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Gender-Based Difference in the Knowledge, Awareness, Economic Valuation, and Conservation Roles in Calatagan Mangroves Forest Conservation Park (CMFCP) in Batangas, Philippines

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Abstract

Using a survey questionnaire, this study determined the gender difference in the level of knowledge, awareness and economic valuation of direct uses of mangrove resources among the local community, local government unit (LGU), and Palitakan–a people organization (PO) who takes an active part in the protection and conservation of the Calatagan Mangrove Forest Conservation Park. The study also differentiated the gender roles of the stakeholders in the protection and conservation efforts through focus group discussion (FGD). Gathered data was validated through a key informant interview. Respondents from PO and the local community were men and women, while respondents from LGU were mostly men. Results showed that women from the PO and local community have a very high level of awareness and knowledge of mangrove resources, services, and conservation practises than men. Men from the LGU have higher awareness on conservation practises than women. Since the men from LGU and the men and women from the PO were actively engaged in the protection and conservation efforts in the mangrove park, they were observed to have a very high level of awareness toward mangrove conservation. Both men and women would sell the different mangrove resources at different prices. The knowledge, awareness, and economic valuation of the three important stakeholders on the mangrove conservation park give a better picture on how they value the mangrove forest. There are still mangrove conservation activities exclusively done by men and women of Palitakan. Gender-based conservation provided more significant and sustainable efforts in mangrove education and conservation.

Keywords: *gender and development, mangrove conservation, biodiversity, economic valuation*

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1.0 Introduction

The last decade showed a renewed interest in protecting the remaining mangrove forests and rehabilitating the destroyed ones (Hamilton & Casey, 2016). Reports indicated that 35 percent of mangrove areas all over the world are gone (World Wide Fund 2010), and six (6) mangroves species in the world face the risk of extinction due to the different anthropogenic activities like logging, agriculture, and the effects of climate change (Gatto 2018). If the trend in mangrove forest destruction continues, they and their various ecological services will be gone to the detriment of both the earth and the people. Thus, efforts to protect and rehabilitate mangrove forests rallied nations to act together (International Union for Conservation of Nature 2010).

The Philippines have approximately 65 mangrove species (Garcia 2014). However, the mangroves in the Philippines are slowly disappearing due to continued deforestation that ranges from 2,000 to 3,000 hectares per year (Tacio 2012), with about 175,000 hectares or about 35 percent of mangrove cover was lost due to conversion into fishponds (Melana, Melana & Mapalo, 2000). The local community and the people's organization within the local community, with the able and consistent support of the LGU and some non-government organizations, have served as a potent force to conserve and manage the country's coastal resources (Abdullah, Said & Omar, 2014). It is important to determine the locals' knowledge and awareness about the resource, how they value the resource and their current or possible roles in mangrove conservation to provide awareness on the direct effects of the loss or the protection of the mangrove forests and their engagement in mangrove-related activities. Since understanding the gender differentiated roles, situations, knowledge, and awareness of locals were found to highly affect participation, so Gender-related information was gathered as inputs for sustainable involvement and success of mangrove conservation efforts.

Mangroves ecosystems are essential because of their many economic and ecological services. They serve as common habitats of various flora and fauna species, spawning and nursery grounds for aquatic animals. Mangrove ecosystems, for the local community, provide livelihood, food, dyes, medicine, fuel and timbers for construction and ecotourism. The area is a valuable resource for scientific and educational studies (Saint-Paul, 2006; Millennium Ecosystem Assessment, 2005). In addition, mangrove ecosystems provide indirect benefits, though often undervalued, like shoreline protection services from soil erosion and extreme weather events, such as cyclones, typhoons, and storms (Chong, 2005; Kandasamy, 2012). They reduced the vulnerability of coastal communities and promoted speedy recovery from hazards (Ellison & Zouh, 2012). There is much evidence of the role of mangroves in food security, provision of livelihood, coastal protection, and sustaining biodiversity (Van Lavieren, Spalding, Alongi, Kainuma, Clusener-Godt, & Adeel, 2012; Punrattanasin, Nattaya & Nakpathom, et al., 2013). The benefits from mangroves can be directly expressed in monetary value or indirectly through aesthetic enjoyment, scientific studies, and a feeling of protection from harm brought by the inclement weather. These direct and indirect benefits from the mangrove ecosystem were explored in this study.

Women play a critical role in extracting natural resources for food, fuel, medicine, even housing materials according to their culturally ascribed reproductive gender role, and even to generate cash income for use in schooling and health needs of the family (productive role). The degradation of the environment would therefore have a significant impact on women whose gender roles are highly dependent on the integrity of the environment. In a highly patriarchal and hierarchical society where women are seldom consulted, if at all, or given a chance to participate in decision making on the use or fate of natural resources, the degradation of the environment and their impact on women gender needs and roles are seldom considered or integrated with planning. Whether men or women participation would be the better custodian of, for example, a mangrove forest like the Calatagan Mangrove Forest Conservation Park (CMFP) or are better partners in its protection and conservation efforts nowadays can be better viewed using a gender lens on the differences of women and men in the knowledge and awareness of the mangrove resources and services, on the economic values they ascribed to these resources and services, and on their actual roles in the conservation and protection of the mangrove resource. This study aimed to gather this baseline information from among the three major stakeholders of CMFCP with the hope of identifying key gender-based factors that will sustain protection and conservation efforts in CMFPC.

1.1 Objectives of the Study

The study determined the gender differences in the knowledge and awareness of mangrove resources and services,

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resource valuation, and the roles in mangrove conservation participated in by three groups of key stakeholders of Calatagan Mangrove Forest Conservation Park (CMFCP) in Barangay Quilitisan, Calatagan, Batangas. Philippines, namely the local government unit, the people's organization (Palitakan) and the local community of Barangay Quilitisan. The generated information will serve as input in enhancing the policy, plans, programs, and people's participation in the conservation and protection of the mangrove forest park, particularly the CMFCP. It specifically determined: (1) The gender differences in the level of knowledge and awareness on mangrove resources and services and on mangrove conservation roles and practices of the men and women of Calatagan Mangrove Forest Park, who were grouped as three key stakeholders; (2) The economic values of the direct uses of mangrove resources as perceived by the abovementioned stakeholders; and (3) The gender-based results that may have hindered or contributed to the sustainable management of the CMFCP.

2.0 Research Methodology

The study used a descriptive research design to describe the gender-based differences in the knowledge and awareness, economic valuation, and mangrove conservation practises of the three major stakeholders of the CMFCP. Survey questionnaires and focus group discussions were used to gather data. Collected data were validated through key informant interviews. The data gathered were described and analysed using a gender lens.

2.1 Time and Place of the Study

Data was gathered from the three major stakeholders of CMFCP from August 2016 to February 2017. The study site CMFCP, locally known as "Ang Pulo", is situated in Barangay Quilitisan in Calatagan, Batangas. It is a 7.5 hectares Marine Protected Area (MPA) managed by a local people's organization named Pro-mangrove Alliance and Implementing Team and Arm as Kilitisan's Advocates of Nature or *Palitakan* (Ang Pulo-CMFCP 2016). There were an estimated 500 households in the barangay.

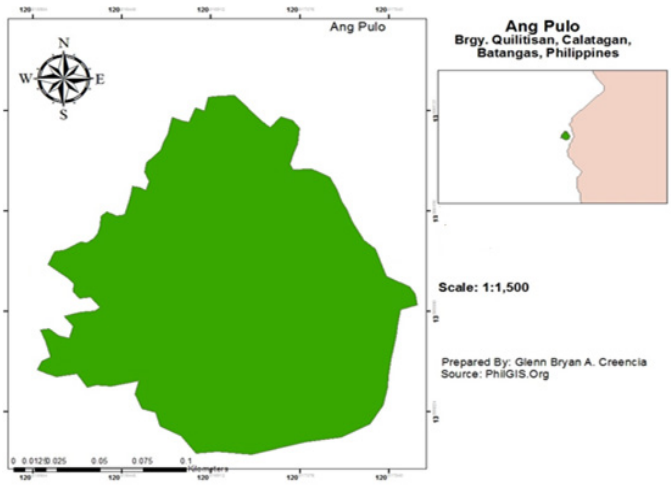

Figure 1.0 The Study Site

2.2 Respondents of the Study

Table 1.0 shows the profile of the respondents on the survey questionnaires in terms of sex and age. There were 79 respondents, of which 46 (58%) were males, and 33 (42%) were females. Almost half of the respondents were from the local community. The local community refers to people in Brgy. Quilitisan, who are mostly living near the mangrove forest park and have direct or indirect benefits from the park. The LGU comprised the employed staff of the municipality, particularly those from the Municipal Agricultural Office and those that hold community assigned power such as barangay *tanod*, and elected persons such as barangay captain and barangay councilors. The 21 respondents who are members of the people's organization *Palitakan* are also part of the local community, primarily local fisherfolk families engaged in fishing, gleaning, and farming, but are distinguished from the latter for being the ones that directly manage the park. After a few years of painstaking voluntary work with visible results in the improvement of catch around the mangrove park and the protection of the park itself, their family members and other members of the local community were encouraged to participate in mangrove conservation and protection efforts. They have attended different seminars and training in mangrove conservation from international and national levels. The FGD respondents were composed of 21 participants from the *Palitakan.*

The age range of respondents from the local community (13-72 years old) and the LGU (22-71 years old) is wide, involving both young (13 years old) and old (72 years old) persons, while the members of the *Palitikan* are mostly within the active work age group, 19-61 years old.

Table 1. Demographic Profile of the respondents.

SEX			
Respondent	Frequency		Total
	Male	Female	
LGU	11 (58%)	8 (42%)	19
PO (Palitakan)	12 (57%)	9 (43%)	21
Local Community	23 (59%)	16 (41%)	39
Total	46 (58%)	33 (42%)	79
AGE			
Respondent	Mean (Year old)	Range (Year old)	Standard Deviation
LGU	39.3	22-71	12.9
PO (Palitakan)	43.2	19-61	12.9
Local Community	37.6	13-72	17.2
Total	39.6	13-72	15.2

2.3 Knowledge and Awareness (KA) Survey

The researchers modified the instrument of Da Silva (2015) to determine the knowledge and awareness of men and women from the LGU, PO, and local community toward mangrove resources, services, and conservation practises in Calatagan Mangrove Forest Conservation Park. The questionnaire uses a 5-point Likert scale. The modifications made from the original instrument were: localization of knowledge since the original questionnaire was conducted in South America; statements under *Knowledge* have been modified and converted to be statements that measure awareness. The modified questionnaire was validated by one (1) registered psychometrician and two (2) environmental science experts.

The following was the basis of the interpretation of scores:

Over-all test scores

A. Over-all test scores: Resources, Services, Conservation Practices:

22-43	=	Very Low Level of Knowledge / Awareness
44-63	=	Low Level of Knowledge/ Awareness
64-83	=	Moderate Level of Knowledge/ Awareness
84-103	=	High Level of Knowledge/ Awareness
104-120	=	Very High Level of Knowledge/ Awareness

B. Over-all test scores: Resources (Knowledge & Awareness):

14-25	=	Very Low Level of Knowledge / Awareness
26-37	=	Low Level of Knowledge/ Awareness
38-49	=	Moderate Level of Knowledge/ Awareness
50-61	=	High Level of Knowledge/ Awareness
62-70	=	Very High Level of Knowledge/ Awareness

B.1 Resources (Knowledge)

7-12	=	Very Low Level of Knowledge / Awareness
13-18	=	Low Level of Knowledge/ Awareness
19-24	=	Moderate Level of Knowledge/ Awareness
25-30	=	High Level of Knowledge/ Awareness
31-35	=	Very High Level of Knowledge/ Awareness

B.2 Resources (Awareness)

7-12	=	Very Low Level of Knowledge / Awareness
13-18	=	Low Level of Knowledge/ Awareness
19-24	=	Moderate Level of Knowledge/ Awareness
25-30	=	High Level of Knowledge/ Awareness
31-35	=	Very High Level of Knowledge/ Awareness

C. Overall test Score: Services (Knowledge & Awareness)

14-25	=	Very Low Level of Knowledge / Awareness
26-37	=	Low Level of Knowledge/ Awareness
38-49	=	Moderate Level of Knowledge/ Awareness
50-61	=	High Level of Knowledge/ Awareness
62-70	=	Very High Level of Knowledge/ Awareness

C.1. Services (Knowledge)

7-12	=	Very Low Level of Knowledge / Awareness
13-18	=	Low Level of Knowledge/ Awareness
19-24	=	Moderate Level of Knowledge/ Awareness
25-30	=	High Level of Knowledge/ Awareness
31-35	=	Very High Level of Knowledge/ Awareness

C.2. Services (Knowledge)

7-12	=	Very Low Level of Knowledge / Awareness
13-18	=	Low Level of Knowledge/ Awareness
19-24	=	Moderate Level of Knowledge/ Awareness
25-30	=	High Level of Knowledge/ Awareness
31-35	=	Very High Level of Knowledge/ Awareness

D. Overall Test Score : Conservation (Knowledge & Awareness)

20-36	=	Very Low Level of Knowledge / Awareness
37-53	=	Low Level of Knowledge/ Awareness
54-70	=	Moderate Level of Knowledge/ Awareness
71-87	=	High Level of Knowledge/ Awareness
88-100	=	Very High Level of Knowledge/ Awareness

D.1. Conservation (Knowledge)

10-17	=	Very Low Level of Knowledge / Awareness
18-25	=	Low Level of Knowledge/ Awareness
26-33	=	Moderate Level of Knowledge/ Awareness
34-41	=	High Level of Knowledge/ Awareness
42-50	=	Very High Level of Knowledge/ Awareness

D.2. Conservation (Awareness)

10-17	=	Very Low Level of Knowledge / Awareness
18-25	=	Low Level of Knowledge/ Awareness
26-33	=	Moderate Level of Knowledge/ Awareness
34-41	=	High Level of Knowledge/ Awareness
42-50	=	Very High Level of Knowledge/ Awareness

2.4 Contingent Claim (Option) Valuation Survey

The Option Pricing Questionnaire (Damodaran, 2011) was used to determine the value of direct uses of mangrove resources based on their knowledge and awareness. This instrument asked the respondent to put monetary values on the different mangrove resources. This questionnaire was validated by two (2) environmental science experts.

2.5 Focus Group Discussion (FGD)

FGD involved 21 members of Palitakan, who were composed of 7 male and 14 female members. The Harvard Analytical Framework Tool No.1 or the Activity Profile lists all the activities required to manage the mangrove park. From the list of activities, discussions on "who does what" were made during FDG by asking which activities were done by women alone, by men alone, which are being done by both women and men, and which can be done by both women and men but are currently assigned or done for women alone or men alone.

During the FGD, the participants were also asked to enumerate their local mangrove conservation practises. These activities were listed on the blackboard then the participants were asked whether they can be done by males or females or it could be done by both. The respondents were gathered at a particular place and time in their most convenient schedules. All of the FGDs were recorded.

2.6 Key Informant Interview

The researcher interviewed key informants to validate the information gathered from the FGD. The researcher chose the focal persons from the PO, their research adviser from the academe, and their current president and vice-president. The key informants were asked questions about the different local mangrove conservation practises enumerated during the FGD to validate if these activities were locally done by their organization.

2.7 Statistical Analysis

Mean was used to analyze the demographic profile and sex-disaggregated data. The Duncan Multiple Range Test was used to analyze the significant differences of the means.

2.8 Ethical Considerations

A letter of request for the conduct of the study was sent to the municipal mayor and coordinated wtih the municipal agriculture office. Consent letters were given to all participants before the conduct of the survey. Information such as the participant's names and addresses were kept confidential.

3.0 Results and Discussion

3.1 Gender Difference in the Knowledge and Awareness

Table 2.0 shows that all men and female respondents from LGU, PO, and the local community exhibited a high to very high level of knowledge and awareness. In general, women have a higher level of awareness and knowledge than men on mangrove resources, services, and conservation practises. However, it was observed that men (LGU and PO) have a very high level of awareness toward mangrove conservation since most of the male respondents are "Bantay Dagat" or sea patrol members; as such, they are more exposed to the different activities in mangrove conservation. The men and women of PO (*Palitakan*) exhibited a very high level of knowledge and awareness compared to the two groups because they are the main stakeholders who led the mangrove conservation project and had attended various seminars and workshops on mangrove conservation. Women from the local community exhibited a higher level of knowledge and awareness toward mangrove services and conservation practises than men. Women have been actively engaged in managing the mangrove resources because their experiences with both reproductive and productive gender roles have propelled a very high level of awareness, knowledge and awareness for the need to protect the mangrove resources. Women's relationship with the mangrove resources in CMFCP and their dependence on these

resources to perform their expected gender roles strongly motivated them to actively engage in the protection and conservation of these resources. Their participation, therefore, promotes sustainable efforts on mangrove protection and conservation of CMFCP. Fortunately, in the case of the men and women PO members who are directly involved in the mangrove conservation in the area, both are highly knowledgeable and aware of the mangrove resources, services, and different conservation practises, and both actively participate in decision making, supportive of the assigned roles that they take on in managing the CMFCP. Both men and women PO members are also involved in gathering data to monitor the status of the mangrove ecosystem in the area, which makes them local mangrove conservation experts or citizen scientists.

The women in Brgy. Quilitisan were the most active volunteers in mangrove rehabilitation and management project when the CMFCP was still in its infancy; they were concerned with the unabated cutting of mangrove trees and the depletion of their mangrove resources usually done by fishers both from their barangay and nearby barangays (March, Smyth & Mukhopadhyay, 1999). They sought help from LGUs and international NGOs to teach them how to protect and conserve their mangrove forest. Through the high motivation initiated by the good leaders among them to protect their resources, they have a high participation rate in maintaining the mangrove resources and attending seminars and meetings.

Table 2.0 Gender Difference in the Knowledge and Awareness of LGU, PO, and Local Community toward Mangrove Resources, Services, and Conservation Practices

Stakeholder	Knowledge			Awareness		
	Resources	Services	Conservation Practices	Resources	Services	Conservation Practices
LGU						
Men	27.4	28.6	41.3	28.0	28.8	42.0
Women	26.1	28.1	39.7	27.9	28.9	40.1
Mean	27.0[b]	28.4[b]	40.7[b]	28.08[b]	28.8[b]	41.0[b]
PO (Palitakan)						
Men	31.4	31.4	45.9	31.3	34.2	44.9
Women	31.5	33.3	49.9	33.3	33.9	48.8
Mean	31.4[a]	32.2[a]	47.2[a]	32.1[a]	30.4[a]	46.3[a]
Local Community						
Men	26.3	27.7	35.9	27.6	28.3	37.9
Women	28.5	31.0	37.7	29.7	30.7	42.0
Mean	27.2[b]	29.0[b]	36.6[b]	28.4[b]	29.2[b]	39.5[b]
Overall Scores						
Men	85.1	87.7	123.1	86.9	91.3	124.80
Women	86.1	92.4	127.3	90.9	93.5	130.9

**Mean Values with the same letter in the superscript under the same column means not significantly different at P= 0.05*

3.2 Gender Difference in the Perceived Economic Value of Mangroves

When asked how they would put values on mangrove resources, results showed that men and women would sell the different mangrove resources at different prices, depending on their gender needs. Table 3 shows that the men from LGU would sell the charcoal, bark, seed, and mangrove tree at a higher price than women, and women LGU would sell fuelwood and seedling at a higher price than men. The men from PO and the local community would prioritize selling timber, fuel wood, charcoal, seed, seedling, and mangrove tree at a higher price than the women who gave higher price on bark of the mangrove trees than men. Overall, women put a higher price on bark and seedling than men. When the cutting of mangrove trees was not yet prohibited, the people in Barangay Quilitisan traditionally exploited the mangrove trees for these various purposes based on their gender needs, which reflected the values they ascribed during the survey. Generally, men have a higher valuation of the different mangrove resources since men have control over their mangrove resources (March, Smyth, & Mukhopadhyay, 1999). In case of CMFCP, while men cannot exploit the mangrove resources through the gathering of timber and the like, they still benefit more from these resources indirectly by boosting the fisheries and income from the ecotourism in the area.

Table 3.0. The gender differences in the perceived selling price of mangrove resources

Stake-holder	Perceived Selling Price (Peso)						
	Timer	Fuel Wood	Charcoal	Bark	Seed	Seedling	Mangrove Tree
LGU							
Men	68.75	41.67	129.17	256.67	43.13	34.92	298.08
Women	72.86	48.57	114.29	240.00	31.00	52.57	139.57
PO (Palitakan)							
Men	396.67	58.75	216.67	152.50	55.50	44.67	351.67
Women	179.42	49.66	153.37	216.39	43.21	44.05	263.11
Local Community							
Men	244.17	45.00	293.75	253.21	14.25	21.06	1663.13
Women	140.00	30.67	278.00	463.87	28.07	17.40	1403.07
Overall Scores							
Men	709.59	145.42	639.59	662.38	112.88	100.65	2312.88
Women	392.28	128.9	545.66	920.26	102.28	114.02	1805.75

3.2 Gender-Based Mangrove Conservation Practices

Table 4.0 shows that mangrove conservation practises done in CMFCP were generally categorized into three: mangrove propagation, education about mangrove, and *Palitakan* mangrove management practises. While some tasks were regularly performed or assigned to either a woman alone, man alone, or both men and women, the group realized and agreed that all the tasks could be done by both women and men, such as those tasks that were traditionally assigned to women or performed by women, such as information and education campaign, promotion, food preparation, and resource generation and those traditionally assigned or performed by men such as repair and maintenance of facilities and boat/ raft operation. It is interesting to note that the security of the area and facilities are done by women. This is usually done during the day, as the women members of the PO assigned members to patrol the area during the daytime while collecting the washed-up plastics and debris. On the other hand, most men PO members are engaged in fishing or fishing-related activities like net mending, during the daytime. The research and development aspect of the CMFCP is led by a male member of the PO who serves as their technical adviser as he has graduate degree in environmental science and postgraduate education in biology major in environmental biology. However, since the women members of PO had been trained in mangrove species identification and assessment by the Conservation International–an international NGO, and the PO technical adviser, these women also helped in mangrove assessment and monitoring as part of the research and development efforts of the CMFCP. Harmonizing the knowledge and awareness of the three important stakeholders (PO, LGU, and local community) of the

Ang Pulo benefit them in the direct and indirect ecosystem services that mangroves can provide (Creencia & Querijero, 2018). The combined and concerted efforts of the three major stakeholders of the CMFCP or "*Ang Pulo*" have given them opportunities not only to benefit from its services, provide opportunities for teaching and scientific studies for various academic institutions that visit the mangrove park and enjoyment and relaxation for those that visited, it has also allowed them to join a competition in the environmental conservation contests for marine resources conservation.

Table 4.0. Gender-Based Mangrove Conservation Activities of PO members.

Mangrove Conservation Activities	Usually done by					Can be done by
	Men alone	Women alone	Mostly men	Mostly women	Both men and women	Both men and women
	A	**B**	**C**	**D**	**E**	**F**
Mangrove Propagation						
1. Collect propagules						/
2. Care the propagules/ seedlings in nursery				/	/	/
3. Plant seedlings				/		/
4. Care the seedlings					/	/
IEC campaign about Mangrove						
1. Serve as lecturers on:						/
a. History of the CMFCP		/				/
b. Mangrove species identification		/				/
c. Protection and Conservation activities					/	/
2. Ecotourism						/
a. Raft ride operation	/					/
b. Food Preparation				/		/
c. Tour guide and EIC		/				/
PALITAKAN Mangrove Management Practices						
1. Conduct/ Facilitate PO meetings		/				/
2. Clean "Ang Pulo" areas of washed up plastics and other debris					/	/
3. Monitoring of mangroves propagules and seedlings					/	/
4. Monitoring of mangrove growth					/	/
5. Repair and maintenance of facilities	/					/
6. Promotion of "Ang Pulo"		/				/
7. Establishment of Partnership in Mangrove Conservation		/				/
8. Local policy making and recommendation					/	/
9. Research and development	/					/
10. Security and Protection of area and Facilities		/				/
11. Resource Generation					/	/

4.0 Conclusion and Recommendation

The three major stakeholders of the CMFCP or "Ang Pulo" have high to very high knowledge and awareness of the mangrove resources and services and have put high values on these resources and services. In general, women have higher knowledge and awareness than men, though only slightly higher in knowledge and awareness about the resources, but significantly higher in terms of services, especially conservation practises. The values they ascribed to these resources and services reflected their traditional gender roles and needs. Women put higher values on mangrove bark and seedlings, while men on timber, fuelwood, charcoal, seed, and mangrove trees. The men and women PO members take on roles and conservation practises that reflect their traditional gender roles, knowledge and awareness of the mangrove resources and services such as information and education campaigns, promotion, food preparation, and resource generation being assigned or performed by women. In contrast, repair and maintenance of facilities and boat/ raft operations are being assigned or performed by men. While some tasks are done by both women and men, they all agreed that any or all of the tasks could be done by all members of the PO, regardless of gender.

It is suggested that men and women from the different stakeholders involved in mangrove conservation must have equal opportunities to learn more about mangrove. They need to continue to enhance their knowledge of mangrove conservation and management through attendance in seminars, conferences, training, and short courses in mangrove conservation. It is also recommended to study the other gender attributes of all the stakeholders, like their access and control over the mangrove resources, consumption patterns, and different fishing activities within the mangrove area. The need for financial sustainability to manage the "Ang Pulo" through various resource generation efforts must also be given attention.

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