Analyzing Factors of Willingness to Work or Pay for the Management of Atulayan Bay Marine Protected Area in Sagñay, Camarines Sur, Philippines: Does Social Capital Help Subserve Fisherfolks' Cooperation for Coastal Resource Governance?

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This study analyzed the factors of willingness to work or pay of the fisherfolks for managing the Atulayan Bay Marine Protected Area (MPA). The results of the study revealed that local people are willing to participate in managing the MPA. Bid level; daily cash on hand; household size; monthly income; membership in a group, association, or organization; and trust among the members of a priority organization influence fisherfolks' willingness to participate in MPA governance. This study suggests that local governments or policymakers may strengthen organizations that can help the local people work together for MPA improvement.

Key words: willingness to work or pay, social capital, marine protected area

1. Introduction

The Philippines is located along the flow of the Kuroshio Current sphere of influence where population growth, rapid development of industries, and changes in lifestyle are deteriorating the marine environment (Morooka *et al*., 2008). To maintain ecosystem services and mitigate biodiversity loss, protected areas are the primary strategy employed worldwide (Gurney *et al*., 2014). Coastal resources are currently being exposed to growing pressure on the carrying capacity of their ecosystem. It is now subjected to damages because of environmental issues and harmful fishing methods. The establishment of MPAs is a popular strategy for fisheries management and marine ecosystem conservation as it limits the uses of specific areas to protect the resources by giving them a chance to recover from earlier damages, thereby providing long-term benefits for the environment and local communities (Ballad *et al*., 2018). According to Launio *et al*. (2010), establishing MPA help in restoring and sustaining marine and fishery resources, but in the case of the Philippines, only 20% of the total MPAs are achieving their management objectives. This means that several MPAs in the Philippines demonstrated management concerns. Without effective management, protected areas are unlikely to achieve the hope of the conservation and development sectors which is to conserve biodiversity and to alleviate poverty (Fox *et al*., 2014). There are over 1,900 marine protected areas in the Philippines (Philippine MPA Database, 2019). Of the total number, 29 have been nationally designated through the National Integrated Protected Areas Systems Act of 1992, while the rest have been established by local municipalities through different national laws and ordinances (The Coral Triangle Atlas, 2019).

Social capital is described as an attribute of actors comprising social ties to other individuals or groups and the extent to which those ties are characterized by norms of reciprocity and trust (Putnam *et al*., 1994). Social capital also means that the community exhibits social ties: – individuals trust, care, cooperate, and share the resources they have with each other. Hence, this helps them achieve harmony in the community. Social capital in this study pertains to the networks of ties between individuals and how these connections function in a society. We used trust as an index of social capital. Since trust can mean different things to different individuals, it is challenging to measure it. To determine trust, an approach that focuses on the context of a specific transaction to which individuals can easily relate will be employed. Lending and borrowing are examples of transactions that require trust (Grootaert and Bastelaer, 2002). Therefore, we used this as a proxy for the trust variable in this study. Understanding social capital to evaluate MPAs can

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help develop interventions that address the human dimension in improving MPA management. In the context of marine resources, researchers argued that the structural and normative components of social capital contribute to increasing the likelihood of sustainable management (Nenadovic and Epstein, 2016). Common-pool resource theory argues that local resource users are capable of sustainably managing resources, such as fish, irrigation systems, and forests (Ostrom, 1990). The tragedy of the commons can occur when a common-pool resource is overutilized. Proper management is needed in order to conserve the natural resources within the MPA. The relationship between social capital and MPA management is that its ties enable communities to cooperate and participate in the sustainable management of a shared natural resource. This study hypothesized that social capital, through joining a group, association, or organization, and trust among individuals in the organization in the rural areas, improves the participation of the local residents, specifically the fisherfolks in the management of MPA. This study analyzed the factors that influence fishers' willingness to work (WTW) or pay (WTP) for managing the Atulayan Bay MPA and the relationship of social capital in terms of promoting fisherfolks' cooperation in coastal resource governance.

2. Study Areas and Methodology

Sagñay is a 4th class municipality in the province of Camarines Sur, with a total land area of 10,819 hectares. Fishing is one of the primary sources of income of the local community in the town. The majority of fishing occurs in the Lagonoy Gulf which stretches all the way to the Maqueda Channel. The Atulayan Bay MPA was established in 1993 by the Local Government Unit (LGU) of Sagñay, under the initiative of the Bureau of Fisheries and Aquatic Resources (BFAR) Region V, to preserve Lagonoy Gulf, the municipality's main fishing area. The Atulayan Bay MPA's core area is 70.36 hectares, and its buffer area is 72.28 hectares.

1) Sampling strategy

The proportionate allocation was used for calculating the sample size. Originally, the respondents were selected from the eight coastal villages in the municipality of Sagñay, namely, Atulayan (island), Nato (coastal), San Isidro and Sto. Niño (coastal farming) and Turague, Sibaguan, Bongalon, and Patitinan (upland coastal). The sample respondents were randomly selected from the registered fisherfolks in each

study area. Because of the occurrence of tropical depression, Usman, in December 2018 that brought heavy rains and the landslide that greatly affected some of the study sites, only the villages of Atulayan and Nato were considered in processing the data generated in the study. From August 2018 to February 2019, 446 respondents were randomly selected from Nato, and these fisherfolks were divided into two equivalent groups. But due to the change of address and death of some respondents, the enumerators only interviewed 201 and 204 respondents for the Nato WTW and WTP surveys, respectively. On the other hand, 110 fisherfolks were interviewed for the Atulayan WTW survey.

Table 1. Sample size by village

Study Area	No. of Registered Fisherfolks	No. of Samples for WTW	No. of Samples for WTP
Island[1]	153	110	-
Coastal[2]	530	201	204
Coastal Farming[3]	74	60	-
Upland Coastal[4]	405	175	-
TOTAL	1162	546	204

Note: [1]Atulayan, [2]Nato, [3]San Isidro and Sto. Niño, [4]Turague, Sibaguan, Bongalon and Patitinan

2) Survey questionnaire

A questionnaire was developed to capture the WTW or WTP of the respondents for the managing the Atulayan Bay MPA. The hypothetical scenario of Atulayan Bay MPA ecosystem-services attributes was used to elicit economic imputation from the respondents for these non-marketed goods. To estimate the difference between the two variants in elicitation method, two types of questionnaire were used during the surveys. The enumerators explained the MPA scenarios to the respondents using the local dialect in the study area. While showing the poster with photos, the enumerators explained that the current good situation of the MPA might change to a worsened situation like in the hypothetical scenario if not properly managed by financial restrictions. In table 2, live coral cover deteriorates from good to fair or poor, and fish biomass and species richness diversity are reduced. The enumerators expounded and asked the WTW respondents the following: "To prevent this from happening, suppose there may be a proposal to ask the help of the residents to voluntarily work for a day or more for free per month (meaning no wage or compensation) for the monitoring and

Table 2. Current and hypothetical Atulayan MPA scenario

MPA	Indicators		
scenario	Live coral reef cover	Fish biomass	Species richness diversity
Present situation*	Good: 44.4% (inside) and 36.4% (outside)	26.8mt/km^2/year (inside) and 23.3mt/km^2/year (outside)	114 species
Possible future situation	Fair: 26%-50% or Poor 0-15%	Reduced by 50%	Reduced by 50%

Sources: Survey poster; Atrigenio *et al*. (2016)*

patrolling of the MPA. This will mean you will sacrifice such time with an equivalent amount of lost daily wages for the MPA. I would like to request you to think carefully about whether you really care for the protection of the coastal and marine resources or not, and what value you put on marine protected area. I would like to ask if you will be willing to work __ days per month for free or pay for the monitoring and patrolling of the marine protected area. Please think carefully about this and remind yourself that there are works that you might wish to spend this time on."

The final set of bid levels used per month for the WTW was 0.5, 1, 3, 5, and 10 days, whereas for the WTP, it was 50, 100, 200, 300, and 500 pesos. Each questionnaire has a randomly assigned bid level.

3) WTW and WTP estimation

Contingent valuation is a common method for measuring ecosystem values which is a survey-based technique for economic valuation of non-market resources (Castaño-Isaza *et al*., 2015). Contingent behavior (CB) approach is used to determine how the fisherfolk's response behavior changes in a hypothetical scenario. The respondents' willingness to pay was measured using contingent valuation method (CVM), and their desire to work was measured using CB. CVM and CB are both stated preference methods. It can provide evidence about the WTW or WTP of fisherfolks in managing the Atulayan Bay MPA in exchange for the ecosystem services or benefits it provides them.

The WTW and WTP response data were structured as binary: 1 was assigned to those who answered "yes" and 0 to those who answered "no" or "willing to work fewer number of days or pay a lesser amount per month". Next, the non-parametric method using survival function was applied to estimate the mean and median values of WTW and WTP. The monetary values of WTW were calculated using the average daily income of the fisherfolk-respondent. For the parametric method, the probit model was used to estimate the voluntary work and payment behavior equations. The model used can be represented as follows.

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

Where α is the intercept, β_1-β_n are the regression coefficients, X_1-X_n are the variables and ε is the error term.

3. Results and Discussion

The socio-economic characteristics of the respondents are shown in table 3 to give background of the fisherfolks in the study areas.

Table 3. Socio-economic characteristics of fisherfolks

Socio-Economic Characteristics	Atulayan (WTW)	Nato (WTW)	Nato (WTP)
[a]Age	47	46	45
[a]Years of schooling	6	9	8
[a]Years of residency	42	38	39
[a]Household (HH) size	5	6	6
Major sources of income			
% Fishing only	57	52	56
% Fishing and other jobs	42	48	44
[a]Personal income*/month	10,856	5,640	6,463
[a]Personal COH[b] daily	220	140	181
Members of organization			
[c]No. of fishing association	69	173	101
[c]No. of other groups	12	18	25
[c]No. of no organizations	29	10	78
[a]HH income/month*	14,691	12,455	14,007

Note: [a]average; [b]cash on hand; [c]number; *in Philippine peso (₱), 1 USD = ₱52.04 (Source: Bangko Sentral ng Pilipinas, Sept. 30, 2019)

The overall pattern of the survivor function in figures 1 and 2, which exhibited a diminishing propensity of acceptance as the suggested bid in terms of voluntary work days or monetary amount increased, is confirmed by the internal validity of the behavior response. The proposed bid levels were used for calculating of the median and mean
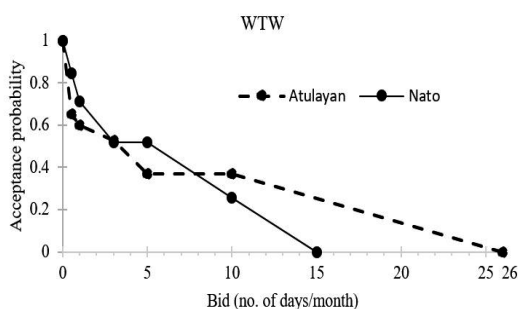
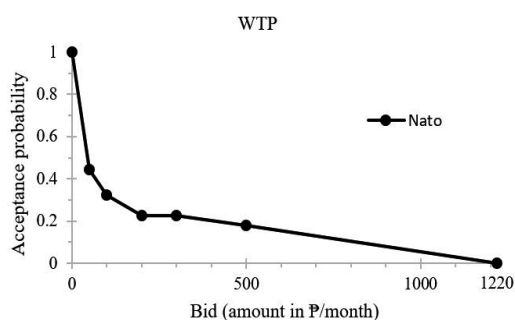**Figure 1. Non-parametric estimation of acceptance probability curve of WTW**

Figure 2. Non-parametric estimation of acceptance probability curve of WTP

Table 4. Result of non-parametric estimation of survival curve

Statistics	WTW (days/month)		WTP (₱*/month)
	Atulayan	Nato	Nato
Median	3.38	5.38	44.64
Mean	4.59	5.06	166.87
No. of Registered Fisherfolks	153	530	530
Aggregated WTW/WTP	702.27	2,681.80	88,441.10
[a]Daily income (₱)*	493.45	256.36	293.77
Converted WTW in Monetary Term:Median	1,667.86	1,379.22	-
Converted WTW in Monetary Term:Mean	2,264.94	1,297.18	-

Note: [a]average; *1 USD = ₱52.04 (Source: Bangko Sentral ng Pilipinas, September 30, 2019)

WTW or WTP.

For the non-parametric estimates (table 4), the mean WTW was estimated at 4.59 and 5.06 days per month for Atulayan and Nato, respectively. This implies that Nato fisherfolks exhibit a higher mean WTW than Atulayan since the latter exhibit more daily income than the former which means that they demonstrate a higher opportunity cost to expense. To find the median, the standard formula for the line given two points was used. The median denotes the amount for which the probability of no response equals 0.5. Nato demonstrates a higher mean and median WTW. High median WTW implies that most of the Nato fisherfolks accept higher bids than the average. The mean monthly WTP of Nato fisherfolks for managing the Atulayan Bay MPA is ₱166.87. This amount is roughly more than 50% of the daily income of the Nato fisherfolks. According to the number of registered fisherfolks, the aggregated monthly WTW for Atulayan is 702 days and for Nato is 2,682 days. Dividing this by the number of days implies that potentially 22 fisherfolks from Atulayan and 86 fisherfolks from Nato can be designated to work daily for the monitoring of activities in the MPA. The aggregated WTP for Nato is ₱88,441 per month. Sea watchers (*bantay-dagat*) patrol around the MPA to check for illegal activities in the area. In 2019, the monthly honoraria for sea watchers was ₱3,750, but this time it is ₱4,800. Considering the existing sea watchers' honoraria, the computed amount can accommodate payment for 18 sea watchers for patrolling the MPA. When the mean WTW was converted into monetary terms and compared with WTP estimations, the comparable value of WTW was 7.8 to 13.6 times greater than WTP. A possible reason for this condition is that villages lack an adequate labor market which explains why fisherfolks preferred money over time. Table 5 shows the result of probit estimation of the Atulayan (WTW) and Nato (WTW and WTP). Only the significant variables that affect the fisherfolks' WTW and WTP for managing Atulayan Bay MPA were included in the table for reference. The negative coefficient of the bid (bid level) which is significant in all data sets, means that the probability of accepting the proposed bid decreases as the bid level rises, which agrees with the welfare economic theory. The inverse and significant correlation of the respondents' COH to WTW tend to suggest that people with lower COH are more needy and do not want to miss even one day of work. Similarly, the negative and significant correlation of the HHs with WTP suggests that fisherfolks with large household sizes tend to

Table 5. Result of the Probit Estimation

Variables	Description of the Variables	Labor Equation (WTW)		Payment Behavior Equation (WTP)
		Atulayan	Nato	Nato
Constant	Constant Term	0.1414 (0.108)	0.4225 (0.338)	1.8851** (2.159)
Bid	Bid level (day or amount)	-0.0928** (-2.268)	-0.1398*** (-4.750)	-0.0016** (-2.517)
COH	Daily cash on hand	-0.0006* (-1.649)	-0.0006* (-1.742)	0.0010* (1.690)
HHs	Household size	-	-	-0.0835** (-2.009)
LogInc	Natural logarithm of monthly personal income	-	-	0.3029** (2.168)
Grp	Belong to a group, association or organization (dummy: 1-Yes; 0-No)	0.6399** (2.243)	-	0.5371** (2.331)
TrustP	Trust another member of priority organization in the matter of lending and borrowing (ordinal: 1-strongly trust; 2-trust; 3-undecided; 4-don't trust; 5-strongly distrust)	-	-0.2918** (-2.144)	-0.2787* (-1.666)
	No. of observations	110	201	204
	Log-likelihood	-68.94201	-117.8653	-110.697
	McFadden's R²	0.0949338	0.1356428	0.09103951
	AIC	155.88	253.73	239.39

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

demonstrate a lesser tendency to pay for the management of coastal resources. The decrease in fisherfolks' WTP is attributed to the income constraint made by the demand for financial support for the family. The positive and significant correlation of COH with WTP among Nato means that the more cash they have in daily basis, the more willing they will pay for the MPA management. The positive and significant correlation of LogInc (monthly personal income) with WTP among the Nato respondents is consistent with the theory. It suggests that as the income of the fisherfolks increases, the more willing they are to pay for the MPA's management. This means that fisherfolks who exhibit an adequate income, will demonstrate a higher tendency to participate in MPA management. Social capital proxy indicators as proposed by Grootaert and Van Bastelaer (2002), are the following: membership in local associations and networks, indicators of trust and adherence to norms, and indicators of collective action. These three categories of indicators serve as proxies for assessing social capital from various perspectives. In this study, trust is measured in the context of lending and borrowing. Societal trust significantly influences group loan contribution rates, and group lending appears to create and harness societal capital (Cassar and Wydick, 2010). The financial transaction is a simple scenario that respondents can easily understand when measuring trust. The positive and significant correlation of Grp with Atulayan WTW and Nato WTP indicates that fisherfolks who belong to a group,

association, or organization are more likely to offer voluntary services for managing MPA. Affiliation with an organization is an important factor that affects the desire of respondents to participate in the management of natural resources. This result supports the remarks that membership of a fisherfolks to an organization is supported by the findings that fishers or members of a fisher's association, for example, showed a higher probability of accepting WTW or WTP questions (Ballad *et al.*, 2018). Members of organizations actively participate in meetings and gatherings conducted by the association and volunteer work, such as coastal clean-up and other fishing activities, and they receive benefits, for example, in their income-generating projects, compared to non-members. Members of an organization have stronger ties with each other than non-members. For example, if there are problems that need to be solved, they can easily reach out to their co-members because they have a social network, compared to non-members who have weak ties and might go through the difficulties alone. The ordinal variable, TrustP, means respondents trust another member of their priority organization in the matters of lending and borrowing. The value corresponds to the level of trust of the respondents, ranging from 1 to 5, with 1 being the highest which indicates that the respondents strongly trust and 5 being the lowest which indicates strong distrust. Several fisherfolks are members of the organizations, such as the Credit for Agriculture and Rural Development, Inc. The negative and

significant correlation of the variable TrustP for WTW and WTP payment vehicles for Nato fishers indicates that the willingness to commit volunteer labor or monetary support for managing of MPA decreases when mistrust increases. This supports the theory about the influence of trust in the collective management of common-pool resources as a normative component of social capital that enhances fisheries governance efficiency. Grafton (2005) cited that higher levels of trust in fishing communities reduce monitoring and enforcement costs. The result of the analysis reveals an affirmative relationship between different kinds of social capital and the local residents, specifically the fisherfolks' participation in the management of the MPA. Trust and cooperation promote harmony in managing shared resources.

4. Conclusions and Implications

The study demonstrated that fisherfolks are willing to work or pay for management of the MPA. Developing social capital in the form of trust within the fishing communities may contribute to the successful management of MPA through reduced transaction costs. For instance, the presence of social capital may result in spending fewer resources on law enforcement in the form of reduced payment for the honoraria of sea watchers. Fisherfolks who belong to a group, association, or organization, indicate a desire to cooperate for the protection of the MPA. This suggests that local governments or policymakers can create or strengthen such organizations that can uplift the local people to work together for improving and managing their natural resources. This research is simply meant to serve as guidance to the community in terms of managing the MPA. The MPA's governance relies not just on the local government but also on the assistance and support of the local population.

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