never (N)
1.81-2.60 - Seldom (S)
2.61-3.40 - Occasional (OC)
3.41-4.20 - Always (A)
4.21-5.0 - Often (O)

question. Aside from this, poverty still remains together with the increasing population that needs to eat and survive. Therefore, the MPAs are difficult to manage and protect because people would still continue to find a way to live today and disregard the future.

This is true in the whole Lingayen Gulf. According to Domingo (2001), illegal fishing, overfishing and pollution are the three major problems of the fishery resources of the Lingayen Gulf, and there are several socio-economic and institutional-related causes that are attributed to these problems. The continuous illegal fishing within the municipal waters of Bolinao, Pangasinan has resulted in the rapid depletion of fish stocks and the destruction of the coastal and marine resources. These caused the low catch and poverty in the area. This was also the problem of the whole Lingayen Gulf as stated by White and Cruz-Trinidad (2000) and Domingo (2001). People would continue to resort to overfishing because they have no other source of income. Whatever law is enforced, implementation would always be difficult if the stomach is empty. One reason for the use of fishing methods destructive to fish populations and habitats is the "cost efficiency" of these methods. Dynamite fishers are known to spend shorter working hours with a maximum of eight hours at sea compared to bottom sea gill net and dredge net fishers who work 12 hours or more. Thus, short term financial profitability and labor productivity are relatively higher for dynamite fishers. Low catch and poverty are the main reasons why people continue to overfish and neglect any coastal resource management. Implementation of any CRM program would be very difficult if people continue to live without subsistence. No one would want to cooperate and they would still prioritize how to live and survive at whatever cost.

All development activities contribute to coastal marine pollution. People all over the world have long thought of the ocean as vast and limitless. As a result, the ocean has been used as a dumping ground for all kinds of waste—hazardous waste, sewage and solid waste. Uncontrolled population growth and increasing urbanization and industrialization have overwhelmed the capacity of the ocean and coastal waters to dilute and disperse this growing volume of wastes. Furthermore, urban and industrial pollutants such as heavy metals, petrochemicals, sediments, sewage and solid waste have degraded the country's coastal waters, impacting the health of coral reefs and fisheries and the communities that depend on them (DENR et al., 2001). The respondents recommended resource rehabilitation program (85.75%) and controlled fishing (92.59%) as a solution to the

low catch. Poverty can be solved if there are employment (84.05%) opportunities for all and livelihood (72.93%) programs. To avoid overfishing, effective enforcement of fishery laws (16.52%) and alternative livelihood (69.80%) were also recommended.

Rehabilitation of degraded habitats to improve fish stocks and fisheries yields is a priority. Philippine fisheries are now being fished to their limit, yet there are sufficient laws that provide a policy and regulatory framework for use, access, and allocation of resources. However, law enforcement has been ineffective and this should be taken into account. Therefore, improving local livelihoods for communities in coastal areas is closely linked to building a base for a more sustainable management of coastal and marine resources. A stimulation of small-scale enterprises in communities could be accompanied by qualified technical assistance and financing opportunities to reduce the pressure in the coastal resources.

Another important factor is giving people information about coastal and marine ecosystems and the effects of their deeds. It is, therefore, a priority to ensure that information is better distributed to both LGUs and coastal communities because increased awareness and access to information will improve participation in coastal resources management, and encourage local communities, barangay groups, and local managers to become effective coastal managers. If the reefs of Bolinao were to provide greater sustained production, new management measures must be adopted to reduce the fishing pressure. This requires the successful introduction of alternative livelihoods, both marine and land-based.

According to the CRM staff, with the implementation of the CB-CRM Program that began in 1993, presentations on the need for coastal management have been made to the municipal government and to the various village councils. Relationships, however, were informal and non-official. Forming an official working group between the municipality and the project will have scientific inputs channeled through public education and passage of municipal resolutions for specific management interventions, and will serve as recommendations for land and coastal use planning.

According to the president of the KAISAKA Federation, the people's organization in every barangay takes charge in the management of the marine sanctuaries and mangrove areas. However, the activities are monitored by the federation and the CRM staff of the local government unit. But, because of poverty where people need to work and survive, the organization has not been very active. Some

leaders have to go to other towns to earn a living and others get sick and could not participate effectively.

In Bolinao, the lack of political will is linked to the low level of environmental awareness. In both scales, overfishing is linked with the lack of alternative livelihoods that can lead to the overall problem of poverty in the coastal areas. Thus, the coastal resources management strategies being developed in Bolinao should address a combination of social, political, and economic issues as well as ecological/environmental concerns.

Overall, the respondents were moderately aware of the fisheries and coastal resource management legislations and regulations. The national policy and legal framework for coastal resource management consist of national laws, administrative issuances and International treaties and agreements that define and guide management responsibilities for the use of coastal resources. However, the implementation of these policies and laws remain weak due to a variety of factors, among them the legal and jurisdictional conflicts that arise from the plethora of legislation and administrative issuances affecting different types of economic activities in the coastal area. Conflicting interpretations of these laws and poor dissemination of information have contributed to the difficulties in implementation (DENR et al., 2001). The people are the key towards the success and management of a development program. According to Alcala and Vande Vusse (1994), the current degraded condition of many coastal areas, low level of public awareness and the socio-economic situation in coastal communities present challenges to successful coastal resource management. But then, the sustainable management of the coastal area can only be correctly addressed with efficient information management of the environmental and socio-economic conditions that affect the coast (SIDS, 2004).

As to the perceptions of the community members, the coastal resource management programs were moderately implemented. According to the CRM staff of Bolinao, after the implementation of the CB-CRM Programs that began in 1993, presentations on the need for coastal management have been made to the municipal government and to the various village councils. Relationships, however, were informal and non-official. According to the president of the KAISAKA Federation, the people's organization in every barangay takes charge in the management of the marine sanctuaries and mangrove areas, monitored by the federation and the CRM staff of the local government unit. However, because of poverty and the need of people to work

and survive, members of the organization have not been very active. Some leaders have to go to other towns to earn a living and others get sick and could not participate effectively. Other members of the community would not want to get involved because they had no time for it unless given financial incentives. This resulted to their perception that the programs/ level of implementation was moderate. Many coastal management programs in the developing world, including that of ISO, aimed to help fishermen because they were seen to be the "poorest of the poor " (Pollnac et al.,2001). Furthermore, within these communities, the "burdens" and benefits of conservation are rarely—if ever—equally distributed. If programs are to benefit the "poorest of the poor," it is vital to explore the ways in which benefits and costs are distributed within and between communities (Eder, 2005).

Intervention of government and non-government institutions were perceived by the people to be occasional or seldom. Since, people could not feel the benefits of the program, while experiencing poverty. The coastal resource management office, on the other hand, does its work in the monitoring of the programs within the 23 coastal barangays. However, the three CRM staff cannot do much without the support of the people's organization considering the area to cover. Budget also is limited considering that only a million peso is the budget for the 23 coastal barangays.

Thus, the coastal resource management strategies being developed in Bolinao addresses to a combination of social, political and economic issues as well as ecological/environmental concerns. In Bolinao, the degree of concern for the environment among the ordinary citizens and local officials is variable. While one environmental problem may be perceived as important, another may be ignored even if the two are intrinsically of equal value. This is not to say that there are no informed individuals. Indeed, a number of residents, including some professionals, have demonstrated an appreciation for environmental issues. Unfortunately, they are in the minority. Yet full appreciation of environmental issues is central to any meaningful progress towards sustainable development.

CONCLUSION

The municipality of Bolinao had established several programs and projects in order to manage its coastal resources. In Barangays Arnedo, Balingasay, Binabalian, and Victory, marine protected areas

and mangrove management areas were established. These coastal areas are protected and managed by the LGUs and NGOs or people's organizations.

Low catch by the fisher folks, poverty, overfishing, illegal fishing, pollution, squatting, waste disposal and climate change were the major problems identified. These were caused by different human activities in the coastal area. As such, provision of alternative livelihood and effective enforcement of fishery laws and ordinances were suggested in order to solve these problems.

The respondents had moderate awareness and moderate perceived level of implementation on information, communication and education programs for Coastal Resource Management(CRM) programs, fisheries and coastal resource management legislations and regulations in Bolinao. Similarly, the local communities had moderate awareness and moderate perceived level of implementation of the CRM programs in Bolinao. The perceived level of community participation and involvement in CRM and perceived level of government intervention were found to be occasional. Moreover, the perceived level of interventions of the NGO, academic and research institutions in CRM of Bolinao, Pangasinan was seldom. The success of the Bolinao coastal resource management programs, thus, hinges on three crucial players: local government, national government, and strong community involvement.

Thus, the coastal resource management strategies being developed in Bolinao should address a combination of social, political and economic issues as well as ecological/environmental concerns.

RECOMMENDATIONS

- Information, communication and education on the management of marine protected areas and mangrove management areas should be strengthened by the local government particularly the CRM department and the people's organization to heighten public awareness and obtain community involvement and participation in the management of marine protected areas.
- The municipal council should continue to strongly support the marine protected areas and mangrove management areas to ensure success in the coastal resource management.
- Livelihood programs started by the LGU and other agency linkages should be supported and continued towards the attainment of

economic sustainability.

- The LGU and the barangay council should join and participate in the training on environmental governance and awareness conducted by the Pangasinan Institute of Environmental Governance to equip them with the knowledge on implementation of environmental laws and legislations.
- Other trainings on environmental awareness should be organized and joined by the community members.

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