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Vascular Plants of Mangrove Forest in Argao, Cebu, Philippines

Edgardo P. Lillo, Steve Michael T. Alcazar, Ritchie U. Nuevo and
Archiebald Baltazar B. Malaki
Cebu Technological University-Argao Campus

ABSTRACT

The primary aim of the study was to assess the species composition of vascular plants in mangrove forest of Argao, Cebu, Philippines. A 20m x 20m quadrat was established within the transect line at 250m intervals. A total of 11 plots were established in the site. All the plant species within the quadrat was identified and recorded.

The study identified 22 species of vascular plants in mangrove forest of Argao, under 11families and 14 genera. The mangrove forest of Argao was dominated by the species of Rhizophora stylosa Griff, Ceriops decandra Ding Hou, and Lumnitzera racemosa Willd. The most abundant family was Rhizophoraceae with 8 species followed by 3 species of Avicenniaceae. While the family of Combretaceae, Myrsinaceae, and Sonneratiaceae had two species each and Bombacaceae, Meliaceae, Myrtaceae, Euphorbiaceae, and Arecaceae had one species.

It was also found out that some of the mangrove species in the site has medicinal and commercial values derived from their resin. The fruits of busain (*Bruguiera gymnorrhiza*) were used as substitute medicine for sore eyes and pedada (*Sonneratia caseolaris*) for hemorrhage control. The mangrove forest of Argao needs to be protected and conserved because of its diversity, medicinal value. This forest is representing the remaining intact mangrove forest in the southern part of Cebu province.

Key words: Argao mangrove forest, mangrove species, vascular plants, medicinal value, and diversity

INTRODUCTION

Mangroves are coastal wetland ecosystem composed of various species of trees, shrubs and herbs capable of growth and seawater (Smith and Smith 2004; Doydee et al. 2008). This unique ecosystem is a vital habitat and very important in terms of biodiversity conservation on coastal landscape. They serve as natural bridges that link the marine and terrestrial environments (Aksornkoae et al. 1992; Doydee and Buot, 2010). The Philippines has a relatively high mangrove diversity with 35 true mangrove species. It ranks 5th among countries with the most number of endemic species {Indonesia (43), Malaysia (41), Australia (37), and Papua New Guinea (37) (Long, et al. 2011). The most common genera are Rhizophora, Avicennia, Bruguiera and Sonneratia (Calumpong & Menez 1996) and at least fourteen species have previously been recorded from Negros Island (Calumpong 1994; and, Walters 2000).

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Throughout their range, mangroves and their associated biota are threatened by human activities such as mangrove destruction and over exploitation, as well as by more indirect anthropogenic factors such as pollution and climate change. In the period 1980–2001, the world lost between 19% and 35% of its total mangrove forest area (Valiela et al. 2001, FAO 2003). On average, 3000 square kilometers of mangrove forest were lost each year between the early 1980s and 2001, which was about 2.1% per year. At this rate of loss, mangroves could be extinct in 100 years (Duke et al. 2007). Mangroves are already critically endangered or approaching extinction in 26 of the 120 countries where they exist (FAO 2003). Growing pressures from urban and industrial development along coastlines, combined with climate change and sea level rise, make the need to conserve, protect, and restore tidal wetlands requiring urgent action (Barbier, 2007). If the destruction of mangroves continues, these forests might be reduced to relic patches too small to support the diversity of organisms that depend on them. In Thailand, Ranong mangrove are in patches, in fact are fragmented due to a combined effect of natural disasters and anthropogenic disturbances such as conversion of extensive tracks to fishponds, shrimp ponds and salt ponds and even to residential villages (Doydee and Buot, 2011). Furthermore reclamation for settlements and conversion of coastal area for commercial purposes endanger this ecosystem. In fact Roldan and Sievert (1993) consider mangrove forest as one of the abused coastal habitat.

The total mangrove area in the world is approximately 15,429,000 ha distributed among many countries (Howard Miles, et al,, 1998). In the Philippines the estimated denudation rate in the mangrove forest is 4,432.5 ha per year. The government's objective to increase fish production out of mangrove conversion to fishponds was not realized. Instead, it created adverse impacts, such as the loss of significant habitats and biodiversity, loss of fishery value resulting from the decline of the protective and ecological functions of mangroves as an ecosystem, and problems of unequal resource access (Melana, 1982). In fact, the remaining mangrove forest in the Philippines is approximately 139,725 ha (Milan and Germano, 1999). Coastal inhabitants in Argao, Cebu utilized mangroves as poles for fencing and construction of houses, wood fuel and even medicine. These practices undoubtedly destroy mangroves. As a result, the productivity of coastal fisheries measured in terms of fish catch also suffered a serious decline. It is estimated that there is a reduction of 670 kg in fish catch for every hectare of mangrove forest that is clear-cut. (CRMP, 1998).With the present rate of the exploitation of our coastal resources there is a need to asses our remaining mangrove resources (DENR 2001).

Overall, there are three dominant mangrove groups found in the Philippines: bakauan group, bakauan lalaki [*Rhizophora apiculata*], bakauan babae [*Rhizophora mucronata*], bakauan bato or bangkau [*Rhizophora stylosa*]), bungalon group (bungalon [*Avicennia marina*], api-api (*Avicennia officinales*], piapi [*Avicennia lanata*], and pagatpat group, pagatpat [*Sonneratia alba*], pedada [*Sonneratia caseolaris*], pagatpat baye [*Sonneratia ovata*] (Primavera, 2000).

Mangrove-dependent fauna are equally diverse — studies have recorded as much as 128 fish species from 54families in the mangrove ecosystems of Pagbilao Bay,Quezon; 56 species of birds belonging to 28 families in 11 sites in Central Visayas and 9 species of panaeid shrimps in a

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riverine and an island mangrove in Guimaras Island (Primavera, 2000).

Botanical assessments such as floristic composition, and species diversity are essential for providing information on species richness of the forests, useful for forest management purpose and help in understanding forest ecology and ecosystem functions (Giriraj et al., 2008; Pappoe et al., 2010). Hence, the study was conducted.

The primary aimed of the study was to assess the vascular plants of the mangrove forest in Argao, Cebu, Philippines. Specifically the study include the preparation of Checklist for Mangrove Plant species, and survey of its medicinal value.

MATERIALS AND METHODS

Study Area

The study was conducted in the mangrove forest of Barangay Taloot of the municipality of Argao, Cebu. The area is located at coordinates N 9.95488^{0} and E 123.619^{0}. The barangay is situated 9 kilometers away from the Municipality of Argao. Barangay Taloot has a total land area of 346.52 hectares. It is bounded on the north by the barangay of Guiwanon, the south by Sumaguan, in the east by Argao Sea, and the west by Bulasa. The barangay served as an entry point of traders and travelers in pre-colonial Philippines. Recently the place serves as an entry point of traders and travelers from Cebu to Bohol province (Figure 1).

The mangrove forest of the barangay considered to be the last ecological frontier in the southern part of Cebu province and was estimated to have an area of 36 ha (DENR 2001). Based on observation the mangrove forest of Argao are considered the densest mangrove forest in terms of timber stand in the southern part of Cebu province. The study sites were categorized as riverine forest types which are flood plain forests along flowing waters such as tidal rivers and creeks. Conditions in this type of forest are favorable for extensive growth due to flushing by daily tides. In addition, freshwater runoff and terrestrial nutrient influx enhance this type of mangrove community.

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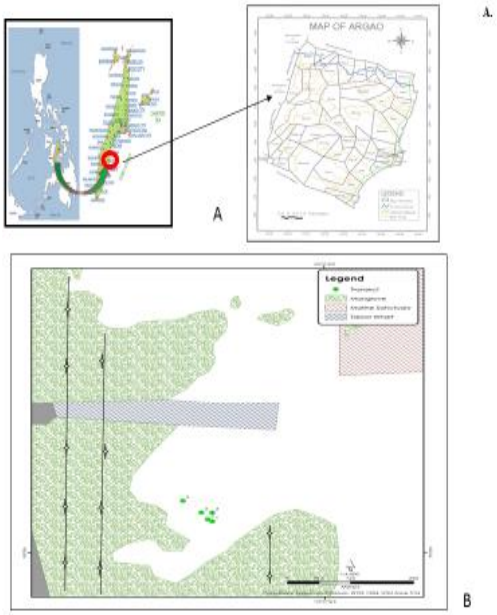

Figure 1. The study area. A. Map showing the location of the Cebu province in the Philippines and Argao municipality. B. Map showing the location of the Taloot, mangrove forest in Argao, Cebu (Flup, 2014), and the quadrat location.

Vascular Plant assessment

The study was a descriptive type of research which includes the assessment of mangrove plant species. A transect line was established in the mangrove forest for a minimum length of 500m. Three transect lines were established in the area which followed the existing trail, at an approximate interval of 100 meters per transect line.

A 20m x 20m quadrat was established within the transect line at 250m intervals or called as belt in transect. A total of 11 plots were established in the site. All the plant species within the quadrant was identified and recorded. The identification of mangrove plant species was done based from the DENR mangrove field guide.

Survey of Medicinal species

A direct interview was conducted with the people in the coastal areas surrounding the Argao mangrove areas with regards to the medicinal value of these mangrove plant species. Old literature was also searched to determine the accredited medicinal value of mangrove species.

RESULTS AND DISCUSSION

Species Composition of Vascular Plants

The study identified 22 species of mangrove plant in Argao, Cebu. The species were

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classified into 11families and 14 genera. This represents almost ½ of the 54 mangrove species all over the world and just over ½ of the 35 species in the Philippines (Ong, etal.,2002). The most represented family was Rhizophoraceae (8 species), and the abundant genera was Bruguiera (4 species), and Avicennia (3 species) which is also one of the most common genera in the Philippines (Calumpong & Menez 1996).

Out of the 22 mangrove plant species identified in the site, it was found out that Rhizophora stylosa Griff, Ceriops decandra Ding Hou, and Lumnitzera racemosa Willd dominated the whole mangrove forest. The result further implies that the whole mangrove forest in Argao was dominated by the species of genera Rhizophora, Ceriops,and Lumnitzera. These 3 genera belonging to the group of bakauan considered as one of the dominant groups in the Philippine mangrove forest (Primavera 2000). The checklist of mangrove plant species was presented in Table 1.

Based on observation during the conduct of the study, the researchers found out some human destructive activities that might affect the survival of the mangrove species. The people of Argao Municipality, particularly those in the coastal areas, utilized or harvested the mangrove trees for firewood, charcoal making, fodder for livestock, and as construction materials for houses. The presence of the few stumps found in the area and the information obtained during the encountered interview conducted in some of the residents of the barangay, have proven the above cited allegations.

Table 1. Checklist of Mangrove Plant Species in Argao

Species	Local Name
Avicenniaceae	
Avicennia marina	bungalon
Avicennia lanata	piapi
Avicennia officinalis	Apiapi
Bombacaceae	
Camptostemon philippinense	gapas - gapas
Combretaceae	
Lumnitzera racemosa	kulasi
Lumnitzera littorea	tabau
Euphorbiaceae	
Excoecaria agallocha	buta –buta
Meliceae	
Xylocarpus granatum	tabigi
Myrsinaceae	
Aegiceras floridum	tinduk tindukan
Aegiceras corniculatum	saging - saging
Myrtaceae	
Osbornia octodonta	taualis
Palmae	
Nypha fruticans	Nipa
Sonneratiaceae	
Sonneratia alba	Pagatpat
Sonneratia caseolaris	Pedada
Rhizophoraceae	

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Bruguiera cylindrical	pototan lalaki
Bruguiera gymnorrhiza	busain
Bruguiera parviflora	langarai
Bruguiera sexangula	pototan
Ceriops decandra	malatangal
Ceriops tagal	tangal
Rhizophora apiculata	bakauan lalaki
Rhizophora stylosa	bakauan bankau

Medicinal Value of Mangrove Species

As a result from the interview conducted with the residents of the community leaving in the coastal areas of Argao, all of them have not recognized the medicinal uses of mangrove plant species as cure to some ailments. They only recognized the use of species as forage to their livestock. From literature surveyed, it was found out that mangrove forest of Argao has contained species with a medicinal value derived from their resin. These includes the fruits of Busain (*Bruguiera gymnorrhiza*) which is used as substitute medicine for sore eyes. While Pedada (Sonneratia caseolaris) is used for hemorrhage control. Some species served as source of tannin like Bakauan –Lalaki (Rhizophora apiculata) , tangal (Ceriops tagal) and some species are used as raw materials for soap making (Piapi (Avecennia lanata) (PCARRD,1987). Other uses of mangroves are presented from the study of Howard Miles, et al. (1998), as shown in Table 2.

Table 2
Utilization of Some Mangrove Species (Howard Miles,etal,, 1998)

Species	Medicinal value
Acanthus illicifolius	Leaf juice used as hair fall protection, fruit pulp as blood, purifier, dressing for boils and snake bite, leaf preparation used for rheumatism
Acanthus ebracteatus	
Aegiceras corniculatum	Bark and seed used as fish poison
Aegiceras floridium	
Avicennia alba	Bark and seed used as fish poison, resin used in, Birth Control, seed ointment relieves smallpox ulceration.
Ceriops tagal	Source of firewood and tannins, yields high quality dyes, bark stops hemorrhaging (source of anticoagulant)
Derris trifoliate	Used to kill fish
Excoecaria agallocha	Fish and arrowhead poison, In Thailand it is known to cause blindness and skin eruptions,In the Philippines it is used as medication for toothache, In Malaysia bark extract is taken as a purgative
Rhizophora mucromata	Bark used to treat diarrhea, dysentery, and leprosy; fruit sap used as a mosquito repellent; wine is made from fruit and honey from the nectar.
Sonneratia caseolaris	Fruit is eatable, sap is used as a skin cosmetic and leaves are used for goat food
Sonneratia ovata	fruit is eatable and used to treat sprains, fermented Juice used as anticoagulant

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Xylocarpus species	firewood, timber, and tannin; bark extract is used to Treat cholera

CONCLUSIONS

The mangrove forest of Argao was dominated by Rhizophoraceae and the species of *Rhizophora stylosa* Griff, *Ceriops decandra* Ding Hou, and *Lumnitzera racemosa* Willd. It was found out that mangrove forest of Argao has contained species with medicinal value derived from their resin. There is a need to examine the dynamics of this biodiversity species for the future planning of appropriate forest management strategy in sustaining this most valuable resource.

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