

Symposium Proceedings

Analysis of villagers' perspectives and involvement in marine protected area management in Northern Luzon, Philippines

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Abstract

The degradation of coastal ecosystems as well as the depletion of marine resources are major concerns confronting the Philippines' fisheries industry. The establishment of MPAs is a global policy for regulating the usage of coastal resources and their conservation. This study assesses the residents' perspective particularly their awareness, perceptions, attitudes, and acceptance of MPAs. It also examines the factors affecting the involvement of local people in MPA management. It is hypothesized that awareness of MPA, and engagement in livelihood projects (ecotourism and fish paste production) influence the involvement of local people in MPA management. Respondents were randomly selected from household lists of San Jose and Sta. Cruz villages in Gonzaga, Cagayan. Using a carefully designed questionnaire, they were interviewed personally by the trained enumerators. Descriptive statistics and probit analysis were applied to analyze the collected data using R, a statistical programming language. The result of the study shows that awareness and livelihood projects affect the involvement of villagers in managing the MPA. Therefore it is suggested to promote awareness campaigns among the local people to increase the understanding of the community about MPAs and to provide support and resources for the development and implementation of sustainable livelihood projects for the communities as this can enhance the residents' involvement in MPA management.

Key words: awareness, coastal resources, livelihood project, Cagayan

INTRODUCTION

The Philippines is an archipelagic country that relies mainly on its coastal environment. It is regarded as the center for marine biodiversity since it is home to the most diversified and biologically complex marine ecosystem (Carpenter and Springer 2005). Coastal resources are the natural resources found within shorelands and coastal water, like beaches, mangroves, estuarine areas, coral reefs, fish diversity, and other marine resources. It provides ecosystem services that are beneficial to society; these services may include provisioning, regulating, supporting, and cultural services that are essential to our daily lives (Milon and Alvarez 2019). But due to the different ecological issues that are present nowadays,

maintaining a sustainable coastal resource is a great challenge for everyone.

The sustainable preservation of coastal ecosystems and their resources is greatly affected by coastal resource governance. The active participation of the local community is necessary for its management. For the purpose of creating inclusive and successful management techniques, it is important to know the perceptions and attitudes of the villagers toward managing the resources (Truong 2021). Marine Protected Areas (MPAs) have the potential to strongly affect the fishing industry, and their success depends, at least partly, on fishers' attitudes towards this management measure; studies on attitudes, perceptions, beliefs, and preferences related to MPA issues have been identified as priority social

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science topics that need further research (Pita and Pierce, 2011). People's understanding of environmental problems is vital for the effective implementation of the ecosystem approach to marine management (Ankamah-Yeboah et al. 2020).

The villagers' way of thinking in managing coastal resources includes their knowledge, perceptions, and attitudes related to MPA management and sustainable use. Several variables, such as cultural, social, economic, and environmental circumstances, affect this. Effective methods for promoting effective resource management practices that are in line with local needs and aspirations can be established by studying the underlying elements influencing how people perceive and interact with their coastal environment (Kitlelele and Sato 2016).

In recent years, it has taken a lot of work to strengthen, diversify, and create alternative livelihood projects in marginalized coastal communities (Pomeroy et al. 2017). That can reduce the dependency on declining coastal resources and enhance the well-being of the local people. Livelihood projects play an important aspect in supporting coastal communities, especially economically.

The study intends to investigate the villagers' perceptions, attitudes, and acceptance of MPAs. This also determines the factors influencing their involvement in MPA management. It is hypothesized that awareness of MPA and engagement in livelihood projects affect the involvement of the villagers in MPA management.

This study can provide ideas on how to improve the current programs and encourage sustainable management of the MPAs by understanding the attitudes and perceptions of the local people towards coastal resource management and the factors affecting their involvement in managing the resource. This will add to the body of knowledge on coastal resource management and give important insights into the viewpoints of the villagers. It will inform policymakers, local authorities, and non-government organizations working in the field of coastal resource management on how to effectively develop and implement participatory strategies.

METHODS

Study area

Data were collected through face-to-face household interviews in September 2022 in San Jose and Sta. Cruz. Both villages are located in Gonzaga, Cagayan a coastal municipality in the northern part of the Philippines. Table 1 shows important information about the study areas. The MPAs in each area are being managed by the fisherfolk organization with the help of the Municipal Agricultural Office of Gonzaga.

San Jose has alternative livelihood projects such as ecotourism: nature village and reef discovery at Sitio Matara and fish paste production which are being managed by the San Jose Fisherfolk organization. These projects were provided by the Department of Environment and Natural Resources and Local Government Unit of San Jose in 2011 and the Bureau of Fisheries and Aquatic Resources in 2012 (Ballad and Shinbo, 2016).

Sta. Cruz is a village with a newly established MPA in 2020. The creation of this MPA is a positive move for safeguarding one of the nation's marine resources. There was no alternative livelihood project present in the village during the conduct of the study.

Table 1. Information about the villages.

Village	San Jose	Sta. Cruz
MPA Details		
Name	San Jose/Matara	Sta. Cruz
Year of establishment	1999	2020
Municipal ordinance of Gonzaga	No. 9 series of 1999	No. 8 series of 2020
Area (ha)	286	205
Management team	San Jose Fisherfolks Organization	Sta. Cruz Fisherfolk Organization
Other information		
No. of purok	7	7
No. of registered fisherfolks (as of 2022)	188	77
No. of fishing boats (as of 2021)	60	14

Data collection

Respondents were randomly selected from the village's list of household heads. A total of 169 from San Jose and 153 from Sta. Cruz (Table 2) villagers were interviewed using well-designed questionnaires.

Table 2. Sample size.

Study areas	No. of Household	No. of samples		Total no. of samples
		Fisher	Non-fisher	
San Jose	379	63	106	169
Sta. Cruz	259	51	102	153
Total	638	114	208	322

During the survey, enumerators used local language to ask the respondents. Villagers were asked about their awareness of the MPA, the benefits they can get from it if they are involved in its management, their socio-demographic information, and other related information. For involvement in the management, respondents were asked, "Are you involved in the MPA management?" This is answerable with a yes or no response. If they are involved in the management of MPA, they were asked if they are part of the law enforcement team (*bantay-dagat*), local residents monitoring group, or other responses.

Descriptive statistics were used to analyze and interpret the variables regarding the villagers' knowledge of MPA and other related factors. A probit model was used to check the factors affecting the involvement of respondents in the MPA

management in their villages. The responses were coded as 1 = yes, they are involved and 0 = no, they are not. The following equation was used:

$$\text{Prob (Yes)} = a + \beta_1 X_1 + \dots + \beta_n X_n + \varepsilon$$

Where a is the intercept, $\beta_1 - \beta_n$ are the regression coefficients, and $X_1 - X_n$ are the variables. and ε is the error term. The data were analyzed using R statistical software.

RESULTS AND DISCUSSION

Profile of the respondents

The background of the respondents' characteristics is shown in Table 3. Non-fishers were relatively older than the fishers. The mean years of schooling are the same for both fishers and non-fishers. Respondents in both areas have lived in the village for 35 years or more. Based on the survey, the monthly income of the fishers came mainly from fishing, while the non-fishers sources were the salary from the job, revenues from selling goods, and pensions. A high percentage of the respondents are male, and some of the remaining are female. These parameters can help us understand the socio-demographic features of the respondents.

Table 3. Characteristics of the residents.

Parameter	Sta. Cruz		San Jose	
	Fisher	Non-Fisher	Fisher	Non-Fisher
Age (years) ¹	46	49	46	52
Education (years) ¹	8	9	8	9
Residency (years) ¹	36	37	35	37
Monthly income ¹ (pesos) ²	3,502	9,056	5,479	9,309
Sex (%)				
Male	98	69	97	69
Female	2	31	3	31

Note: ¹average; ²0.4018 peso = 1 yen (Source: BSP, September 2022)

Residents' knowledge, awareness, and acceptance of the establishment of the MPA

Public perceptions, including knowledge levels and opinions of how the public feels about the marine environment and pro-environmental attitudes, are critical socio-economic assessment tools for the success of any marine management program (Jefferson et al. 2015).

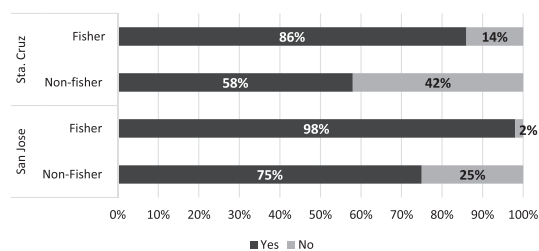


Fig. 1. Have knowledge about MPA.

Villagers in San Jose have more knowledge about the MPA compared to Sta. Cruz villagers, as seen in Fig. 1. Fisher respondents have higher knowledge compared to non-fishers; this may be because they are more familiar with the MPA than the non-fishers, whose line of work is different.

Residents of San Jose are more aware of the presence of the MPA in their village than Sta. Cruz (Fig. 2). More than 75% of all the fishers and non-fishers in both areas are in favor of the establishment of the MPA (Fig. 3).

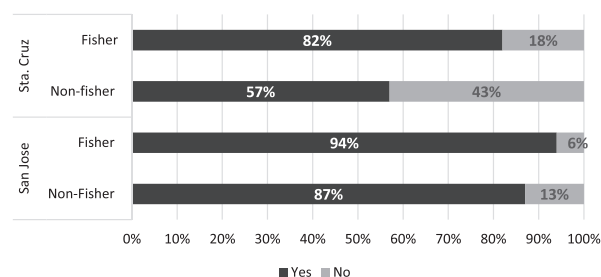


Fig. 2. Aware in village MPA.

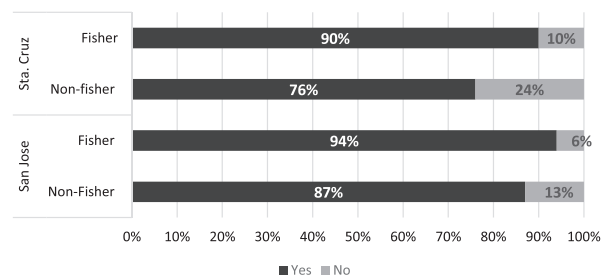


Fig. 3. In favor of MPA establishment.

The difference in perception and awareness between each village signifies the level of their understanding regarding their respective MPA. Knowing about and being aware of the MPA is critical for marine biodiversity conservation, enhancement of fisheries, sustainable use of coastal resources, and education and research.

The benefits of MPA prevail over its negative impacts

Figure 4 shows the local residents' responses to the question, "Do the benefits from MPA outweigh the costs or negative impacts?" According to the response, 65% of the fisher and 43% of non-fisher respondents in Sta. Cruz, 79% of fisher and 63% of non-fisher respondents in San Jose expressed that for them, there are more positive impacts than negative effects of having an MPA. Most of the local people said that the benefits they get from having an MPA are the following: increased fish catch and other marine products; a greater chance to catch older or larger fish; and the maintenance of natural habitat (good live coral cover and fewer dead coral reefs).

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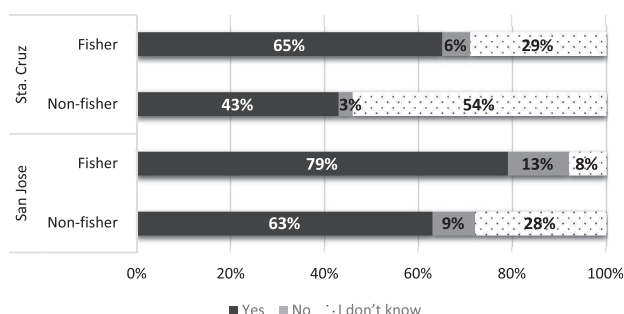


Fig. 4. MPA benefits outweighs costs.

Perception of fishery status

The given data in Fig. 5 shows the responses of the villagers regarding whether the MPA's current situation is better, the same, or worse, or they have no idea. Most of the San Jose villagers said that the current situation is better, while in Sta. Cruz village, only 39%, and 34%. This may be because the promised effect on the fishery is still ongoing since the Sta. Cruz MPA is newly established.

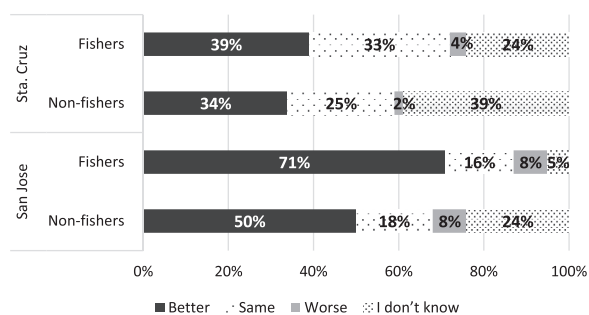


Fig. 5. Perception of fishery status.

Involvement in the MPA management

We also asked the local people in each village about their involvement in the MPA management. Table 4 shows how many of the respondents are involved in the MPA management in their villages.

Table 4. Involvement in MPA management.

Villages	Respondents	No. of Respondents	No. of Involve
San Jose	Non-fishers	106	14
	Fishers	63	48
	Total	169	62
Sta. Cruz	Non-fishers	102	6
	Fishers	51	13
	Total	153	19

According to the survey, it appears that the primary motivation of the respondents to join the management is because they are thinking about the future of the next generation (Fig. 6). Villagers want the coastal resources to be

available in the following years for the coming generations. Preservation and protection of MPAs are important for the sustainability of the world and succeeding generations.

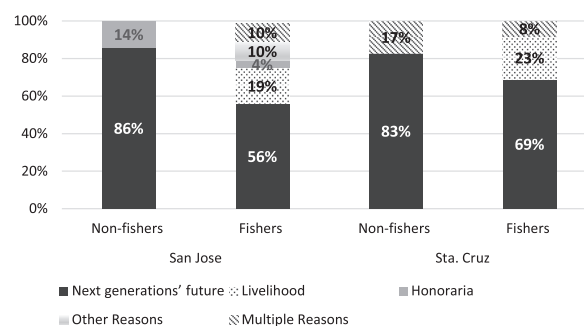


Fig. 6. Motivation to participate in MPA management.

Assessment of the MPA management

Overall, most of the respondents in San Jose rated the current MPA management as average or excellent; only a few responded that the management is poor and they don't have an idea (Fig. 7). Since Sta. Cruz is still recently established, and most of the respondents' assessments regarding the status of the MPA management were average.

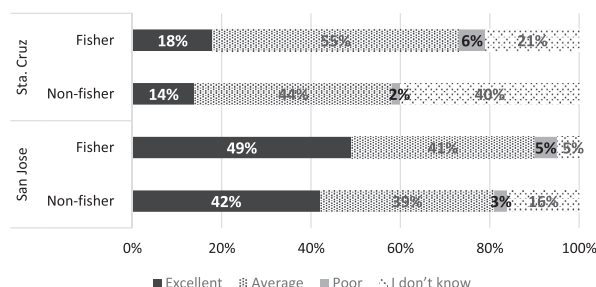


Fig. 7. Local residents' assessment of the MPA management.

Probit analysis

Table 5 shows the result of the probit analysis. The San Jose and Sta. Cruz data sets were merged to check the factors affecting the involvement of the villagers in the MPA management. Model 1 and Model 2 have almost the same significant variables except for the additional variable Trust3, a social capital variable, which was not included in Model 1. Considering Model 2 has a better fit, we will use this for the interpretation of the result.

The variable aware has a positive coefficient, which suggests that respondents who are aware of the MPAs are more willing to get involved in managing them. Awareness is important if there is to be meaningful participation that leads to a healthy MPA (Charles and Wilson, 2008).

Fisher has a positive coefficient, which means that fishers

are more likely to be involved in the management of MPAs. Since fishers' main source of income relies on the sea, they are concerned with managing the fishery resources. The study by Di Franco et al. (2016) said that fishermen's engagement in managing coastal resources is one of the attributes of a successful MPA. Hence, collaborative work with fishers is a valuable tool for effective MPA management. Age has a positive coefficient, which indicates that as the age of respondents increases, the more likely they will be involved in MPA management. Mature residents have more experience and understanding, which is why they want to help manage the MPA.

Livelihood project (LP) has a positive sign, which implies that those respondents who are engaged in livelihood projects such as ecotourism and fish paste production are more likely to want to be involved in MPA management. This is supported by the study of Ballad et al. (2022), which shows that villagers' support for MPA can be influenced by alternative livelihood projects that generate additional and other income sources.

BenefitsI4c has a positive coefficient, which means that respondents who perceive the MPA benefits of having good cover of live corals, fewer dead coral reefs, and others are more likely to be involved in managing the MPA.

Table 5. Factors affecting the involvement in MPA management.

Variables	Description of the Variables	Model 1	Model 2
Constant	Constant term	-5.812967(-6.460)***	-6.759560(-5.882)***
Aware	Awareness in MPA	1.476053(2.714)***	1.598273(2.839)***
Fisher	Fisher (1=yes; 0=no); dependence in marine resources	1.393115(6.045)***	1.546699(6.271)***
Age	Age in years	0.021603(2.710)***	0.023808(2.880)***
LP	Have livelihood project (1=yes; 0=no)	1.093968(3.527)***	1.110667(3.497)***
BenefitsI4c	MPA benefits: maintain the natural habitat-good cover of live coral, fewer dead coral reefs, etc. (1=yes; 0=no)	0.520449(2.420)**	0.527119(2.362)**
CurrentMngt	Current management of the MPA (4-excellent; 3-average; 2-poor; 1-I don't know)	0.340039(2.878)***	0.349490(2.688)***
Mem	Member of an organization (1=yes; 0=no)	0.567436(2.072)**	0.566555(1.971)**
Loc	Village (1-San Jose; 0-Sta. Cruz)	0.393172(1.662)*	0.480256(1.915)*
Trust3	Trust in the village officials (5-strongly trust; 4-trust; 3-undecided; 2-don't trust; 1-strongly distrust)	-	0.320217(2.550)**
	No. of observations	322	322
	Log-likelihood	-97.79406	-93.95544
	McFadden's R ²	0.4615433	0.4826788
	AIC	213.59	213.91

Note: (1) Figures in parentheses are z-value; (2) Sign codes: ***1% or better; ** 5% or better; *10% or better

CurrentMngt has a positive coefficient, which suggests that villagers who perceive that the current management of the MPA is in good condition are more likely to get involved in MPA management.

Mem has a positive coefficient, which means that respondents who are members of organizations are more likely to get involved in managing the MPA.

Loc has a positive coefficient, which implies that San Jose villagers are more involved in the management of the MPA. This is because they have a long-standing MPA, and the local people have become more involved in several activities since then.

Trust 3 has a positive coefficient that signifies that respondents who trust the village officials are more likely to be involved in MPA management. Trusted leadership within society provides platforms for several collective actions (Kitolelei and Sato, 2016). Trust is an important factor in enhancing the villagers' involvement in managing the resources.

CONCLUSION

It was proven that awareness of MPA is positively associated with involvement in the management of MPA. Promoting awareness campaigns among the local people is recommended to increase their understanding of MPAs, as this can boost their involvement in managing MPAs. It is also highly encouraged to regularly monitor and evaluate the MPA to see its current condition and look for areas of improvement. This may be done with the help of the local government unit and other agencies that have the capacity and ability to conduct monitoring and evaluation of the MPA.

The presence of alternative livelihood projects greatly affects the involvement of the local residents in managing the MPA. Hence, it is suggested to provide support and resources for developing and implementing sustainable alternative livelihood projects for the communities, as this can strengthen and enhance the local residents' involvement in MPA management.

Additionally, the enhancement of collaboration and partnership among the local leaders and villagers is also recommended, as this can develop trust among each other and boost the involvement of the villagers in MPA management. The community's involvement and cooperation are major factors that can help in attaining sustainable MPA management in their respective villages.

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