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# Gender awareness and perception on Marine Protected Areas (MPAs) in Taytay, Palawan, Philippines

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## ABSTRACT

Marine Protected Area (MPA) is a recognized tool for conservation and fisheries management. In the Philippines, there are around 1,800 locally-managed MPAs and 155 are in Palawan. However, gender knowledge and perceptions on their impacts on communities and the environment are poorly documented. Thus, this study was conducted to determine the gender awareness and perception on MPAs' functions, benefits, and status of coastal communities in Taytay, Palawan, Philippines. The socio-demographics of the respondents and their effects on perceptions were also investigated. There were 401 respondents but only 108 were considered for analysis after data cleaning. About 60% are men and 40% are women. A total of 16 questions on MPA awareness and perceptions were asked during the interview that utilized KoboToolBox. The data were analyzed using General Linear Model, and Principal Component Analysis. Results showed that awareness varied between genders with men being more aware of the existence of MPAs (82%) and its programs (72%). However, both have almost the same level of perception on benefits from MPAs. Men and women perceived MPAs to have helped in conservation like improving biodiversity, but not on providing direct economic benefits such as an increase in catch and income. These indicate that their perceptions on MPAs were generally theoretical, rather than actual. Further, men's perceptions were significantly affected by age and ethnicity while women's perceptions were not affected by any of their socio-demographics.

**Keywords:** conservation, economic impacts, fish catch management, well-being

## INTRODUCTION

Marine Protected Area (MPA) is recognized as an important tool for conservation and fisheries management across the globe (Claudet 2012; Bennett and Dearden 2014). MPAs are designed to manage human activities and protect the habitats, ecosystem structure, function and integrity of marine species (Lester et al. 2009; Sala and Giakoumi 2017) by

protecting the critical spawning stock that ensures recruitment supply to fished areas (Roberts et al. 2001, Goñi et al. 2010, Muallil et al. 2014). Additionally, MPAs preserve natural and cultural heritages (Wahle et al. 2003; Clarke and Jupiter 2010). Some MPAs are traditional fishing grounds of coastal communities while there are sites too that are considered sacred by some indigenous groups.



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The Republic Act (RA) 8550, as amended by RA 10654, encourages the local government units (LGU) to designate at least 15% of their municipal waters as fish sanctuaries. In 2014, there are 1,800 MPAs in the country (Cabral et al. 2014) with an area estimated at 3,861,25.5 ha (PMD 2022) and of these 155 are reported in Palawan covering 82,000 ha (PCSD 2015). However, only 115 are reflected in the Philippines Marine Protected Area Database (2022). Despite the number of MPAs in the country, the majority (80-90%) are “paper parks” or on papers only with policies but are weakly or not managed properly (Pollnac et al. 2001; Licuanan et al. 2006; PMD 2022).

In Taytay, Palawan, several small MPAs were established in 2007 like “Raket-Raket”, Black Rock, “Pawikan”, Dinot and Tecas Reef through Municipal Ordinance No. 037-2007, M.O No. 197-2014, and Resolution 115-2017. In 2017, the LGU declared its entire municipal waters as an MPA covering an area of 192,000 ha, with 15 core zones having a total area of 21,215.05 ha representing 11% of Taytay’s municipal waters (Revised Fishery Code of Taytay, Palawan 2017). In addition to these LGU-managed MPAs, portions of Taytay have been declared under the National Protected Areas particularly the Malampaya Protected Landscape and Seascape and the El Nido-Taytay Managed Resource Protected Area, which were established in 2000 and 1998, respectively (WWF 2013).

As the establishment of MPAs directly impacts the community, particularly the fisherfolks due to fishing exclusions, community involvement in the planning and implementation of MPAs are therefore very important (White et al. 2002). MPAs are said to be effective if there is local participation in the planning, monitoring, and sound decision-making (White et al. 1994). Similarly, community perception is important for it serves as mental representations of the community’s information that is a crucial factor in decision management and execution (Beyerl et al. 2016). However, the knowledge on the status of many MPAs including their impacts on communities and the environment is very limited (Leenhardt et al. 2015, Cayabo et al. 2020). In the case of Taytay, Palawan, the gender issues in fisheries management particularly an awareness and perception on MPAs have not been evaluated yet. According to WorldFish center (2022), gender equality in fisheries could increase fish production and reduce poverty. The FAO (2016) estimated that women comprise 15% of workforce in wild fisheries and 90% of fish processing but this important role and gender’s role in fisheries sector (Siles et al. 2019; WorldFish 2022) and MPA management are often not accounted (Kleiber 2018). Considering the vital roles of gender in fisheries and

MPA management (Kleiber 2018; Siles et al. 2019), this study was conducted to determine the gender’s level of awareness and perception on MPAs in Taytay, Palawan, Philippines. The study investigated the gender’s basic knowledge on MPAs existence, functions, and management. The study also determined their perceived benefits from MPAs and the latter’s impacts on their economic status and well-being. Likewise, the socio-demographic profile of the respondents and their effects on their perception were investigated. These types of information are helpful in streamlining, monitoring, and evaluating of MPAs towards improving their management.

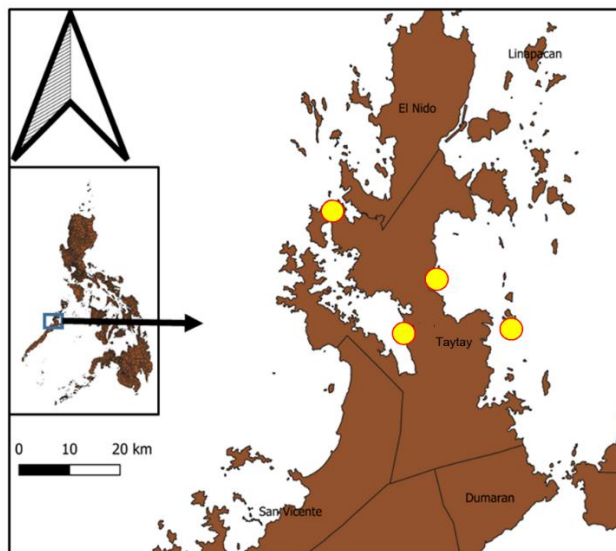
## METHODS

### Study Site

This study was conducted in Taytay, Palawan, Philippines covering the Barangays of Biton, Liminangcong, New Guinlo, and Pamantolon (Figure 1). The municipality of Taytay is a first class and the largest municipality in Palawan having a total area of 223, 319 ha. Its entire municipal waters (92,000 ha.) were declared as an MPA with 16 core zones or no-take zones that total to 21,215.50 ha (Municipal Ordinance No. 270). Taytay also harbors the Malampaya Sound Protected Landscape and Seascape and portions of it are also under the El Nido-Taytay Managed Resource Protected Area, both under the management of the National Integrated Protected Areas System (NIPAS). Taytay has a total population of 83,357 and the major sources of livelihood are fishing and farming (PSA 2020). The four barangays covered by this study had a total population of 14,490 and total household of 3, 171 (GCRF Blue Communities-Philippines 2020).

### Data Gathering

**Respondents.** The survey was done in areas near the coasts of each barangay where most of the people with frequent interactions with the marine environment are residing. The respondents were chosen randomly and were limited to one respondent per household to cover more respondents who are not from the same household. This was done to avoid biases in answers because in a separate survey conducted by the team, the members of the same household gave almost the same answers to one question, which could have been different if they did not hear the answer of the other household member/s. Also, only those that were 18 years old and above were chosen as respondents due to ethical and legal considerations.



**Figure 1.** Map of Taytay, Palawan, Philippines indicating the sampling sites (●).

In total, there were 401 respondents who participated in the survey, which represents 13% of the total households (3,171) of four barangays covered by this study (GCRF Blue Communities-Philippines 2020). Of these, only 108 responses were considered after the data cleaning that involved the elimination of respondents that have lower than 10 responses and disregarded supplemental questions that were answered by lower than 30 respondents. Many respondents refused to answer a lot of questions because they were not confident while others hesitated due to political issues thus, only few responses were considered for analysis. About 60% of the respondents are men and 40% are women, with age ranging from 19 to 77 years old with an average of  $44 \pm 13$  years.

**Questionnaire.** A structured questionnaire translated to the local language and uploaded in KoBoToolbox, a free android application that was used during the survey. Questions include basic knowledge on MPAs and their benefits from it. Information on socio-demographics (age, gender, education and ethnicity) of respondents was also taken. The following questions on MPA awareness answerable by yes or no were asked:

1. Are you aware that there are MPAs in your area or in Taytay?
2. Are there securities or “Bantay Dagat” protecting the MPAs?
3. Were there any consultations done prior to establishment of MPAs?
4. Do you know the area covered or location of MPAs?
5. Are there signages about MPAs in your area?
6. Do you know who governs the MPAs?

7. Are you aware of the programs related to MPAs?

The following statements on benefits from MPAs were scaled by the respondents were from 1-7 with 1-extremely low/disagree; 2-moderately low/disagree; 3-low/disagree; 4-neutral/no change; 5 high/agree; 6-moderately high/agree; 7-extremely high/agree.

1. MPAs protect marine biodiversity.
2. MPAs increase the population of Key or Indicator species (e.g. sharks, turtles, large fish, and endangered species).
3. MPAs increase fish population/catch.
4. MPAs help you improve your well-being.
5. MPAs help you increase your income.
6. MPAs help you afford better health services.
7. MPAs help you send your children to school.
8. MPAs help you improve your houses.
9. MPAs help you acquire more assets.

Prior to the survey, the purpose and scope of the study were explained to the respondents, who were then asked if they were willing to participate. It was also explained that they can withdraw their responses at any period of the survey should they decide not to continue. They were further assured that their identity and answers will be kept confidential. Upon their consent, they were asked to answer the questionnaires on their own but some who asked for help were also assisted. This study has secured clearance from the National Ethics Committee of the Philippines.

**Data Analysis**

The data gathered were tabulated using Microsoft Excel 2016 Spreadsheet. This was followed by data cleaning that involved the elimination of respondents that have lower than 10 responses and disregarded supplemental questions that were answered by lower than 30 respondents. This was done to minimize data biases, skewness, and outliers. From 401 responses, only 108 were considered for analysis. A simple descriptive statistics and percentile analysis were used for the questions on awareness answerable by yes or no while the General Linear Models (GLM) was employed to determine the Mean Marginal Perception (MMP) of questions on the perception that were scaled by the respondents from 1-7. It was also used to determine if the 16 questions are significant factors affecting the respondents' perception. The 16 questions were further subjected to Principal Component Analysis (PCA) and Rotation Method (RM) using Varimax with Kaiser Normalization to reduce the complex individual analysis effects on the respondent's awareness and perceptions. The reduction method transformed the data into low-dimensional space, but retain their meaningful properties. The results were clusters of significant factors, which were further treated as dependent variables and tested against the socio-demographics of the respondents (gender, age, educational attainment, and ethnicity) using the Multivariate regression to determine which among the socio-demographics significantly affect the respondents' awareness and perception.

**RESULTS**

**Awareness**

The majority of men (82%) were aware of the existence of MPAs in their area and 74% have knowledge about MPA programs (Figure 2). However, only 38% of men were aware of the

presence of MPA guards while only 35% had an idea about the public consultation done prior to the establishment of the MPAs. Men's awareness on the location or area covered by MPAs, presence of signages about MPAs, and its management body were apparently low (Figure 2).

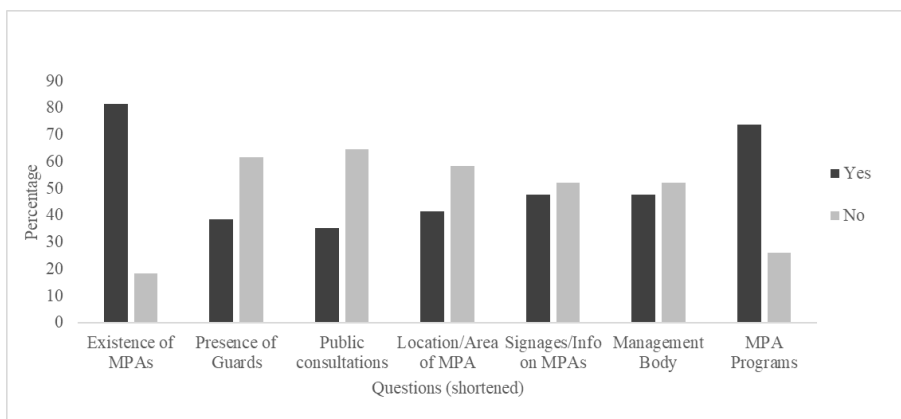
Women also had high awareness on the existence of MPAs in the area (70%) despite the fact that only 2% were aware about public consultations prior to the establishment of MPAs. The majority of them were also not aware of the location or area of MPAs and whether they are guarded but more than 50% were aware of MPAs' signages, programs, and management body (Figure 3).

**Perception**

Both men and women highly perceived MPAs to have help improve the biodiversity, key marine species or indicator species such as sharks, turtles, and large fishes, including the volume of fish catch as shown by high MMP (6) (Figure 4). However, they were neutral in terms of MPAs contribution to their well-being and they do not perceive the MPAs to have helped them increase their income, acquire better health services, and education nor improve their houses. Perception of both men and women displayed consistent and similar patterns without apparent significant variations as indicated by error bars.

**Clustering of Factors affecting the Perception of Men and Women**

All 16 questions were treated as variables and were subjected to PCA reduction analysis for clustering of similar variables. Table 1 shows five clusters of variables for men: well-being, awareness, MPA goals, MPA program and management, and MPA area/location.



**Figure 2.** Awareness of men on Marine Protected Areas (n = 65).

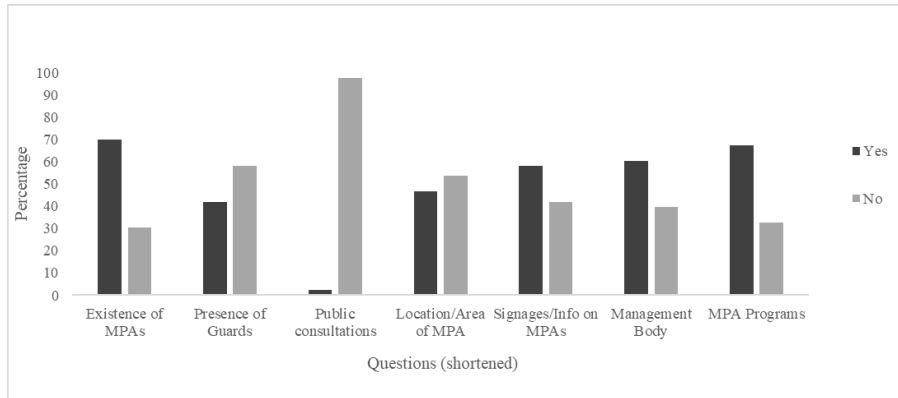


Figure 3. Awareness of women on Marine Protected Areas (n = 43).

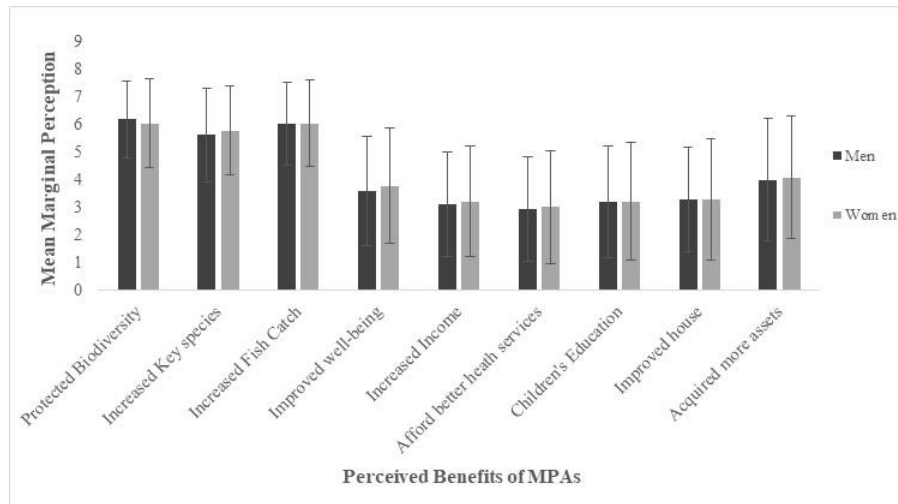


Figure 4. Mean Marginal Perception (MMP) of men and women on benefits from Marine Protected Areas. 1-extremely low/disagree; 2-moderately low/disagree; 3-low/disagree; 4-neutral/no change; 5-high/agree; 6-moderately high/agree; 7-extremely high/agree. Error bars represent Standard Deviation.

Table 1. Clustering of questions/variables on men’s awareness and perceptions on Marine Protected Areas using General Varimax Dimension Reduction (Principal Component). Rotation Method: Varimax with Kaiser Normalization. Rotation converged in four iterations.

Questions /Variables	Clusters (5)				
	Well-being	Awareness	MPA goals	MPA Program and Management	MPA area/location
1. Help acquire more assets	0.966				
2. Help improve the house	0.958				
3. Help send children to school	0.941				
4. Help afford health services	0.913				
5. Increase income	0.806				
6. Improve well-being	0.703				
7. MPA consultations		-0.846			
8. MPA guards		0.775			
9. Awareness on presence of MPA		0.704			
10. Increase Biodiversity		0.550			
11. Improve key species			0.875		
12. Increase fish catch			0.827		
13. MPA programs				0.687	
14. MPA management body				0.683	
15. MPA signages				0.646	
16. MPA area/location					0.821

The variables that displayed high correlation coefficient were clustered together. High coefficient value means that there is a strong correlation between variables and factors while those with lower values (< 0.5) have weak correlation.

For women, only 13 variables were subjected to dimension reduction analysis due to exclusion of some variables with zero variances and/or showed no significant correlations across the other variables. The resulting clusters include well-being, MPA programs and management, and awareness (Table 2).

**Socio-demographics on perception and awareness men and women**

The socio-demographics such as age, education, and ethnicity of men and women were subjected to Multivariate Regression Analysis against the clustered perception to determine their effects. Results for men showed that age affects their perceptions on MPA awareness while ethnicity affects their perceptions on MPA programs and Information, Education, and Communication ( $P < 0.05$ , Table 3).

In the case of women, the socio-demographic profiles did not appear to have effects on their perceptions on MPAs ( $P > 0.05$ , Table 4).

**Table 2.** Clustering of questions/variables on women’s awareness and perceptions on Marine Protected Areas using General Varimax Dimension Reduction (Principal Component). Rotation Method: Varimax with Kaiser Normalization. Rotation converged in four iterations.

Questions /Variables	Clusters (3)		
	Well-being and MPA goal	MPA Programs and Management	Awareness
1. Increase income	0.961		
2. Help improve the house	0.957		
3. Increase fish catch	0.953		
4. Improve key species	0.940		
5. Increase biodiversity	0.816		
6. Help acquire more assets	0.755		
7. MPA signages	-0.344		
8. MPA management body		0.980	
9. MPA guards		0.971	
10. MPA programs		0.955	
11. MPA area/location			0.784
12. MPA consultations			0.710
13. Awareness on presence of MPA			0.654

**Table 3.** Multivariate regression analysis across effects of demographic profiles on men’s perceptions on Marine Protected Areas. *P* values in bold are socio-demographics with significant effect on perception of men on specific cluster of factors.

Cluster of factors	Regression coefficients and statistics					
		Coef.	SE	t	<i>P</i>	R <sup>2</sup>
1. Improved well-being	Constant	3.67	1.33	2.76	0.01	
	Age	-0.02	0.02	-0.90	0.37	0.01
	Education	-0.01	0.33	-0.02	0.98	0.00
	Ethnicity	0.05	0.15	0.31	0.76	0.00
2. MPA Awareness	Constant	2.23	0.28	7.98	0.00	
	Age	0.01	0.00	2.11	<b>0.04</b>	0.04
	Education	0.12	0.07	1.65	0.11	0.01
	Ethnicity	-0.03	0.03	-0.98	0.33	0.00
3. MPA goal	Constant	5.09	0.96	5.31	0.00	
	Age	0.00	0.02	0.06	0.96	0.01
	Education	0.42	0.24	1.74	0.09	0.05
	Ethnicity	-0.04	0.11	-0.36	0.72	0.00
4. MPA Program & Management	Constant	1.32	0.25	5.24	0.00	
	Age	0.00	0.00	0.43	0.67	0.00
	Education	0.10	0.06	1.52	0.13	0.03
	Ethnicity	-0.06	0.03	-2.06	<b>0.04</b>	0.05
5. MPA area/location	Constant	1.43	0.30	4.73	0.00	
	Age	0.00	0.01	0.15	0.88	0.00
	Education	-0.05	0.08	-0.70	0.49	0.01
	Ethnicity	-0.01	0.03	-0.24	0.81	0.00

**Table 4.** Multivariate regression analysis across effects of demographic profiles on women's perceptions on Marine Protected Areas.

Cluster of factors	Regression coefficients and statistics					
		Coef.	SE	t	P	R <sup>2</sup>
1. Well-being and MPA goal	Constant	3.95	0.98	4.05	0.00	
	Age	0.00	0.01	-0.34	0.73	0.01
	Education	0.05	0.23	0.21	0.84	0.00
	Ethnicity	0.14	0.09	1.51	0.14	0.06
2. MPA programs and Management	Constant	1.28	0.44	2.88	0.01	
	Age	0.00	0.01	0.60	0.56	0.01
	Education	0.08	0.10	0.78	0.44	0.02
	Ethnicity	-0.02	0.04	-0.53	0.60	0.02
3. MPA awareness and area	Constant	1.62	0.21	7.59	0.00	
	Age	0.00	0.00	-0.73	0.47	0.01
	Education	0.01	0.05	0.14	0.89	0.00
	Ethnicity	-0.01	0.02	-0.34	0.73	0.00

## DISCUSSION

### Awareness and Perception of Men and Women

The coastal communities of Taytay, Palawan, Philippines have high awareness despite the lack of knowledge of the majority on consultations prior to its establishment. In particular, men displayed higher awareness on the existence of MPAs and its program (82% and 74%) than women (70% and 67%). This could probably be attributed to the fact that more men (38%) were able to attend the consultations while only few women (2%) were aware about it. It is common in coastal communities that men attend to invitations concerning fishing and conservation because they are the ones who go out to the sea. This also showed that they have more interaction with the marine environment rather than women. In Danajon Bank, Central Philippines, it was also the men that participated mostly in MPA management while women were less likely to participate in such activities (Kleiber et al. 2018) because they were not comfortable to speak in a male-dominated event (Di Ciommo and Schiavetti 2012), or they do not have a role in management (Smith 2012).

Despite of not being able to attend the consultation, women appeared to be more aware of the MPAs signages (58%) and management body (60%) than men (< 50%). In rural areas, women being sociable in nature got more access to information. They are the ones who do most of the household errands thus they have higher chances of seeing signages about MPAs. The study of Madarcos (2021) in Palawan, Philippines noted that women are the ones who usually attend community consultations, meetings, seminars, and trainings but such finding could be purpose-specific because in this study, women have minimal participation in MPA consultations and they were not involved at all in management.

In terms of awareness on the location of MPAs and the presence of MPA guards, both men and women have limited knowledge. This is possible because MPAs are established far from shores and unmarked boundaries, making it hard for the people to identify their area or location. During the MPA management planning in 2019, it was found out that even the community leaders are not fully aware of the location of MPAs in their area, indicating that they are not actively involved in management. It is reported that in the Philippines, the choice of where to locate the MPA and which fisherfolk organization manages and guards it can sometimes be a political decision, and employment and income opportunities that emanate from its establishment are also influenced by politics (Rosales 2018). Political issues are also apparent during the survey in this study as many respondents refused to answer some questions out of hesitation or possibly fear despite the assurance that their identity would be kept confidential. For instance, the question on management of MPAs, if the respondents think it is well-managed or not, was removed during the data cleaning because very few answered this question.

On the aspects of benefits from MPAs, men and women displayed similar perceptions. Both agreed that MPAs help in protecting biodiversity and in increasing the key species including fish catch as supported by high MMP (6). This finding is similar to the study of Kleiber et al. (2018) in MPAs in Central Philippines where both men and women were positive about MPAs despite the fact that women were less certain about the impacts of MPAs in fishing. Additionally, results of this study showed that both genders did not consider the MPAs to have helped them improve their economic status. The MMP on direct economic benefits like increase in income and assets was below 4, which is close to disagree. This implies that their perception on the importance of

MPAs could be just theoretical, which they probably got from information campaigns on MPAs conducted by LGUs and other organizations working in the area, and not based on their actual experiences. Studies have shown that MPAs do increase the provisioning capacity of marine ecosystems particularly in no-take areas through their effects on diversity and fish population particularly the target species (Agardy 1993; Worm et al. 2006; Goñi et al. 2010; Bennett and Dearden 2014). Apparently, this impact was not felt yet by the respondents. Data of fish population within the core zones before and after the establishment of MPAs are not yet available to support this idea.

Interestingly, cluster analysis showed that men's perception on MPAs was highly rooted on the impacts of MPAs on their well-being, which include their ability to acquire more assets, improve their houses, send their children to school, afford better health services, and increase their income. These variables were clustered because they were highly correlated with each other. The high correlation coefficients indicate that they are the most significant factors affecting men's perceptions. This is very likely because fishing is the major livelihood of men in the area. The negative correlation of MPA consultation was attributed to the fact that the majority were not able to attend or not aware of it. Other variables that significantly affect men's perception, but to a lesser degree, were their awareness on MPAs, their knowledge on importance of MPAs including its programs, management body, and area or location. Similarly, women's perception was also highly affected by their well-being but including their knowledge on MPA conservation goals because both were clustered together. This implies that women value equally the direct benefits from MPAs, or those that benefit their well-being (e.g. increase income, improve their houses, and acquire assets), and the conservation benefits of MPAs (e.g. improve key species and biodiversity), while men focused only on direct economic benefits. Other aspects that affect women's perception include their knowledge on MPA programs and management, location, consultations, and its existence.

Direct economic benefits such as the increase in fish catch and income take time to manifest and require thorough planning, management, and active support from the community. Micheli et al. (2004) reported that benefits from MPA are difficult to quantify and often slow to detect. Similarly, in Apo Island, Sumilon Island, and Tubataha Reefs Natural Park in the Philippines, the impacts on fish catch and coral cover took decades to manifest (Russ and Alcala 1999; Dygico et al. 2013). In addition, these MPAs have strong and well-defined management with sustained enforcement actions. Claudet (2012) noted that enforcement including the design and age of MPAs are crucial factors in the attainment of success,

which are gauged against the goals and objectives through monitoring and evaluation (Dygico et al. 2013). In the case of Taytay Bay MPA, it was only established in 2017, and the majority of its core zones (10 out of 15) only covered 59 to 770 ha. The rest are pearl farms classified as core zones covering 1,000 has to around 8,000 ha (Municipal Ordinance No. 270). Additionally, the implementation of MPA programs and its management remained challenging as these are lodged under the Municipal Agriculture Office.

In coastal areas where fishing is a major livelihood, a reduction of fishing mortality due to fishing would be the most visible impact of MPAs (Goñi et al. 2010). Next is the increase in fish catch thru spill-over (Micheli et al. 2012), but such is highly reliant on the design, size, management and enforcement (Claudet 2012; Dygico et al. 2013). It is therefore important to monitor the Catch-Per-Unit Effort (Leenhardt et al 2015) along with other indicators stipulated in Taytay Bay MPA Management Plan. Results of monitoring should also be shared with the community and other stakeholders as it affects the public perception, awareness, and attitudes towards marine protection (Hawkins 2016). Moreover, the management must encourage the gender's participation in its programs and activities for the latter to have better understanding of the management or status of their MPAs as well as a sense of empowerment (Christie et al. 2005). Studies have shown that the community's engagement is the most important factor affecting the MPA's success or failure (Russ and Alcala 1999; White et al. 2002; Giakoumi et al. 2018) along with good governance (Dygico et al. 2013). It was noted that fishers' support to MPAs is determined by the benefits they could get from them (Fabinyi 2007).

#### **Effects of Socio Demographics on Perception and Awareness of Men and Women**

It is apparent that men's perception is affected by their age and ethnicity while women's perception is not influenced by their socio-demographics. Specifically, older men appeared to be more aware of the MPAs than the younger ones. It could be that older men have more interactions with the marine environment, just like fishing, making them more knowledgeable in terms of MPA existence, than the younger ones. Also, men who belong to indigenous groups showed higher awareness on MPA programs and IEC than the migrants or those coming from places outside Palawan. This is very likely since indigenous groups have been residing in the area since birth. Whereas women's perceptions appeared not to be affected by any socio-demographics. Even education do not influence the perceptions of both genders, indicating that information campaigns and



access to information as the major factors influencing the community's perceptions.

Overall, it appeared that there is a gender bias in terms of awareness with men being more aware than women in terms of MPA existence and its programs, although a higher percentage of the latter is aware of the other aspects of MPAs such as its management body and signages. In terms of benefits from MPAs, both genders almost have the same level of perception. They both agree that MPAs helped in conservation but not on giving direct economic benefits such as the increase in fish catch and income. Consequently, they do not perceive the MPAs to have helped their overall well-being. These findings indicate a strong information campaign on the importance of MPAs but their tangible impacts where people could directly benefit were not apparent yet. Further, men's perception on MPAs is mainly anchored on benefits that affect their well-being while women's perception is influenced by both the well-being and conservation benefits of MPAs.

As noted, impacts of MPAs like increase in fish biomass and population that could yield to an increase in fish catch and income of fishers take time to manifest (Russ and Alcala 1999, Micheli et al. 2004). In the case of Taytay, its entire municipal waters are only declared as MPAs in 2017 – two years prior to the conduct of this study. Although the LGU has MPAs in earlier years, the majority are classified as small MPAs (10-20 ha) and the impact range of such is also limited, and these could be the reasons for low agreement of the community on the direct economic benefits from MPAs. In many cases, the links between the ecological effects of MPAs and services have rarely been considered (Leenhardt et al. 2015), especially in small and LGU-managed MPAs. At present, there is no available data on fish population and other indicators for Taytay Bay MPA. Although earlier MPAs have baseline assessments, there is a need on updating data and monitoring as well. In addition, beneficial outcomes for all stakeholders are often hard to attain so it is important to present a realistic purpose and cost-benefit analysis within specified timeframe (Fabinyi 2008)

It is therefore recommended to revisit and evaluate the MPAs' management goals and objectives to align its programs and implementation. With fishers and marine users being the ultimate beneficiaries, it is important to include studies on fish catch and income of fishers fishing near the core zones, for this is where the spill-over effect is immediately manifested. Corals and indicator species in core zones among other related parameters must also be monitored to determine their exposure to impacts of climate change to ensure that conservation efforts would not be wasted. It is important that cores zones must also be resilient to impacts of climate change particularly the sea surface temperature, which cause corals to bleach

and die-off if unable to recover (Arceo et al. 2001; Mcfield 2017). The social, economic, and political interests of stakeholders must also be considered in order to identify a set of specific, measurable, attainable, realistic, and time-bound goals with a defined set of indicators. More importantly, the management should consider the gender's participation particularly the representation of women in management especially that their perception was influenced by both the well-being or direct economic benefits and conservation benefits of MPAs while men's perception on MPAs was only driven by the direct economic benefits they could get from it. These information and considerations would be helpful in refining and improving the management of Taytay Bay MPA to ensure that it meets its purpose.

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