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Anthropogenic activities inside the mangrove conservation and rehabilitation area: A case of Davao Occidental, Philippines

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Abstract

The present study determined and evaluated the anthropogenic activities of the local settlers living near Philippine National Aquasilviculture Program (PNAP) - Mangrove Rehabilitation Areas in the 4 selected Coastal Barangays of Davao Occidental namely Brgy. Tubalan, Brgy. Buhangin, Brgy. Sto. Rosario and Brgy. Tanglad. A self-structured survey questionnaire was formulated to know the perception of the local settlers on the issue concerning anthropogenic activities on the mangrove ecosystem near the PNAP areas. Gathered data include socio-demographic profile, issues and concerns, and perception including the activities of the local settlers lived near the area. A purposive sampling technique was done during data gathering.

Results revealed that majority of the respondents are male, married and in the age ranges from 30 – 40 years old. These respondents confirmed that majority of the local settlers living near PNAP areas were converting the mangrove area into residential (90.38%), converting into fishpond with 25.75% and utilizing as ports for fishing boats like in the case of Brgy. Sto. Rosario. Other anthropogenic activities include improper waste disposal, grazing of stray animals, among others. Moreover, the effects brought by these anthropogenic activities include gradual destruction of the mangrove ecosystem, and high mortality of mangroves. Though these areas were negatively affected, best practices were likewise noticed such as the conduct of regular coastal clean-up and mangrove planting activity.

Through this, it is suggested to intensify the awareness efforts (such as IEC campaign) of all concerned organizations and institutions, and by entering a multi-partite agreement among key players and coming-up with one resolution of protecting these ecosystems. Likewise, a regular monitoring among these mangrove ecosystems is being encouraged.

Keywords: Philippine national Aquasilviculture program (PNAP), mangroves, anthropogenic activities, survival and mortality rates

Introduction

Mangroves play a role both on land and in the water, unfortunately this unique ecosystems is itself being violently harmed, the existence of mangrove forests is under great risk due to the fragmentation of the habitats. The mangrove areas are under heavy human pressure especially in the well-developed mangroves that grow along humid sheltered tropical coastlines. Mangrove systems are threatened by both natural and anthropogenic processes that pose a risk for their long term survival. This has received considerable attention in the literature with various estimates of mangrove loss world-wide (Duke *et al.*, 2007) [2]. Globally, mangroves are disappearing at an alarming rate of 1 to 2 % per year, faster than the adjacent coral reefs or tropical rainforests (Kawalekar, 2015) [6]. About 90% of the global mangroves are growing in developing countries and they are under the condition of critically endangered (Kathiresan *et al.*, 1991) [3].

Nowadays, massive rehabilitation efforts have been done for the last two decades both by the government, non-government agencies and other concerned sectors but environmental degradation remains to be an alarming issue. This pressures for development and utilization of the coastal resources particularly the mangrove ecosystem. It must be addressed within a realistic framework of conservation and sustainable resource management without jeopardizing the livelihood of the coastal fisherfolks (Pacyao and Genciano, 2018) [9].

Moreover, the Philippine National Aquasilviculture Program (PNAP) is a banner program of the Department of Agriculture (DA) implemented by the Bureau of Fisheries and Aquatic

Resources (BFAR). An agreement was then entered into by and between BFAR and the Commission on Higher Education (CHED) for program implementation. The Program concept is primarily mangrove resource rehabilitation and livelihood provision to help address climate change, food security and poverty among municipal/ artisanal coastal fisherfolk (Pacyao and Llameg, 2018)^[11].

Generally, mangroves are being threatened with anthropogenic factors. Hence, the study focused on the assessment of the common anthropogenic activities in the mangroves ecosystem near PNAP mangrove rehabilitation project areas in Davao Occidental. The specific objectives of this study were as follows:

1. Determine the socio-demographic profile of the local settlers living near the PNAP areas;
2. Identify the common anthropogenic activities practiced by the local settlers living near the area;
3. Determine the effects of these anthropogenic activities to the Mangrove Ecosystems; and,
4. Determine the best practices in the PNAP mangrove rehabilitation sites.

Materials and Methods

The study was conducted in the four (4) coastal barangays of Davao Occidental where mangroves planted near the mangrove rehabilitation areas of the Philippine National Aquasilviculture Program (PNAP) established. The data on the determination of anthropogenic activities near PNAP mangrove rehabilitation areas were gathered through personal interview using a self-structured survey questionnaire. This was presented in English dialect but translated into Visayan to facilitate easy understanding.

The respondents considered in the study were the local settlers (either directly or in-directly engaging in fishing activities) living near PNAP mangrove rehabilitation areas of Davao Occidental. A purposive sampling technique was employed during actual conduct of the study. Respondents were interviewed based on the administered self-structured survey questionnaire.

Table 1: Recorded number of household in each study sites.

Barangay	Municipality	Number of Households
Tubalan	Malita	81
Buhangin	Malita	33
Sto. Rosario	Sta. Maria	54
Tanglad	Sta. Maria	153

Source: Local Government Unit (LGU) of Malita & Sta. Maria, Davao Occidental 2018

Data Analysis

The data obtained from the study were analyzed using Mean and Percentage.

Results and Discussions

Socio-Demographic Profile of the Respondents

A total of 66 local settlers randomly selected in the 4 study sites using purposive sampling technique were considered during the actual conduct of the study. A self-structured survey questionnaire was utilized as these facilitate the efficiency in gathering data. Active respondents for mangrove rehabilitation efforts and fisherfolks (directly or indirectly) living near the Philippine National Aquasilviculture Program

(PNAP) – Mangrove Rehabilitation Areas in Davao Occidental were prioritized (Table 1).

Age

Majority of the respondents are in the age ranging from 30 – 40 years (34.85%), and 28.79% from (40 – 50 years old).

Gender

The participation of females with 51.52% across study sites place a significant contribution to rehabilitation efforts implemented by the National Government Agencies (NGAs), Non-Governmental Organizations (NGOs), and other key players.

Civil Status

In terms of civil status, married respondents dominated the 4 study areas with 77.27%.

Number of Years Residing in the Area

Most of the respondents confirmed that they settled and lived near the mangrove area around 30 – 40 years (30.30%). Others stayed for a half century (40 – 60 years) with 22.73%.

Religion

Roman Catholic Religion dominated the 4 study sites with 75.76%. A few numbers of Islam Communities were also recorded with 16.66%. Other denominations include Seventh Day Adventist, Iglesia ni Cristo, and the United Church of Christ in the Philippines (UCCP) (7.57%).

Educational Attainment

Most respondents attained elementary level status with 40.91%, followed by high school graduate (18.18%), and few finished college.

Common Anthropogenic Activities

Based on the respondents' perspectives, majority strongly agreed that one of the common anthropogenic activities made by the local settlers in the mangrove ecosystem is the conversion to residential and reclamation sites with 90.38%. The respondents from Brgy. Buhangin (71.42%) confirmed that some of their mangrove areas are being converted into fishpond and fish pen.

In Brgy. Sto. Rosario in Sta. Maria, their mangrove areas were used as harbour and ports for their boats (72.73%) since majority is very dependent on fishing activities.

The grazing of astray animals (such as livestock and poultry in particular) in Brgy. Tubalan, Brgy. Buhangin and Brgy. Tanglad was also considered negative factors as it contributes to low survival of mangroves with 12.06%. Mangroves mortality may result from different factors such as grazing of animals, deforestation, feral pigs, sea level rises, wave action, shoreline erosion, altered tidal flows, floods and waste disposal which are mainly caused by human pollution and activity (Trenberth, 2005)^[15]. This result supported with the findings of Pacyao and Genciano (2018)^[9-11] that any mangrove areas closed to coastal communities may have problems on grazing of astray animals. Furthermore, a study of Melendrez (2018)^[7] stated that PNAP mangrove rehabilitation areas are very vulnerable to various anthropogenic activities, thus, contributed much to a significant number of mangrove mortalities.



Plate 1: Grazing of astray animals was identified as one of the common problems among mangrove rehabilitation areas in Davao Occidental, Philippines.

During the interview, 13.33% of the respondents confirmed that they utilized their mangroves ecosystem as a source of construction materials (for fencing in particular). Other used it as source of firewoods and charcoal (24.99%).

Moreover, mangrove areas of Brgy. Tubalan, Brgy. Buhangin and Brgy. Sto. Rosario was partly converted into various dumpsites for wastes (7.57%). A study of Pacyao and Llameg

(2018) [9-11] confirmed that mangrove project sites close to populated areas have common problem on garbage. Also, Orale and Fabillar (2011) [8] reported that household in most coastal communities in the Philippines directly dispose domestic waste into the marine environment. The presence of common household waste in four study sites corroborates the findings of Orale and Fabillar (2011) [8].



Plate 2: Improper garbage disposal among mangrove rehabilitation areas of Davao Occidental.

Effects of Anthropogenic Activities

Around 83.45% of the respondents confirmed that the destruction of mangrove ecosystem was identified as the common effect of human anthropogenic activities. The high concentration and input of anthropogenic marine debris and all forms of wastes in selected Barangays of Davao

Occidental presents a clear danger for mangrove ecosystem and by which probably can have a negative impact on the growth and reforestation efforts. In Brgy. Tanglad, mortality of mangroves (54.84%) is one of the possible effect of these anthropogenic activities most specially near the PNAP rehabilitation areas (see Table 2).

Table 2: Identified Common effects of the Anthropogenic Activities to the Mangrove Areas.

Project Sites	Commonly-Identified Effects of Anthropogenic Activities to the Mangrove Ecosystem			
	Destruction of Mangroves		Mortality of Mangroves	
	No. of local settlers responded	%	No. of local settlers responded	%
Brgy. Tubalan, Malita	17	100%	7	41.18%
Brgy. Buhangin, Malita	6	85.71%	3	42.85%
Brgy. Sto. Rosario, Sta. Maria	6	54.55%	4	36.36%
Brgy. Tanglad, Sta. Maria	29	93.55%	17	54.84%
Total	83.45%		43.81%	

Best Practices

The results on the evaluation of best practices employed by the respondents are presented in Table 3. Although, there is a problem on how to intensify the IEC campaign implemented by various agencies, 73% of the respondents of the 4 study

sites have revealed that the local settlers are regularly conducting mangroves rehabilitation efforts in a year. Around 83.87% of local settlers of Brgy. Tanglad revealed that the Local Government Unit (LGU) has initiated a regular coastal clean-up at least once a month.



Plate 3: Best practices of the local settlers in the mangrove rehabilitation areas.

The clean up and mangrove planting and rehabilitation are some of the best practices observed in most study areas where mangroves exhibits good survival rate (49.47%). These were visually observed in Brgy. Sto. Rosario and Brgy. Tubalan (45.78%), followed by Brgy. Tanglad with 24.65 %. According to Melendrez (2018) [7], most areas exhibits high survival of mangroves was basically due to local initiatives employed by the local settlers living near the area. Majority of local respondents (90%) participated in cleaning up of coastal areas at least every month. It was also observed that 4Ps Beneficiaries under DSWD Program have regular monthly activities relative to conservation and preservation of mangroves. Other local settlers are also regularly engaging in

coastal initiatives like Planting of Mangroves with BFAR, SPAMAST and LGUs, and even private sectors. Coastal settlers in these 4 Barangays also observed RA 8550 (The Philippine Fisheries Coded) which prohibit the cutting of Mangroves in the country. Community involvement is identified as they key factor for success (Pacyao and Llamag, 2018) [9-11] so they organized small scale groups like Tanglad Mangrove Planters of Brgy. Tanglad, and the Tubalan Small Farmers and Fisherfolks Association (TUSSFA) of Brgy. Tubalan. Monitoring of illegal activity in the area, and the presence of BFARMC as recommendatory body for national and local policy concerning fisheries and aquatic resources were likewise organized.

Table 3: local mangrove rehabilitation best practices.

Project Sites	Identified Best Practices							
	Mangrove Planting		Protecting the Mangrove		Mangrove cutting restrictions		Coastal clean-up	
	No. of respondents	%	No. of respondents	%	No. of respondents	%	No. of respondents	%
Municipality of Malita								
<i>Brgy. Tubalan</i>	12	70.5%	8	47.05%	11	64.7%	8	47.05%
<i>Brgy. Buhangin</i>	3	42.8%	2	28.57%	6	85.7%	2	28.5%
Municipality of Sta. Maria								
<i>Brgy. Sto. Rosario</i>	9	81.8%	5	45.45%	8	72.7%	1	9.09%
<i>Brgy. Tanglad</i>	30	96.7%	26	83.87%	21	47.7%	26	83.8%
Total		73.0%		51.23%		67.7%		42.1%

Conclusions

The following are the drawn conclusions from this study:

1. Majority of the Local settlers are within the age of 30-40 years old. Most are Females, and lived between to 30 -40 years in the area.
2. Identified common anthropogenic activities are the following: the presence of astray animals, converting mangrove areas into fishpond and dumping sites, accumulation of coastal wastes, among others.
3. Mangrove degradation is the major effect of these Anthropogenic activities (83.45%) responses by the local settlers.
4. Mangrove planting and rehabilitation, regular coastal clean-up, and the presence of People’s Organization (POs) and National Government Agencies (NGAs) supporting the coastal initiatives are some of the observed best practices in all study sites.

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