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Species Distribution and Abundance of Mangrove Species in different Zonation of Bayabas, Surigao del Sur, Philippines

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Abstract

Mangroves are salt-tolerant trees adapted to salty and brackish water environment. The decline of mangrove areas due to over-exploitation and unsustainable use has been a worldwide catastrophe. Thus, this study was conducted to determine the distribution and abundance of mangrove species which will serve as a baseline data for future research.
The study was conducted at the landward, middle ward and seaward zones of Cagbaoto, Bayabas, Surigao del Sur where it employed a purposive sampling method. The study revealed 8 species of mangrove belonging to 8 families. It had shown that Acanthus ebracteatus was the highest in terms of species abundance (30.43%) and Aegiceras floridum was the lowest (1.45%). Bruguira cylindrica and Exoecaria agalloca were found across all zones but there were also species that only grow on seaward zone. Based on the study, it can be concluded that there were specific species that dominated in terms of their abundance on each zone and evidently shown their distribution across all zones.
Keywords: Landward, Middle ward, Seaward, Mangroves

1.0 Introduction

Mangrove are woody plants bordering land and sea growing in conditions of high salinity, extreme tides, strong winds, high temperature, and muddy anaerobic soils (Dissanayake and Chandrasekara, 2014). Mangroves do not limit their contribution as shelter provider and breeding sites for marine and terrestrial organism but also play important roles in coastal protection from typhoon and many other natural disasters (Primavera and Esteban, 2013).
Mangrove forests are extremely important coastal resources, which are vital to our socio-economic development. A vast majority of human population lives in coastal area, and most communities depend on local resources for their livelihood. The mangroves are sources of highly valued commercial products and fishery resources and also as sites for developing a burgeoning eco-tourism (Kathiresan and Bingham, 2015). The mangrove forests have been shown to sustain more than 70 direct

human activities, ranging from fuel-wood collection to fisheries (Lucy, 2016).
Over the past decades, the Philippine mangrove ecosystems and beach forests suffered severely due to their conversion to fishponds (Primavera & Esteban, 2013), their unsustainable use, over exploitation, human settlements, and degradation of their zones that have been pointed as the biggest threat for mangrove forest decline (Melana, 2014).
Barangay Local Government Unit (BLGU) of Cagbaoto, Bayabas, Surigao del Sur participated in projects conducted by DENR, Surigao del Sur where 85% is the survival rate on the 3 hectares mangrove plantation. The BLGU had replaced attacked and dying propagules through replanting. Cagbaoto has also an existing mangrove forest that is not part of any DENR programs but is protected and maintained by the BLGU. However, the said mangrove forest has not been assessed by researchers and there were still no records of existing mangrove species on the area. Hence, this study would be beneficial in the assessment

of existing species and will serve as a baseline data of mangrove species before total depletion occurs.

2.0 Research Methodology

There were 15 sampling quadrates that were laid divided into zones which include the seaward, middle ward and landward mangroves on the sampling area where there were 5 sampling quadrates per zone. A purposive sampling was employed in the establishment of sampling quadrates. Each sampling quadrate has an interval of
30 m/ quadrate. Each quadrate has a dimension of 10m x 10m. The quadrate was set using string rope on the areas with sufficient mangrove cover and was laid using Global Positional System (GPS) to obtain the exact geographic coordinates. Species that were found on each quadrate were identified to the lowest taxon using identification guides and was verified in a social media page “Co’s Flora and Fauna of the Philippines” where experts from different fields are members including those that are mangrove professionals. Species located inside the sampling quadrates were the one considered for species inventory.
All the data gathered regarding the mangrove species were subjected to vegetation analysis using the following standard formula of Brower and Zar (1990).
Species Abundance
% Abundance= # of individual of species x 100 Total number of individual of all species
Density
D = total number of individuals counted for species
total area sampled

Figure 1. Map of Cagbaoto, Bayabas, Surigao del Sur

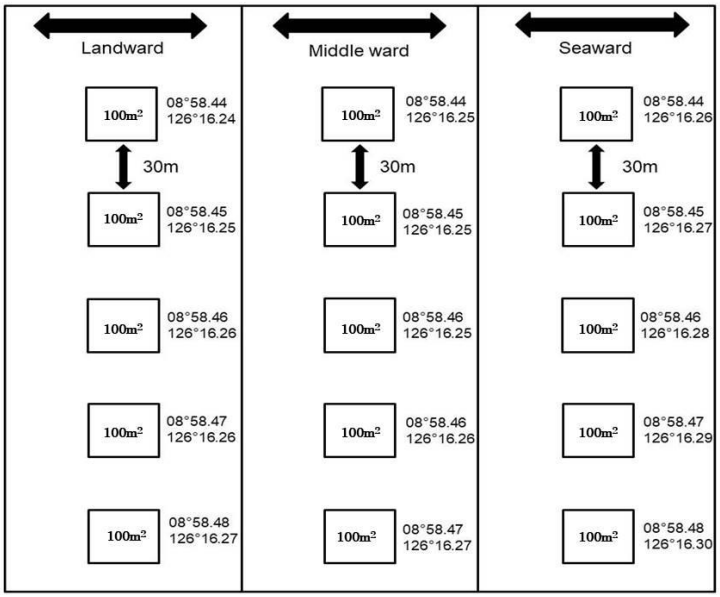

Figure 1. Sampling Quadrates on each Zone on the Sampling Site with their Geographic Coordinates.

Relative Density
RD = total number of individuals of a given species total number of individuals of all species
Frequency
f = number of plots in which species occurs total number of plots sampled
Relative Frequency
Rf = frequency of species frequencies of all species
Species Importance Value
SIV= Relative density + Relative frequency

1.0 Results and Discussion

There were a total of 8 species found across all study sites belonging to 8 families of mangrove species. The Philippines has 46 species of mangroves which is 65.7% of the world's existing mangrove species that is 70 as recorded recently (Primavera et al., 2013).

Table 2. Species Abundance of Mangroves

Mangrove Species	Seaward	Total	Landward	Middle ward	Species Abundance (%)	
Acanthus ebracteatus			7	77	-	84
30.00						
Aegiceras floridum			-	-	4	4
2.00						
Bruguira cylindrica			28	19	4	51
19.00						
Exoecaria agalloca			12	4	14	30
11.00						
Lumnitzera racemosa			-	7	13	20
7.00						
Nypa fruiticans	19		-	-	19	7.00
Sonneratia alba	-		3	39	42	15.00
Xylocarpus granatum			6	20	-	26
9.00						
Total	72	130	74	276	100%	

A total of 276 individuals belonging to 8 species were found across the whole study sites. Acanthus ebracteatus has the highest in terms of the number of individuals (84) as well as the species abundance (30.00%) and the least in species abundance was recorded in the species of Aegiceras floridum (2.00%). Acanthus ebracteatus is found to be abundant on areas near the coast where they are inundated by seawater (Ellison et al., 2010).This species naturally reproduces vegetatively and also by seeds (Robertson and Alongi, 2015), and thus dominated the area rapidly than the other species. Aegiceras floridum, being the lowest in species abundance, is a species that lives in high salinity areas and has a very narrow habitat range (Ellison et al., 2010) and consequently has low adaptability to landward zones and mud flat areas.

Acanthus ebracteatus and Xylocarpus granatum were present on landward and middle ward zone but were absent on seaward zone. These species were not found on the seaward zone as to where there is high salinity and high alkalinity because these species commonly grow on the river banks or tidal canal sides or low swampy areas in the mangrove forest of which possesses a low in salinity and is nearly acidic in environment (Binoli, 2011; Ellison et al., 2010) of which the species only survives.
Bruguira cylindrica and Exoecaria agalloca which were found on all zones are usually found in downstream and intermediate estuarine zones in the mid- intertidal region. It is

also shade tolerant (Robertson and Alongi 2015) making it to grow and survive even if the area is covered with trees. These mangrove species often exploit open areas and are also tolerant of disturbed areas (Peng and Xin-men, 2015).
Lumnitzera racemosa together with Sonneratia alba were found on middle ward and seaward zones and were absent on the landward zone. Lumnitzera racemosa is found most often in the upstream zones in the mid to high intertidal region and grows relatively quickly, but is shade intolerant suggesting why it is not found on other

quadrats where mangrove cover is heavy (Robertson and Alongi, 2014). Sonneratia alba is also intolerant of long periods of freshwater, and prefers high salinity. It is a pioneering species that is fast growing, but has low seed-viability (Kathiresan et al., 2015).
Nypa fruiticans was absent on middle ward and seaward zones because this species usually dwell on estuarine and near on fresh water areas (Robertson and Alongi, 2015). It is very fast growing, especially in fresh water, and is a competitive species while Aegiceras floridum which is only found on seaward zone has a restricted contribution and is uncommon. It is found in rocky and sandy substrates, and along beaches (Ellison et al., 2010).

4.0 Conclusion

There were 8 mangrove species belonging to 8 families that were found on the sampling zones where Acanthus ebracteatus was the highest in terms of species abundance and Aegiceras floridum was the lowest and that there were specific species that dominated in terms of their abundance on each zone and evidently shown their distribution across all zones.

Recommendations

This study thereby recommends for future researchers for constant monitoring of the area since some of the nearby areas were already converted into beaches. Also it is a need to specify on the texture of soil since this has a positive relationship on the mangrove's diversity and has seen to have variable contribution to mangrove's survival on the area.

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