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Mangrove Conservation: Awareness and Attitudes of the Local Community

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ABSTRACT

The study examined the awareness and attitudes of the local community towards mangrove conservation in Barangay Wawa, Calapan City, Oriental Mindoro, Philippines. The research study used a descriptive-correlational method to identify the different variables and presents quantitative research that used an online survey method to collect data from the respondents. The respondents of the study were thirty (30) in which it will divided to three components, ten (10) barangay officials, ten (10) residents from barangay Wawa, and ten (10) tourists who visited the mangrove trees in Barangay Wawa. The respondents were chosen through purposive sampling from pre-surveyed barangay officials, residents from Barangay Wawa, and tourists who experience closure during the changes of mangrove trees from past years up to present situation. The majority of respondents were from 21 to 30 years old young adult or 30 % of the total in which it implies that young adult is more active and responsible in preserving the mangrove forests of Barangay Wawa, Calapan City, Oriental Mindoro. Results also showed that there is a significant relationship between the attitudes of the local community towards mangrove forests and awareness of the local community on mangrove conservation in terms of regeneration, recovery, and recreation. The involvement of the local community in preserving the mangrove forest is very important wherein they both benefit each other.

INTRODUCTION

A variety of trees that inhabit the coastal intertidal zone make up mangroves. According to Harefa *et al.* (2023), mangrove habitats are among the planet's most productive and physiologically complex ecosystems and offer crucial ecosystem services. It is renowned for having a highly developed root system and a salt filtering system that enable it to stand on stilts above the sea. Helophyte is well-suited to surviving in harsh coastal areas where it offers a variety of habitats for birds, fish, sea turtles, and other creatures that store more atmospheric carbon dioxide to slow down climate change, which is essential to maintain and restore them. In addition, the mangrove environment, which is incredibly productive and biologically diverse, supports a range of species, including endangered ones like oyster, shrimp, shellfish, crabs, and many others. Mangrove environments are thought to have a multitude of benefits that either directly or indirectly improve human well-being, according to Awuku-Sowa *et al.* (2022). By improving output and opportunities for local livelihoods like fishing and tourism-related activities, mangroves improve community resilience. By offering products and services that significantly improve the livelihood, well-being, and security of coastal inhabitants, it is valuable. One of the most overlooked living and non-living things on earth, it ought to be preserved and improved for the benefit of the local community and the environment. Meanwhile, Babia and Cotejo (2021) noted that although these programs represent significant efforts to maintain the mangrove forest in the Philippines, no documentation has shown how the training communities have changed the participants' lives.

Mangrove conservation is one of the most effective ways to preserve mangrove trees, which will improve the local community's ability to sustain itself while also preserving the environment. The best type of mangrove conservation, as discussed by Camacho *et al.* (2020), is community-based since it distributes responsibility to groups of people who depend on local resources and have a strong interest in protecting mangrove ecosystems. Mangrove plants will aid in reducing unclear effects that will undoubtedly have an impact on the community's ecological system. Mangroves must be preserved in order for them to continue to grow sustainably, and at the same time, the neighborhood will acquire the necessary resources to meet its demands as the community's tourism industry develops. Worthington *et al.* (2020) claim that it is challenging to put into practice successful collaborative management for mangrove forests since there are no shared obligations and explicit statutory commitments on community rights for utilizing mangrove ecosystems. The most recommended action to preserve and nurture the coastal sections of the mangrove plantation is to repair any damage where mangroves once grew.

In the mangrove forests, there are hundreds of areas that urgently need management, awareness, and attention for sustainable development (Das, 2018). However, because to the negative repercussions that occur within the community, protecting mangroves is exceedingly challenging. Climate change, excessive deforestation, the construction of many structures, natural disasters, anthropogenic pollution, the demise of coral reefs, river transition, and other harms brought on by unanticipated threats are some of the potential negative effects. As

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the significance of mangroves is becoming more widely understood, efforts are being undertaken by the local government and the community to replenish or restore mangroves and to enhance the legal institutions that will control their future use, according to Nguyen *et al.* (2023) research. Due to its constant reliance on marine resources, Barangay Wawa will no longer be a varied community if these detrimental impacts continue. The marine ecology as a whole will also be at risk.

In the context of Barangay Wawa, Calapan City, Oriental Mindoro, regeneration is ideally required in order for the maritime protected areas to grow and be preserved. Rebuilding the damaged mangrove ecosystem is a process necessary for the growth and survival of the mangrove trees. The Guardian (2019) claims that one of the most effective and affordable methods to address the climate change challenge is by planting billions of trees around the globe. As they continue to serve the Barangay Wawa residents, ecosystem, and wildlife, it is crucial to restore them. The Barangay's mangrove plantation is losing species survival and other living organisms nowadays, which has an impact on the locals' ability to continue their way of life. Increased economic and ecological benefits will result from mangrove plantations that are ecologically sustainable.

Aside from that, there are certain consequences that could result in prospects for the mangrove area's coastal development. Research is needed to improve how conservation efforts interact with local knowledge (Indrawati *et al.*, 2021). The mangrove region will be able to recover sustainably thanks to the implementation of improving the local ecology, which will also help Barangay Wawa better mitigate the effects of climate change. The various opportunities of the coastal area must be used to implement an action plan for the most effective biodiversity measures to increase the mangrove restoration and recovery in order for the local community's mangroves to fully recover to their endangered proportion. Effective participation, in accordance with Begum *et al.* (2023), aids the local community in comprehending and appreciating the relevance of mangroves in maintaining livelihood opportunities, as well as the effects of mangrove exploitation and the necessity to restore degraded regions in order to achieve sustainability. Due to the lack of interest in the mangrove region, Barangay Wawa and the Local Government Unit have been forced to create projects like extension programs to improve knowledge of the crucial components of the mangrove for recovery and avoiding any dangerous risks or disasters. Mangroves can provide as a reliable source of charcoal, tannin, fuel, and poles. Recovery requires preserving the ecosystems of the whole mangrove area because losing those mangroves one at a time will have an impact on the rich and productive marine life.

On the other hand, by implementing sustainable livelihood programs, the restoration of mangrove trees in Barangay Wawa will open up endless options. The Barangay Wawa residents' living conditions will be

improved, and the mangrove ecology will be managed sustainably, thanks to this program. The protection of mangroves prevents siltation of the oceans, protects inland areas from storm damage, routinely degrades pollutants, filters sediments, and provides protection for the province's sensitive beaches. According to Raihan *et al.* (2021), the assessment of the community's non-use benefits of mangroves must be done in the presence of social, environmental, and political specialists in order to promote trust and remove conflicts of interest. Thus, the study assessed the awareness and attitudes of the local community towards mangrove conservation that provide relevant information on mangrove preservation which it strengthens mangrove populations within the area so that they can continue to provide environmental safeguards and services for wildlife, ecosystems, and communities of barangay Wawa, Calapan City, Oriental Mindoro. This also aims to have better opportunities for the locals in terms of furnishing sustainable livelihood and ensuring a healthy environment for future generations.

Objectives of the Study

Generally, this study aimed to (1) determine the awareness of the local community on mangrove conservation in terms of regeneration, recovery, and recreation, (2) determine the attitudes of the local community towards mangrove forests, and (3) the significant relationship of the awareness of the local community on mangrove conservation and their attitudes towards mangrove forests.

METHODOLOGY

Research Design and Sampling

The research study used descriptive-correlational method to identify the different variables and presents quantitative research that used an online survey method to collect data from the respondents.

The respondents of the study were thirty (30) in which it will be divided to three components, ten (10) barangay officials, ten (10) residents from barangay Wawa, and ten (10) tourists who visited the mangrove trees in Barangay Wawa. The respondents were chosen through purposive sampling from pre-surveyed barangay officials, residents from Barangay Wawa, and tourists who experience closure during the changes of mangrove trees from past years up to the present situation.

The study is restricted to the Barangay officials, residents from Barangay Wawa, and tourists who did not experience closure during the changes of mangrove trees from past years up to the present situation. The study's main weakness was challenging to participate respondents due to the absence of the locals involve and the nature of duties and responsibilities of barangay officials, local residents, and tourists.

Research Instrument

The study used a researcher-made online survey questionnaire using google forms with a close-ended 4 –point Likert scale statements (quantitative data) after

looking for literature review pertaining to the aspects and components of the residents' experience in relation to the Barangay Wawa Mangrove Plantations. The descriptions followed in the study were Strongly Disagree (1) ranging 1.00 – 1.49, Disagree (2) which range in 1.50 – 2.49, Agree (3) ranging 2.50 – 3.49, and Strongly Agree (4) which range in 3.50 – 4.00. The questionnaire statements were divided into three (3) primary domains:

- The first part was the demographic profile of the respondents from Barangay Wawa.
- The second part contains the awareness of the local community in mangrove conservation in terms of regeneration, recovery, and recreation.
- The third part was the attitudes of the local community towards the mangrove forests.

Validity and Reliability

To assure the validity of the research instrument, the online survey questionnaire was presented by the researchers and sought advice and suggestions from the experts, professionals, and environmental agencies related to mangrove conservation who are knowledgeable enough about mangroves as they take their potential to emphasize its importance to the environment and to the community. By the help of the research mentor of this study, the researchers were able to identify the significant elements to validate the online survey questionnaire. For more recommendations, the researchers consulted the Local Governments Officials to gather data that will possibly use as the research instrument. The reliability of the study will determine after using the result of the data gathered from the online survey. The instrument will determine reliable data with the inter-rater reliability which encompasses the accuracy of the assessment from time to time to assure that the respondents of the study are consistent.

Data Collection

The data were gathered from the thirty (30) respondents among the Barangay Officials, residents from Barangay Wawa and tourists who visited the Mangrove Area. The respondents were given access to an online survey form via link emailed to their Facebook Messenger, Fb page or personal account using Google Forms. They were informed a week before to the community of the online survey with consideration to some hindrances that affected the respondents from Barangay Wawa. There were a total of thirty (30) respondents

participated in the study which covered 100% of the identified research respondents.

Statistical Treatment of Data

Frequency and percentage will be used to describe the socio-demographic profile of the respondents. Weighted Mean will be used to describe the awareness of the local community on mangrove conservation in terms of regeneration, recovery, and recreation, and the attitudes of the local community towards the mangrove forests. Pearson's r correlation will be used to describe relationship between awareness and attitudes of the local community towards mangrove forests.

Ethical Consideration

Ethical consideration protects the rights of the respondents in the study and maintains the secrecy and confidentiality of the information during the data collection.

Informed Consent and Voluntary Participation

The permission to conduct this study will be freely given informed consent to the researchers in collecting specific data and information. The researchers are allowed to come up with the references regarding regeneration, recovery, and recreation of the mangrove plantation. The respondents are well informed a week before gathering information. They were educated and given an explanation about the study of Mangrove. The respondents voluntarily agreed to participate in the study and the information collected was handled with secrecy and confidentiality.

Anonymity and Confidentiality

Anonymity and confidentiality will be maintained by not including their names in the questionnaire and not revealing it in the data collection, analysis, and in results of the study. Privacy and confidentiality in terms of social media accounts like Facebook Messenger and telephone numbers is properly handled during phone communication, data processing, and publication of the results.

Telephone Communication

To find out the decision of the selected respondents whether or not to engage in the online survey, some of the participants will be contacted by phone or through the use of their social media accounts.

RESULTS AND DISCUSSION

Following the completion of the online survey, there were

Table 1: Demographic Profile of the Respondents

Gender	F*	Age	F*	Category	F*
Male	12	15 to 20 years old adolescence	1	Barangay Officials	10
Female	21	21 to 30 years old young adult	10	Tourists	11
Prefer not to say	0	31 to 40 years old young adulthood –middle adulthood	8	Residents	11
		41 to 50 years old middle adulthood	9	Others	1
		61 years old and above late adulthood	5		
		N=33 *for frequency			

33 study respondents, which is more than the intended number of participants (n=30). According to Table 1 of the study's findings, the majority of respondents—21 in all, or 64% of the total—were female. Twelve men provided the remaining 36% of the total responses, and none of the respondents indicated a preference to withhold their gender. On the other hand, the majority of respondents were young adults, as defined by Erik Erikson's eight stages of development, with 10 responses or 30% of the total. This was followed by middle adults, who were between the ages of 41 and 50, who had 9 responses or 27% of the total, and older adults, who were between the ages of 31 and 40, who had 8 responses or 24% of the total. Finally, adolescents between the ages of 15 and 20 received only 1 response, or 3% of the total. The majority of the respondents, or 30% of the total, were young adults aged 21 to 30.

This suggests that young adults are more involved and responsible in protecting the mangrove forests in Barangay Wawa. This may be in line with the conclusions of a research assessment conducted by the US Chamber of Commerce Foundation (2012), which concluded that younger generations are more politically engaged, community-minded, and concerned about maintaining the environment's positive reputation than older

generations. The results showed that those aged 15 to 20 had the fewest responses—1 or 3% of the total—indicating that adolescence is not particularly useful for managing and safeguarding the mangrove plantation.

With 11 responses or 33% of the total, the study's findings indicate that tourists and residents make up the majority of the respondents. Barangay officials came in second with 10 responses, or 30% of the total, and there were 1 other responses, or 3% of the total. According to Annuar *et al.* (2020), tourists benefit mangrove forests by generating income when local communities use their resource base to operate eco-lodges, offer mangrove tours, and engage in other ecotourism endeavors.

The results of the review show that tourists and residents receive the highest responses, garnering 11 or 33% of the total. By doing this, the stakeholders are also promoting the preservation and sustainable use of their resource base. There is no doubt that the tourists contributed to the local economies, particularly in Barangay Wawa. Additionally, the community should support the preservation of the mangrove region through the involvement of the local inhabitants when it comes to citizens preserving community control of mangrove management operations (Treephan *et al.*, 2019).

Table 2 showed the awareness of local communities on

Table 2: Awareness of Local Communities on Mangrove Conservation in terms of Regeneration

Items	Weighted Mean	Rank	Description
Plant new seedlings in a mangrove plantation is necessary after deforestation.	3.76	1.5	Strongly Agree
Continue monitoring of previously planted mangrove seedlings.	3.67	5.5	Strongly Agree
Restoring mangrove areas helps the people in the community in terms of sustainable income.	3.67	5.5	Strongly Agree
Regenerate is important in order to prevent natural disasters like flood, storm surge, etc.	3.67	5.5	Strongly Agree
Practice planting more mangrove trees to reduce carbon dioxide in the atmosphere.	3.76	1.5	Strongly Agree
Foster environment awareness about protecting and preserving the mangrove areas.	3.70	4	Strongly Agree
Ensure the project sustainability, marine resource cleaning activities like extensions provide opportunities in preserving the mangrove areas.	3.73	3	Strongly Agree
Plant tree is efficient to maintain the beauty for a better tourist attraction.	3.67	5.5	Strongly Agree
Overall Mean	3.70		Strongly Agree

mangrove conservation in terms of regeneration. After deforestation, it is required, according to the respondents, to plant more mangrove trees in order to reduce carbon dioxide in the atmosphere. This is supported by the highest weighted mean of 3.76, which is orally interpreted as strongly agree. Following this, efforts to clean up marine resources, such as project expansions that offer chances to preserve mangrove regions, are done to assure the project's sustainability. These activities have the third-highest weighted mean of 3.73. Additionally, maintaining the beauty for a better tourist attraction

is effective in maintaining the lowest weighted mean of 3.67, which is verbally described as strongly agree. Additionally, continuing to monitor previously planted mangrove seedlings, generating sustainable income, and regenerate is important in order to prevent natural disasters like floods, storm surges, etc., and planting trees is effective in maintaining the beauty. Promoting environmental awareness regarding safeguarding and preserving mangrove ecosystems receives the lowest weighted mean of 3.70, which is interpreted as strongly agree. In conclusion, the verbal description of the overall

mean of 3.70 is “strongly agree.”

Based on the results, barangay officials, visitors, and locals value the need to practice planting more mangrove plants to reduce atmospheric carbon dioxide following deforestation and emphasize the need of doing so. The conclusion of the study by Ellison *et al.* (2020) that there is a strong need to restore or rehab mangroves in order to counteract ongoing losses of mangroves around the world and that the number of mangrove restoration projects globally has nearly tripled in the last 20 years may be similar to this one. On the other hand, the study also showed that barangay officials, visitors, and

locals continue to monitor previously planted mangrove seedlings, that regenerating is important in order to prevent natural disasters like flood, storm surges, etc., and that planting trees is effective to maintain the beauty for a better tourist attraction. This may be similar to the findings of the study by Andradi-Brown *et al.* (2013), which showed the importance of mangrove forests. As a result, numerous projects to restore or rehabilitate deforested mangrove areas have been undertaken, many of which aim to combine biodiversity preservation with the restoration of ecosystem services for the benefit of local communities. According to the respondents, implementing mangrove

Table 3: Awareness of Local Communities on Mangrove Conservation in terms of Recovery

Items	Weighted Mean	Rank	Description
Engaging new facilities such as nipa huts enhances the ecological effectiveness of the mangrove plantation.	3.61	4.5	Strongly Agree
Implementing mangrove restoration platforms provides necessary mangrove ecosystem services like coastal protection and fisheries.	3.73	1	Strongly Agree
Adopting environmental practices helps in the recovery of loss and deterioration of the mangrove biodiversity.	3.67	2	Strongly Agree
Advocate ecological programs ensure that mangroves will recover and survive any environmental and climatic change.	3.61	4.5	Strongly Agree
Providing environmental policies keeps the sustainability of the mangroves.	3.61	4.5	Strongly Agree
Conserve mangrove plantation protects the abundance of the mangrove population.	3.58	6.5	Strongly Agree
Improve long-term solutions build up the fully recovery of the mangroves.	3.64	3	Strongly Agree
Enhance the coastal safety optimize the most diverse and resilient mangrove ecosystem.	3.58	6.5	Strongly Agree
Overall Mean	3.63		Strongly Agree

restoration platforms provide essential mangrove ecosystem services like coastal protection and fisheries gain the highest weighted mean of 3.73, which verbally described as strongly agree, as the study’s findings in Table 3 in the awareness of local communities on mangrove conservation in terms of recovery. The second highest weighted mean of 3.67, which is vocally stated as strongly agree, is followed by adopting environmental actions that aid in the recovery of loss and deterioration of the mangrove biodiversity. Hence, developing long-term solutions that help the mangroves fully recover earns the third-highest weighted mean of 3.64, which is vocally interpreted as strongly agree. Furthermore, the respondents said that improving coastal safety maximized the most diversified and robust mangrove environment and preserved mangrove plantations protected the quantity of mangrove population achieving the same lowest weighted mean of 3.58 which was defined as strongly agree.

This is followed by promoting ecological initiatives that make sure that mangroves will recover and survive from any environmental and climatic changes and that they will maintain the same lowest weighted mean of 3.61, which

is vocally characterized as highly agree. In conclusion, the verbal description of the overall mean of 3.63 is “strongly agree.”

The findings showed that the barangay officials, visitors, and locals who implemented mangrove restoration platforms offered essential mangrove ecosystems services like fisheries and coastal protection. This may be similar to the findings of Imbert’s (2018) study, which found that mangroves share many traits with plant species and can expand quickly in coastal habitats with few options. Overall, they bounce back more swiftly from natural causes than any other marine ecosystem. The first signs of recovery can be seen in three to five years after the establishment of new mangrove plantations, although it might take some time for an ecologically sound forest to fully recover. On the other hand, the findings also showed that barangay officials, visitors, and locals improve coastal safety while maximizing the most diversified and resilient mangrove environment and conserving mangrove plantations to safeguard their abundance. This may be in opposition to the results of Mukherjee *et al.* (2023), which indicated that storm surge and wave energy waste are crucial in terms of risk management and insurance issues.

Table 4: Awareness of Local Communities on Mangrove Conservation

Recreation			
Items	Weighted Mean	Rank	Description
Form organization who will manage the mangrove area in the community.	3.61	6	Strongly Agree
Strong movement for the protection and conservation of the resources.	3.73	1	Strongly Agree
Conduct extension will increase the awareness of the survival in the area.	3.48	7	Agree
Ensure a healthy environment for future generations by means of conserving and restoration of mangrove plantations in Barangay Wawa.	3.67	4.5	Strongly Agree
Plant natural barriers against violent storm surges and floods in nearby communities.	3.67	4.5	Strongly Agree
Provide environmental safeguards and services for wildlife, ecosystems, and communities of Barangay Wawa.	3.70	2.5	Strongly Agree
Rebuild new facilities for tourist that will bring countless opportunities.	3.67	4.5	Strongly Agree
Clean coastal areas for the ecological sustainability of mangrove plantation in the area.	3.70	2.5	Strongly Agree
Overall Mean	3.65		Strongly Agree

Table 4 showed that the awareness of local communities on mangrove conservation in terms of regeneration, that according to the selected respondents, strong movement for the protection and conservation of the resources gain the highest weighted mean of 3.73 which verbally described as strongly agree. Followed by provide environmental safeguards and services for wildlife ecosystems, and communities of Barangay Wawa gain the second to the highest weighted mean of 3.70 which verbally described as strongly agree. This is followed by clean coastal areas for the ecological sustainability of mangrove plantation in the area gain the third to the highest weighted mean of 3.7 which also verbally describe as strongly agree. On the other hand, according to the respondents conduct extension will increase the awareness of the survival in the area gain lowest weighted mean of 3.48 which verbally described as agree. This is followed by the form organization who will manage the mangrove area in the community gain the second to the lowest weighted mean of 3.61 which verbally describe as strongly agree. This is followed by the ensure a healthy environment for future generations by means of conserving and restoration of mangrove plantations in Barangay Wawa, plant natural barriers against violent storm surges and floods in nearby communities, and rebuild new facilities

for tourists that will bring countless opportunities gain the third to the lowest weighted mean of 3.67. To sum up, the overall mean of Table 2.3 is 3.65 that is verbally described as strongly agree.

The results revealed that the Barangay officials, residents, and tourists undergo strong movement for the protection and conservation of the resources. This may be parallel to the findings showed in the study of Firdaus *et al.* (2021) that participating local communities in the management of the mangrove forest is an efficient strategy to preserve and improve the protective function of the mangrove forest, while also generating income for the community and promoting improved governance and assessment of natural resources. Better conservation planning and management depend on the assessment of the condition of mangrove forests. Moreover, two results revealed that Barangay officials, residents, and tourists conducting extension will increase the awareness of the survival in the area and form organization who will manage the mangrove area in the community. This may be parallel to the findings showed in the study of Kadaverugu *et al.*, (2021) that mangroves provide cultural ecosystem services to coastal populations as well, including practical benefits like recreation and intangible benefits like aesthetic appeal and spiritual qualities.

Table 5: Attitudes of Local Communities Towards Mangrove Forests

Items	Weighted Mean	Rank	Description
Give importance on the benefits of the mangrove forests	3.64	1	Strongly Agree
Attend extensions that is related in conserving mangrove forests.	3.48	4	Agree
Organize meetings about the plans and actions for mangrove improvement.	3.52	2.5	Strongly Agree

Show perseverance through actively participating in maintaining the cleanliness of the mangrove area.	3.52	2.5	Strongly Agree
Do harmful activities that will damage and disturb the forests.	2.85	8	Agree
Restore mangroves damages to gain essential resources.	3.33	7	Agree
Manage the forests in response to their essential needs.	3.42	5	Agree
Cut mangroves for building facilities will bring negative effect to the local communities. .	3.39	6	Agree
Overall Mean	3.39		Agree

As the result of the study showed in table 4, according to the respondents, give importance on the benefits of the mangrove forests gain the highest weighted mean of 3.64, which described as strongly agree. This is followed by organizing meetings about the plans and actions for mangrove improvement and show perseverance through actively participating in maintaining the cleanliness of the mangrove area gain the same highest weighted mean of 3.52 that is described as strongly agree. Moreover, attending extensions that is related in conserving mangrove forests gain the third to the highest weighted mean of 3.48 that is described as agree. On the other hand, restoring mangrove damages to gain essential resources gain the lowest weighted mean of 2.85 which described as agree. This is followed by cutting mangroves for building facilities will bring negative effect to the local communities gain the second to the lowest weighted mean of 3.39 as well, which verbally described as agree. And lastly, managing the forests in response to their essential needs gain the third to the lowest weighted mean of 3.42 that is described as agree. To sum up, the overall mean of Table 3 is 3.39 that is verbally described as agree. The results revealed that the barangay officials,

tourists, and residents give importance on the benefits of the mangrove forests. This maybe parallel to the findings shown in the study of Roy (2016) that the privilege of local citizens to the commons have been of special significance to environmentalists, who frequently concentrate their research on methods for including different stakeholders in ecological services (e.g, guard of the common resources, replanting, etc.). As a result, local communities feel and think about protecting the mangrove forest has an impact on how they take resources. In order to establish traditional communities typically use their local ecological knowledge (LEK) in resource extraction practices and utilization. Moreover, the results also revealed that the barangay officials, tourists, and residents that restoring mangrove damages to gain essential resources. This maybe parallel to the findings showed in the study of Romañach *et al.* (2018) that at the international, national, and local levels, sustainable conservation actions such as restoration programs and participatory management approaches, are encouraged in relation to the caused by human activity drivers of mangrove degradation in order to stop the loss of mangroves and to encourage their sustainable use and conservation.

Table 6: Significant relationship between the attitudes and awareness of the local community on mangrove conservation

Attitudes of the Local community towards mangrove forests	Awareness of the Local Community on Mangrove Conservation						
	Regeneration		Recovery		Recreation		N
	Pearson Correlation	Significance (2-tailed)	Pearson Correlation	Significance (2-tailed)	Pearson Correlation	Significance (2-tailed)	
Give importance on the benefits of the mangrove forests	0.690**	.000	0.704**	.001	0.755**	.000	33
Attend extensions that is related in conserving mangrove forests.	0.548**	.001	0.564**	.001	0.614**	.000	33
Organize meetings about the plans and actions for mangrove improvement.	0.481**	.005	0.507**	.003	0.548**	.001	33
Show perseverance through actively participating in maintaining the cleanliness of the mangrove area.	0.498**	.003	0.541**	.001	0.531**	.001	33
Do harmful activities that will damage and disturb the forests.	0.152	.399	0.277	.118	0.166	.356	33
Restore mangroves damages to gain essential resources.	0.246	.168	0.428*	.118	0.423*	.014	33

Manage the forests in response to their essential needs.	0.446**	.009	0.529**	.002	0.547**	.001	33
Cut mangroves for building facilities will bring negative effect to the local communities.	0.375*	.032	0.494**	.004	0.541**	.031	33

**Correlation is significant at the 0.01 level (2-tailed), *Correlation is significant at the 0.05 level (2-tailed)

Table 6 showed the significant relationship between the attitudes of the local community towards mangrove forests and awareness of the local community on mangrove conservation in terms of regeneration. As you can see giving importance on the benefits of the mangrove forests has a significant relationship to regeneration with the highest correlation of 0.690. Followed by, attending extensions that is related in conserving mangrove forests which has a significant relationship with the correlation of 0.548. In contrast, restoring mangroves damages in gaining essential resources doesn't have a significant relationship to regeneration with correlation of 0.246. Moreover, doing harmful activities that will damage and disturb the forests gained the least correlation of 0.152. The result revealed that the attitudes of the local community towards regeneration are significant correlated with 0.01 level (2-tailed) and 0.05 level (2-tailed). This maybe parallel to the findings of the study of Pearson *et al.* (2020) that effective involvement of local community helps to understand and value the significance of mangroves in restoring the sustainability of the area. On the other hand, this may contradict to the findings of Nyangoko *et al.* (2022) that local community has the higher mangrove ecosystem services status that distant from mangrove since they are open perceive in declining state and worsen the cultural and decline in the availability of mangrove poles which the local community is the most critical drivers of mangrove degradation.

It also showed the significant relationship between the attitudes of the local community towards mangrove forests and awareness of the local community on mangrove conservation in terms of recovery. As showed in the table, giving importance on the benefits of the mangrove forests has a significant relationship to recovery with highest correlation of 0.704. Followed by, attending extensions that is related in conserving mangrove forests which has significant relationship with the correlation of 0.564. On the other hand, restoring mangroves damages to gain essential resources doesn't have significant correlation to recovery with the correlation of 0.428. Otherwise, doing harmful activities that will damage and disturb the forests gained the least correlation of 0.277. The result revealed that the attitudes of the local community towards recovery are significantly correlated with 0.01 level (2-tailed) and 0.05 level (2-tailed). To maybe parallel to study of Carrington (2019) that planting billions of trees across the world is one of the biggest and cheapest ways of taking carbon dioxide out of the atmosphere to tackle the climate change crisis. Otherwise, this may contradict to the findings of Adhikari *et al.* (2019)

that risks are frequently not considered when making policy decisions of recovering mangrove areas because there is a lack of information regarding how changes can sustain local lives will affect them.

The table also showed the significant relationship between the attitudes of the local community towards mangrove forests and awareness of the local community on mangrove conservation in terms of recreation. As showed in the table, giving importance on the benefits of the mangrove forests has a significant relationship to recreation with highest correlation of 0.755. Followed by, attending extensions that is related in conserving mangrove forests which has significant relationship with the correlation of 0.614. Furthermore, restoring mangroves damages to gain essential resources doesn't have significant correlation to recovery with the correlation of 0.423. However, doing harmful activities that will damage and disturb the forests gained the least correlation of 0.166. The result revealed that the local community's attitudes towards recreation are significantly correlated with 0.01 level (2-tailed) and 0.05 level (2-tailed). This contradicts to the findings of Wodehouse and Rayment (2019) that previous mangrove restoration projects have proven unsustainable in the long run due to an emphasis on planting in the wrong place, wrong species, wrong destiny.

CONCLUSION

Giving importance to the advantages of mangrove forests has a strong, positive association with the regeneration, recovery, and reinvention of the sustainable conservation of mangroves. It's crucial to manage and keep an eye on the mangrove ecosystems to repair any harm caused by human activity. Since the beginning of the mangroves plantation, the local community's attitudes have been crucial in gaining and creating the best practices and activities for the plantation in order to ensure sustainable growth. Maintaining the biological variety and lowering the unpredictable effects would be made possible by increasing local residents' understanding of the need of protecting the mangroves in Barangay Wawa. The local community's participation in the conservation of mangrove forests is crucial because they are the ones responsible for defending the animal ecosystem and local population.

RECOMMENDATION

The locals should promote sustainable social development that will improve and hone the community's talents. The mangrove conservation area must be supported by all stakeholders. Encourage young professionals to raise awareness so they may work more effectively to safeguard

the environment, as well as their own safety and health. implementing expansion programs and activities for the neighborhood's initiatives for sustainable life.

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