Peoples' Resource Utilization of Mangroves and Their Awareness to Its Environmental Importance

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Abstract

This study investigated the people's resource utilization of mangrove and their awareness to its environmental importance. One hundred fifty five (155) residents along the coastal areas of Bacolod and Kauswagan, Lanao del Norte accomplished the questionnaires and subjected to focus group discussions. The survey indicates that people along the coastal area have their dependence on the resources from the mangroves. People seldom engaged in cutting of mangrove trees for domestic consumption of fuel and house construction. The rate of cutting is periodic due to the interventions imposed by the Department of Environment and Natural Resources (DENR). Despite low species diversity in the mangrove area, people used to collect shells and other forms of aquatic life for consumption. Some local residents also utilized mangroves for pharmaceutical and medicinal applications.

The local residents were aware on the economic importance of the mangroves as good source of food and its ecological benefits in protecting their lives against calamities brought by storm surges, strong waves, tides, currents and wind damage. Their awareness has dramatically enhanced their positive response to the governments' coastal management program through intensive plantation and taking the responsibility as stewards of the mangroves' resources. This study concludes with significant propositions to intensify government interventions to ensure greater food security and protection against natural disasters among the coastal community people.

Keywords: Awareness, DENR, Mangroves, Species diversity, Utilization

Introduction

Mangroves are a diverse group of unrelated trees, palms, shrubs, vines and ferns that share a common ability to live in waterlogged saline soils subjected to regular flooding. They are highly specialised plants that have developed unusual adaptations to the unique environmental conditions in which they are found. Mangroves provide ecological as well as economic benefits. (Faunce and Serafy, 2006). Ecologically, mangroves are important in maintaining and building the soil, as a reservoir in the tertiary assimilation of wastes, and in the global cycle of carbon dioxide, nitrogen, and sulfur. The protection against cyclones is a

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"free" benefit. Yet hidden benefits from mangroves, especially in marginal areas, may even be more important than the obvious ones. (Satyanarayana, et. al.2012; Chand, et.al.2012;)They play a significant role in coastal stabilization and promoting land accretion, fixation of mud banks, dissipation of winds, tidal and wave energy.

Economically, mangrove provides variety of uses. Mangrove cleared to make way for human development. Many animals and plants depend on mangroves and cannot survive without them. It provides nursery grounds for aquatic animals and support fishery production in coastal waters. It protects coastal areas and communities from storm surges, waves, tidal currents and typhoons. It also served as recreational grounds for bird watching and observation of wildlife. (Gomes, et. al. 2010; Walton, et. al. 2006; Mangroves are essential to maintain coastal fisheries, protect property and coastlines from the effects of cyclones and storms and protect coral reefs from sediments and pollutants.

Though mangroves are faced with natural dangers like typhoons, pests and diseases, and rising sea levels due to global warming, the biggest threats are man-made. Human threats include conversion of mangroves to fishponds and salt beds; reclamation of mangrove areas for development such as piers and housing; pollution and siltation from upland communities; and human disturbance, overexploitation and utilization, such as overcutting for firewood purposes. Garbage thrown into the mangrove pollutes water and harm animals. Mangroves are frequently seen as expendable and little care is taken of them. Often mangroves are just seen as an area for mosquito breeding and a place to unlawfully dump rubbish. The natural ecological and economic benefits lost with mangrove loss are significant and non-retrievable. Atheull, A. et. al. (2009).

In the Philippines, the Department of Environment and Natural Resources (DENR) is mandated to be the primary government agency responsible for the conservation, management, development and proper use of the country's environment and natural resources, including those in reservations, watershed areas and lands of the public domain. In the DENR, management of mangrove areas is a mandate of the Coastal and Marine Management Division of the Protected Areas and Wildlife Bureau (PAWB). Reports from the bureau indicate that the mangrove forest resources in the Philippines have deteriorated significantly. The culprits in the decline of mangroves are many but the primary one is conversion to aquaculture ponds and more recently conversion to urban land and reclamation and other land uses. If this trend continues, there will be virtually no mangroves left in the Philippines in the years to come (Melana, et.al. 2000; Samson, et.al. 2008).

This paper presents research findings from a study of how people utilize the resources from the mangroves and their awareness to its importance. It will show how local community managed their mangroves with the mandates of the government.

Statement of the Problem

This study aims to investigate peoples resource utilization and their awareness on the importance of mangroves. Specifically, this study aims answer the following questions:

1. What is the profile of the respondents in terms of:
   1.1 Age
   1.2 Gender
   1.3 Highest educational attainment
   1.4 Means of livelihood
2. How do respondents utilize the resources from the mangrove?
3. What is the respondents' general perception on the importance of mangrove?
4. What is the extent of the respondents' awareness on government interventions in managing the mangrove?
5. Is there a significant impact of respondents' awareness on government intervention to their resource utilization of the mangrove?

Methodology

The study was conducted in the coastal areas of Kauswagan, Lanao del Norte, Philippines. The study used the descriptive research design to describe peoples' resource utilization and their awareness on the importance of mangrove. The subjects of this study were one hundred fifty five (155) residents dwelling along the coastal areas of Bacolod and Kauswagan, Lanao del Norte.

Questionnaire was used to obtain data from the respondents**.** The questionnaire was translated into Cebuano to be easily understood by the residents**.** To ensure that all the necessary information are included in the research instrument. The questionnaire was validated by having a dry run to a group of non-respondents to check if the items in the questionnaire are clear. Their answers to the dry run were subjected to reliability test through Cronbach of scaled items. As per computation, the Cronbach alpha for the test instrument is 0.86 which means the test is reliable. Focus group discussion was also conducted to obtain qualitative data on the extent of their utilization of the resources in the mangrove area and their perception on government interventions in managing the mangrove.

The data gathered were tabulated and statistically treated for analysis and interpretation. Frequency distribution and percentages were used to summarize the profile of the respondents. Pearson r was used to determine the relationship between the profile of the respondents and their resource utilization of the mangrove. Regression analysis was used to determine the impact of their awareness on government intervention to their resource utilization of the mangrove.

Results and Discussion

Table 1. Frequency and Percentage Distribution of Respondents' Profile According to Age, Gender, Highest educational Attainment and Means of livelihood

Indicators	Frequency	Percentage
Age Group		
59-70	23	15
46-58	32	21
33-45	53	34
20-32	47	30
Total	155	100.0
Gender		
Male	75	48
Female	80	52
Total	155	100.0
Highest Educational Attainment		
College graduate	20	13
College level	22	14
High school	62	40
Elementary	46	30
Vocational	5	3
Total	155	100.0
Means of Livelihood		
Fisherman	44	28
Housewife	29	19
Government Employee	25	16
Farmer	18	12
Fish vendor	15	10
Skilled worker	13	8
None	11	7
Total	**155**	**100**

Table 1 shows the profile of the respondents. Results revealed that respondents vary in age which ranges from 20 to 70 years old. Male and female respondents are nearly equal in number. A number of them are college graduate (13%) and college level (14%). Majority of them have low educational attainment until high school (40%), elementary (30%) and very few (3%) finished vocational courses. Their means of livelihood varies from being fishermen

(28%), fish vendor (10%), skilled workers (8%), and farmers (12%). Few of them are government employee (16%). Few of them are plain housewife (19%) and others don't have any means of livelihood as they are still students.

Table 2. shows the peoples' utilization of mangrove resources. Results revealed that people seldom engaged in cutting of mangrove trees for domestic consumption of fuel and house construction and fishing poles. The rate of cutting is periodic due to the interventions imposed by the Department of Environment and Natural Resources (DENR). Despite low species diversity in the mangrove area, people used to collect shells and other forms of aquatic life for consumption. Some local residents also utilized mangroves for pharmaceutical and medicinal applications. People seldom use mangrove trees for house building, furniture as well as fishing poles and certain household items and never use them for furniture though mangrove wood is resistant to rot and insects, making it extremely valuable.

Table 2. Peoples' Utilization of Mangrove Resources

Indicators	Mean	Description
Collect shells and other forms of aquatic life for consumption	3.15	sometimes
Collect various aquatic foods regardless of its size	3.02	sometimes
Use as fishing poles	2.51	sometimes
Use for firewood	2.35	sometimes
Use its parts for medicinal purposes	2.13	seldom
Collection of firewood for sale	1.86	seldom
Cutting of mangrove tree for house repair	1.80	seldom
Use as source of dye	1.79	seldom
Cutting of mangrove for house construction	1.78	seldom
Use of mangrove as lumber for sale	1.76	seldom
Use for furniture	1.34	never
Overall mean	2.14	Seldom

Mangroves are a good source of wood and timber and nipa shingles for housing materials, firewood and charcoal, and poles for fish traps. Mangrove seeds and propagules can be harvested and sold. Fish, crustaceans and molluscs can also be harvested from mangroves. Aquaculture and commercial fisheries also depend on mangroves for juvenile and mature fish species. When these activities are managed appropriately it is possible to derive timber products from mangrove forests without significant environmental degradation, and while maintaining their value as a nursery and a source of food for commercial capture fisheries.

In other parts of the world, people have utilized mangrove trees as a renewable resource. Harvested for durable, water-resistant wood, mangroves have been used in building houses, boats, pilings, and furniture. The wood of the black mangrove and buttonwood trees has also been utilized in the production of charcoal. Tannins and other dyes are extracted from mangrove bark. Leaves have been used in tea, medicine, livestock feed, and as a substitute for tobacco for smoking.

In the Philippines, the government has set regulations governing the utilization, development and management of mangrove resources. There is a strict implementation of the policy to conserve, protect, rehabilitate and develop the remaining mangrove resources of the country, stop the wanton exploitation of the mangrove resources and enhance the replenishment of the denuded areas through reforestation (Administrative Order No. 15 issued February 1, 1990).

Table 3 shows the respondents' awareness on the importance of mangrove. Generally, people are fully aware on the importance of mangroves which is very much essential for sustainability of the ecosystem. They are aware of the fact that mangroves are used by a vast array of organisms as breeding, nursery and feeding areas, thus support fisheries production in the coastal areas. Mangroves produce leaf litter and detritus matter, which are valuable sources of food for animals in estuaries and coastal waters. These habitats provide a rich source of food while also offering refuge from predation. Hence, loss of mangroves not only affects us indirectly but there are direct economic repercussions through loss of fishing industry (Primavera, 2005**).**

Table 3. Respondents' Awareness on the Importance of Mangrove

Indicators	Mean	Description
Mangrove prevent garbage to scatter from the seashore to the sea	3.85	Fully aware
Mangroves can help establish the good image of the sea	3.85	Fully aware
There are a variety of birds inhabiting the mangrove area	3.49	Fully aware
Mangroves protect coastal areas and communities from storm surge, waves, tidal currents and typhoons**.**	3.37	Fully aware
Mangroves are used by a vast array of organisms as breeding, nursery and feeding areas.	3.32	Fully aware

Indicators	Mean	Description
Mangroves play an important role in coastal protection by acting as a natural buffer to water erosion from both the land and the sea.	3.31	Fully aware
Mangroves help clean the air	3.26	Fully aware
Mangroves provide habitats for a large number of marine and terrestrial fauna.	3.20	Moderately aware
Mangrove helps in sustaining the clean groundwater	2.94	Moderately aware
Mangrove is the habitat for a variety of seashells	2.85	Moderately aware
Mangroves serve as recreational grounds for wildlife enthusiasts.	2.57	Moderately aware
Mangrove is a hardwood kind of tree that that is good for making furniture	2.31	Moderately aware
Mangroves can be a source of medicine for a variety of illnesses.	1.97	Slightly aware
There are parts of the mangrove being dumped with filling materials as reclamation area for wharf or house construction	1.90	Slightly aware
Overall Mean	2.95	Moderately aware

Results further revealed that people are fully aware that mangroves protect coastal areas and communities from storm surge, waves, tidal currents and typhoons**.** The crown and stem of mangroves serve as physical barriers**.** The dense root systems of mangrove forests trap sediments flowing down rivers and off the land. This helps stabilizes the coastline and prevents erosion from waves and storms. In areas where mangroves have been cleared, coastal damage from hurricanes and typhoons is much more severe. By filtering out sediments, the forests also protect coral reefs and seagrass meadows from being smothered in sediment. Coastlines throughout the world are facing serious problems of coastal erosion and threat of rising sea levels due to global warming that has tremendously increased by several folds. (Kairo, et.al. 2014; Shaher, 2010**).** Mangroves protect shorelines from damaging storm and hurricane winds, waves, and floods. Mangroves also help prevent erosion by stabilizing sediments with their tangled root systems. Mangroves not only help in preventing soil erosion but also act as a catalyst in reclaiming land from seas. This is a very unique phenomenon, since there is a general tendency of water to engulf land.

People are fully aware that mangroves help clean the air. Mangroves produce organic biomass (carbon) and reduce organic pollution in near shore areas by trapping or absorbing pollutants in the air thus, provides a clean air to breath. Barth (2011). The community people are moderately aware of the fact that mangrove helps purify the water by absorbing impurities and harmful heavy metals**.** Thus, they maintain water quality and clarity, filtering pollutants and trapping sediments originating from land.

The community people are moderately aware that mangroves serve as recreational grounds for wildlife enthusiasts. Mangroves provide shelter for local and migratory wildlife and serve as roosting and foraging grounds. They also provide access to highly diverse mangrove plants and animals and their adaptations, making them ideal for field laboratories and ecological destinations.

Table 4. Respondents' Awareness on Government Interventions in Managing the Mangrove

Indicators	Mean	Description
The government has certain programs in managing the mangroves	3.37	Fully aware
There is a clear cut program of the government to prohibit cutting of trees in the mangrove areas	3.70	Fully aware
There are government employee who are conducting regular monitoring in the use of mangroves	3.48	Fully aware
There had been various seminars and trainings conducted about managing the mangrove ecosystem	3.43	Fully aware
There had been trainings conducted on mangrove restoration	3.49	Fully aware
There are government employees watching people who make use of the mangroves resources.	3.34	Fully aware
The government has strictly imposed penalty to people taking advantage of the mangroves.	3.38	Fully aware
Overall Mean	3.46	Fully aware

Generally, the respondents are fully aware of the government's interventions in managing the mangrove. Table 4 depicts the extent of their awareness. Management of mangrove areas is a mandate of the coastal and marine management division of the Protected Areas and Wildlife Bureau (PAWB).

There had been government intervention programs and policies, which dictated development in both the uplands and coastal areas which are based mainly on abundant

available resources without due consideration for sustainable options for future generations (Melana, et. al. 2000; Lewin, 2009; Saleh, 2011**).** The Philippine government has imposed the Mangrove replanting programs. Mangrove reforestation gets funds from the trillion-peso National Greening Program (NGP), the government's biggest reforestation program that aims to plant 1.5 billion trees by 2016. Primavera and Esteban (2008). Another program is the establishment and management of mangrove nursery. A mangrove nursery is a place for raising and tending mangrove seedlings until they are ready for planting of for sale to other mangrove planters. Nursery technologies ensure the availability of planting materials and the production of high quality seedlings.

A community-Based Forest Management Agreement (CBFMA) is a production sharing agreement entered into between a community and the government to develop, utilize, manage and conserve a specific portion of forestland consistent with the principles of sustainable development and pursuant to an approved Community Resources management Framework. (CRMF)(DAO96-29, DENR)

Table 5 Regression Analysis between the Respondents' Resource Utilization of mangrove and their Awareness to Environmental Importance and Government's Intervention Program

Independent Variables	Regression Coefficients	*p* Value
Awareness to its Importance	-0.002	0.419
Awareness to Government Intervention	-0.107	0.019**

** Highly significant

Adjusted R^2 : 0.302
F value: 1.759
Sig. Level: 0.002

Table 5 shows the regression analysis between the respondents' resource utilization of mangrove and their awareness to its environmental importance and government's intervention program. The F value of 1.759 indicates that the model was significant at 98.2% confidence level. In fact the whole set of variables explained 30.2% of the variation of the peoples' resource utilization. Considering the independent variables included in the study, results have shown that the government's intervention program have significant influence on their utilization of the mangrove resources. This is borne by its regression coefficient, which shows that for every unit increase in their awareness to government's intervention program, their resource utilization would decrease by 10.7%. This result poses a significant implication

for the government to vigorously pursue its efforts through sustained mangrove reforestation activities and protection of the mangrove forests.

Conclusion and Recommendations

The community people utilized the resources of the mangroves at a very minimal level. They are aware on the importance of the mangrove and the government's intervention programs in managing the mangrove ecosystem. Their awareness to these government's intervention have greatly influenced and impede their utilization of mangrove resources.

This study concludes with significant propositions to intensify government interventions to ensure greater food security and protection against natural disasters among the coastal community people. Strong political will be sustained among local leaders to implement fishery laws and institutionalize coastal resources management within their area of jurisdiction;

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