



THE STATUS OF MANGROVES AMONG COASTAL BARANGAYS IN BUENAVISTA, GUIMARAS

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ABSTRACT This study was conducted to determine the condition of the mangrove resources in the coastal barangays of Buenavista, Guimaras. Mangrove resources were assessed using the transect plot technique established by English et al., (1994). The data gathered were regeneration rate per meter square, crown cover, average tree height and disturbances/cuttings of mangrove noted during the data gathering. Common species of mangrove per barangay were also recorded using the Field Guide to Philippine Mangroves (Primavera and RDB Dianala, 2009). For categorizing the overall health of Mangrove, the PCRA Training Guide, 2004 was used. Among the seven (7) locations, the overall health of the six (6) locations of mangrove resources ranges from excellent to good and only one (1) location showed poor performance. This shows that the mangroves in the coastal barangays of Buenavista, Guimaras are still in good conditions. But there should be intervention to be done by the concerned government agencies for the areas with excellent to good regeneration data so that these saplings/regenerated mangroves will grow into a full grown mangrove tree.

Keywords: Mangrove resources, Transect Plot method, Buenavista, Guimaras,

INTRODUCTION

Background of the Study

People mostly have thought that mangroves are noxious impenetrable swamps full of diseases, and they used to be destroyed as a public health measure. But now we know better. Mangroves are very productive coastal resources that are useful in many ways. The coastal ecosystems in the Asia-Pacific region are perhaps among the most threatened (Adeel and King, 2002). In South Asia, coastal populations are vulnerable to extreme weather events and survive on diminishing coastal resources. In the western Pacific region, small islands are threatened by the encroaching pressures of development and climate change.

The mangroves are a characteristic forest biotope in tropical river estuaries and tidal zones. They constitute an incredible adaptation to the environmental conditions of entering salt, sea water and escaping sweet, riverine water. The forests are highly productive areas and in many place an underdeveloped resource. They are also widespread along the coast of Guimaras Island. Generally, mangroves play a variety of important economic as well as ecological services particularly to communities around them. They serve as breeding grounds and nursery of marine organisms. Commercial seafood species depend for part of their life cycle in mangrove ecosystems. Mangroves support vast varieties of marine species through complicated food web part of it coming from detritus they generate. They are also sources of raw materials for construction, furniture production as well as for energy (fuelwood and charcoal) (Ellis, 2010). As well as providing a buffer for the land, mangroves also interact with the sea.

Sediment trapped by roots prevents silting of adjacent marine habitats where cloudy water might kill corals or smother seagrass meadows. In addition, mangrove plants and sediments have been shown to absorb pollution, including heavy metals. Mangroves are also very effective at storing carbon. Another benefit is soil nutrient replenishment as soil nutrients (NPK) are recharged by litter-fall of the mangrove forest. They also provide habitat for the number of wildlife and serve as a resting place for migratory birds. House Bill. No. 841, introduced by the Honorable Angelo Palmones, an act promoting the "National Strategy for the Sustainable Development, Management and Protection of Mangrove Resources in the Philippines" otherwise known as "Mangroves Resources Act" of 2010 states that it is the policy of the State to promote equitable access to natural resources and ensure the success of broad-based community participation in the development, management and protection of the country's mangrove forests. In line with this, it is the policy of the State to ensure the success of rehabilitating degraded mangrove areas and its sustainable development as well as the management and protection of all natural mangrove forests and associated ecosystems therein. Sustainable utilization of mangrove resources is encouraged to serve as an incentive to develop more areas within the framework of community-based and other socially-responsive approaches.

Based on Geographical Information System (GIS) latest survey data, (Buenavista-LGU, July 2002) the total

mangrove cover of Province of Guimaras is about 516.41 has. of which, only 49.56 has or 9.56 % of the total mangrove area comes from the mangrove cover of Buenavista.

Given these data, a confirmation study must be conducted after 11 years in order to determine whether there are changes in the mangrove density and other characteristics of the mangrove resources in the municipality in order to plan for development works to conserve, rehabilitate and reforest the coastal areas of the municipality.

Objectives:

General:

This study determined the status of mangrove resources in the coastal Barangays of Buenavista, Guimaras.

Specific:

1. Determine the mangrove species found in the coastal barangays of Buenavista, Guimaras;
2. Measure and compute the average height and percent crown cover of mangroves in the coastal barangays of Buenavista, Guimaras;
3. List the average number of seedlings and saplings in each area under study;
4. Determine the overall condition of mangroves found along coastal barangays of Buenavista, Guimaras;
5. List any additional observations on the disturbances/ presence of foreign objects noted during data gathering.
6. Come up with a mangrove scorecard per area evaluated

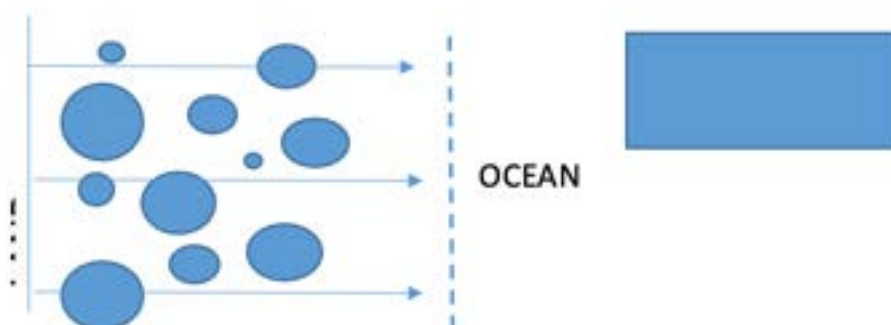
METHODOLOGY

Study Area:

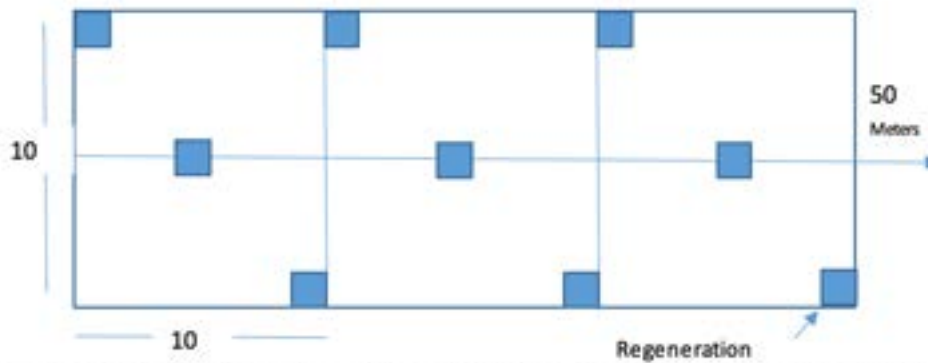
The study area covered the different coastal barangays of Buenavista, Guimaras identified to have mangrove vegetation. The map below showed the area covered by the study.

Mangrove diversity, abundance, and regeneration assessments were conducted within the predominant Mangrove forest locations in the municipality. These locations were identified through satellite imagery and through community consultation / participatory community mapping. After the sites were identified, mangroves were assessed using the transect plot technique established by English et al., (1994).

1. First, a 50-meter transect line was laid from the landward margin of the forest at the right angle to the edge of the mangrove forest.

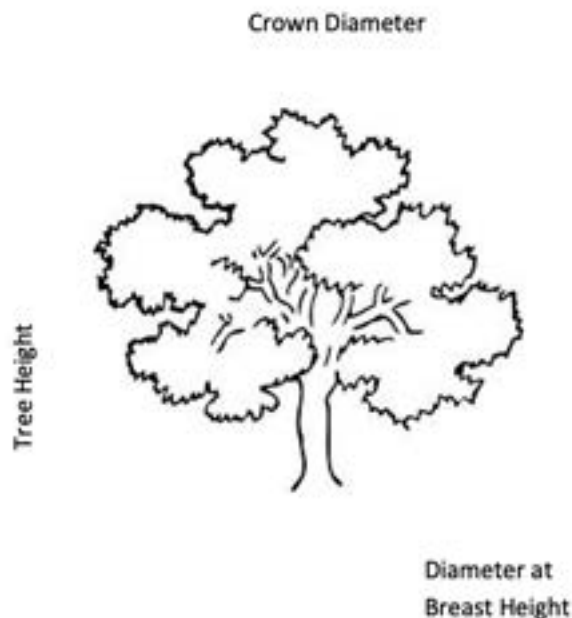


2. Each quadrat/ plot measuring 10m x 10m every 10m of the transect line was set. GPS locations were recorded



3. In these plots (10 X10 meter quadrants), the total number of mature trees was identified. Identified mature trees are those having a height greater than one (1) meter and greater than 4 cm in circumference at chest height (~1.5 m).

4. For each mature tree, the species, substrate, total height, diameter at breast height, and crown diameter were recorded. Based on this data, the researchers calculated the total percent cover along the transects (Equation 1).



5. Also in these plots, the dominant species were noted, their abundance/count. Additional notes may include the substrate type and other observations such as associated flora and fauna.

6. In each quadrant, three 1 X 1 Meter regeneration plots were sampled, one in the very center of each larger quadrat and in two opposite/diagonal of the four corners (See diagram above). Regeneration plots were used as an indicator to determine the number of seedlings and saplings in a 1 x 1 Meter subsection of the transect so that an estimated value for the forest regeneration can be calculated (equation 3).

7. Post survey, the overall condition, and health of the mangroves can be determined, including the degree of regeneration or growth of new trees and total percent cover within the area. These parameters were calculated as follows:

Eq. 1 Percent crown cover = total crown cover of all trees / total area sampled

Eq. 2 Average height = total height of all trees recorded / total number of all trees recorded

Eq. 3 Regeneration per M² = total regeneration count / total no. of regeneration plots

8. The condition of a mangrove area can now be classified as excellent, good, fair, or poor, based on the criteria in the table below:

Criteria used for categorizing the health of a mangrove forest (Source: PCRA Training Guide, 2004)

Condition	Criteria
Excellent	76% and above in % crown cover 1 regeneration per m ² Above 5 meters in average tree height Undisturbed to negligible disturbance
Good	51-75 % crown cover <1-0.76% regeneration per m ² <5m-3m average height of trees Slight disturbance and few cuttings
Fair	26-50% crown cover 0.50-0.75 regeneration per m ² <3m-2m average height of trees Moderate disturbance and noticeable cuttings
Poor	0-25% crown cover <0.50 regeneration per m ² <2m average height of trees Heavy disturbance/cuttings/pollution, rampant conversion to other uses, nearly destroyed

RESULTS AND DISCUSSIONS

The assessment of the mangroves based on qualitative description ranges from fair to excellent with the majority of the locations having a qualitative description of good. The location with mangrove growth described as excellent was Umilig area 2 while two locations where mangrove growth was fair are found in barangays Avila and East Valencia. These findings show that even there are some disturbances but mangrove growth in the different coastal barangays are still good (Table 1).

Table 1. Summary table for the conditions of the mangrove resources in Buenavista, Guimaras

Area/ location	# of Parameters rated as "excellent"	Description
Getulio	2	Good
Umilig- Area 1	2	Good
Umilig- Area 2	3	Excellent
Avila	1	Fair
East Valencia- Pagatpat	2	Good
East Valencia- Mampay	1	Fair
Taminla	2	Good
Montpiller	2	Good

Scale: Excellent- 3 and above parameters having conditions rated as "excellent"; Good- 2 parameters having conditions rated as "excellent"; Fair – 1 parameter having conditions rated as "excellent"; Poor- no parameter having conditions rated as "excellent"

The growth of any mangrove species is site-specific because there are some mangroves which cannot thrive in the environmental conditions of other places. The maximum number of different mangroves thriving along coastal barangays of Buenavista was seven (7) composed of Pagatpat, Baras-baras, Bakhaw, Bungalon, Bakhawanbabae, Bakhawanlalaki, nipa, tawalis, and tabigi. The local name was used because the study did not focus on identifying the genus of each mangrove based on the established guides (Primavera et.al, 2010). The distinct identifying factors such as flowers and fruits were absent during the time of the study, hence, the complete scientific name cannot be determined if identification will be based solely on leaf characteristics. The barangay with the most varied species of mangrove was Montpiller followed by Umilig area 2. This may imply that only these mangrove species can thrive along coastal areas of Buenavista, Guimaras. Data are presented in Table 2.

Table 2. Mangrove species growing along coastal barangays of Buenavista

Area/ location	Number of species /area	Rank	Mangrove local name
Getulio	5	4.5	Pagatpat, Bakhaw, Bungalon, Bakhawanbabae, Bakhawanlalaki
Umilig- Area 1	2	8	Pagatpat, Bungalon
Umilig- Area 2	5	4.5	Pagatpat, Bakhaw, Bungalon, Bakhawanbabae, Bakhawanlalaki
Avila	5	4.5	Pagatpat, Bakhaw, Bungalon, Bakhawanbabae, Bakhawanlalaki
East Valencia- Pagatpat	5	4.5	Pagatpat, Bakhaw, Bungalon, Bakhawanbabae, Bakhawanlalaki
East Valencia- Mampay	4	7	Pagatpat, Bungalon, Bakhawanbabae, Bakhawanlalaki
Taminla	7	2	Pagatpat, Bakhaw, Bungalon, Bakhawanbabae, Bakhawanlalaki, Tabigi, Barasbaras
Montpiller	8	1	Pagatpat, Baras-baras, Bakhaw, Bungalon, Bakhawanbabae, Bakhawanlalaki, nipa, tawalis

The data on the average height of the mangrove trees across different areas when evaluated showed that the height ranges from 5.05 to 8.43meters and the overall average height was six (6) meters. All of the tree heights were all described as excellent. Area two in Umilig got the lowest mean height of 5.05 meters while the highest mean height of 8.43 meters was found in Pagatpat, East Valencia, Buenavista. The height of mangroves may also imply the age of the mangrove plantation. The higher the heights of the mangrove the older may be the trees and vice-versa. It was observed that the area in Pagatpat showed less regeneration while in Umilig regeneration was very evident. This low tree heights in Umilig area 2 can be attributed to active regeneration that upon data gathering, within a sampling quadrant there might be some young trees as a result of high regeneration rate in previous years while Pagatpat although trees were very tall it showed poor regeneration and the tendency during sampling was that all the matured trees were counted and parameters were taken attributing to tall trees within the sampling quadrant. The Data are presented in table 3 below.



Table 3. Average height of matured trees

Area/ location	Height (m)	Description
Getulio	6.17 m	Excellent
Umilig- Area 1	5.43 m	Excellent
Umilig- Area 2	5.05 m	Excellent
Avila	5.25 m	Excellent
East Valencia- Pagatpat	8.43 m	Excellent
East Valencia- Mampay	6.34 m	Excellent
Taminla	5.35 m	Excellent
Montpiller	5.82 m	Excellent
Mean	6 m	Excellent

The barangays with excellent regeneration rate were Umilig, Avila, Taminla and Montpiller having 10, 1.49, 5.2 and 1.78, average number of regenerated trees per square meter, respectively while East Valencia got poor regeneration rate. Getulio and part of Umilighad fair regeneration rate.

Table 4. Mangrove regeneration per square meter

Area/ location	Mangrove Regeneration/sq. m	Description
Getulio	0.667	Fair
Umilig- Area 1	0.6	Fair
Umilig- Area 2		Excellent
	10	
Avila	1.49	Excellent
East Valencia- Pagatpat	0.47	Poor
East Valencia- Mampay	0.42	Poor
Taminla	5.2	Excellent
Montpiller	1.78	Excellent

The percent forest cover for matured trees ranges from 57% to 143% described as good and excellent. The results further showed that out of 8 areas evaluated, 4(50%) showed excellent percent forest cover and another 4(50%) showed good excellent forest cover

Table 5. Percent cover for mature trees

Area/ location	Percent Cover for Mature Trees	Description
Getulio	95 %	Excellent
Umilig- Area 1	76%	Excellent
Umilig- Area 2	76%	Excellent
Avila	57%	Good
East Valencia- Pagatpat	143%	Excellent
East Valencia- Mampay	59%	Good
Taminla	70%	Good
Montpiller	68%	Good
Mean	80.5%	Excellent

The overall degree of disturbance with garbage for all areas was 21.9 described as moderately disturbed. On the other hand, the disturbance due to cuttings of mangrove trees was 20.4 described as heavily disturbed. The barangay with heavy disturbance due to both garbage and cuttings was Getulio. Umilig also showed heavy disturbance due to garbage. In terms of disturbance due to cuttings of mangrove trees beside Getulio, Umilig and East Valencia also showed heavy disturbance.

Table 6. Disturbance

Area/ location	Garbage		Cutting	
	Disturbance	Description	Disturbance	Description
Getulio	47	Heavy Disturbance	31	Heavy Disturbance
Umilig- Area 1	4	Slight Disturbance	9	Slight Disturbance
Umilig- Area 2	33	Heavy Disturbance	26	Heavy Disturbance
Avila	15	Slight Disturbance	12	Moderate Disturbance
East Valencia- Pagatpat	17	Moderate Disturbance	22	Heavy Disturbance
East Valencia- Mampay	19	Moderate Disturbance	24	Heavy Disturbance
Taminla	17	Moderate Disturbance	19	Moderate Disturbance
Montpiller	23	Moderate Disturbance	20	Moderate Disturbance
Mean	21.9		20.4	



B. Analysis per Location:

Barangay :Getulio

The overall mangrove condition for barangay Getulio over the five quadrants sampled across three replications were rated as good. the average height for mature trees were 6.17 meters while the percent crown cover for these trees was 95% and all were rated as excellent. However, the area has a slow regeneration and was rated as fair which may imply that because of the excellent forest cover regeneration was hampered because the sun cannot penetrate the ground and cannot provide enough sunlight for the photosynthesis process to take place for the samplings and newly regenerated mangrove resources. In addition, Getulio mangrove area has heavy disturbances in terms of proliferation of garbage and cutting of mangroves by the people in the community.

Table 7. Assessment of the mangrove condition in Getulio

Particular	Rating	Description
Average Height for mature trees	6.17 m	Excellent
Percent Cover for mature trees	95%	Excellent
Mangrove Regeneration per m2	0.667	Fair
Disturbances :Garbage	47	Heavy disturbances
Cuttings	31	Heavy disturbances
Overall Conditions	2 parameters rated as "excellent"	Good

Among the five (5) species of mangrove present in Getulio, only Pagatpat (*Sonneratia* sp.) does not have regeneration or re-growth, the rest of the mangrove species composed of Bakhaw (*Rhizophora* sp.) and Bunagonal (*Avicennia* sp.), have re-growth. The species found in Getulo are listed in Table 8.

Table 8. List of Mangrove species found in Getulio, Buenavista, Guimaras

Local Name	Regeneration		Mature Trees	
	Local Name	Scientific Name	Local Name	Scientific Name
1. Bakhaw		<i>Rhizophora</i> sp.	1. Pagatpat	<i>Sonneratia</i> sp.
2. Bungalon		<i>Avicennia</i> sp.	2. Bakhaw	<i>Rhizophora</i> sp.
3. Bakhawan babae		<i>Rhizophora</i> sp.	3. Bungalon	<i>Avicennia</i> sp.
4. Bakhawan lalaki		<i>Rhizophora</i> sp.	4. Bakhawan babae	<i>Rhizophora</i> sp.
			5. Bakhawanlalaki	<i>Rhizophora</i> sp.

Barangay: Umilig (Area 1)

For Barangay Umilig, 2 areas were identified as the study area. The first area, the overall condition of the mangroves was classified as good. The average height for each tree was 5.43m. The percent crown cover was 76%, interpreted as "excellent". On the other hand, the area's regeneration per m2 was 0/6 which mean that the area's regeneration of mangrove species was rated as "fair". As to the disturbances in terms of garbage found in the area and the observable cuttings on mangrove trees, the area is said to be as slightly disturbed. Data are shown in Table 10.



Table 9. Assessment of the mangrove condition in Umilig area 1

Particular	Rating/Data	Description
Average height for mature trees	5.43 m	Excellent
Percent crown cover for mature trees	76%	Excellent
Mangrove Regeneration per M ²	0.6	Fair
Disturbances		
Garbage	4	Slight disturbances
Cuttings	9	Slight disturbances
Overall Conditions	2 parameters rated as "excellent"	Good

As to the species of mangrove found in the area, only Bungalon (*Avicennia* sp) and Pagatpat (*Sonneratia* sp.) are present in the observed area.

Table 10. Mangrove species found in Umilig, area 1

Regeneration		Mature Trees	
Local Name	Scientific Name	Local Name	Scientific Name
1. Bungalon	<i>Avicennia</i> sp.	1. Pagatpat	<i>Sonneratia</i> sp.
2. Pagatpat	<i>Sonneratia</i> sp.	2. Bungalon	<i>Avicennia</i> sp.

Barangay : Umilig (Area 2)

The second area being observed showed an overall condition of mangroves described as excellent. The area was excellent. The area was excellent in terms of average height for matured trees (5.05m); crown cover for mature trees (76%); and regenerated per m² (10). On the other hand, heavy disturbances were observed in terms of garbage found in the trees and cutting of the mangroves observed

Table 11. Assessment of the mangrove condition in Umilig area 2

Particular	Rating/Data	Description
Average height for mature trees	5.05 m	Excellent
Percent crown cover for mature trees	76%	Excellent
Mangrove Regeneration per M ²	10	Excellent
Disturbances		
Garbage	33	Heavy disturbances
Cuttings	26	Heavy disturbances
Overall Conditions	3 parameters rated as "excellent"	Excellent

The species of regenerated mangroves present in the second area being observed were Bungaln (*Avicennia Marina*); Bakhawan babae (*Rhizophora* sp.); Bakhawan lalaki (*Rhizophora* sp.) and Pagatpat (*Sonneratia* sp.). As to the matured trees bakhaw (*Rhizophora* sp.) added the group.

Table 12. Mangrove species found in Umilig area 2.

Regeneration		Mature Trees	
Local Name	Scientific Name	Local Name	Scientific Name
1. Bungalon	<i>Avicennia</i> sp.	1. Pagatpat	<i>Sonneratia</i> sp.
2. Bakhawan babae	<i>Rhizophora</i> sp.	2. Bakhaw	<i>Rhizophora</i> sp.
3. Bakhawan lalaki	<i>Rhizophora</i> sp.	3. Bungalon	<i>Avicennia</i> sp.
4. Pagatpat	<i>Sonneratia</i> sp.	4. Bakhawan babae	<i>Rhizophora</i> sp.
		5. Bakhawan lalaki	<i>Rhizophora</i> sp.

Barangay : Avila

The third coastal barangay was Barangay Avila which is just next and adjacent to barangay Umilig. The overall mangrove condition was "fair". The only parameter having a condition described as excellent was the average height for matured trees (5.25m). The percent crown cover for matured trees was 57% described as fair. In terms of disturbances, the area was slightly disturbed with the presence of garbage, the area was slightly disturbed with the presence of garbage and was moderately disturbed by the observed cuttings, both in the regenerated and matured mangroves.

Table 13. Assessment of the mangrove condition in Avila

Particular	Rating/Data	Description
Average height for mature trees	5.25 m	Excellent
Percent crown cover for mature trees	57%	good
Mangrove Regeneration per M2	1.49	Fair
Disturbances		
Garbage	15	Slight disturbances
Cuttings	12	Moderate disturbances
Overall Conditions	1 parameter rated as "excellent"	Fair

The species of mangrove present in the barangay Avila were bakhaw, bungalon, bakhaw babae bakhaw lalaki, and pagatpat. Only bakhaw was not part of the matured trees.

Table 14. Mangrove Species found in Avila

Regeneration		Mature Trees	
Local Name	Scientific Name	Local Name	Scientific Name
1. Bakhaw	Rhizophoea sp.	1. Pagatpat	Sonneratia sp.
2. Bungalón	Avicennia sp.	2. Bungalón	Avicennia sp.
3. Bakhawan babae	Rhizophoea sp.	3. Bakhawan babae	Rhizophoea sp.
4. Bakhawan lalaki	Rhizophoea sp.	4. Bakhawan lalaki	Rhizophoea sp.
5. Pagatpat	Sonneratia sp.		



Figure 1. Pictures during the data gathering

Barangay: East Valencia

The overall condition for the mangroves in Pagatpat, a portion in Barangay East Valencia, was good. The parameters on average height for mature trees and crown cover obtained a rating of 8.43m and 143% respectively described as excellent. The mangrove regeneration was poor (0.47) and the area was moderately disturbed by garbage and was heavily disturbed in terms of cuttings.

Table 15. Assessment of the mangrove condition in East Valencia

Particular	Rating/Data	Description
Average height for mature trees	8.43 m	Excellent
Percent crown cover for mature trees	143%	Excellent
Mangrove Regeneration per M ²	0.47	Poor
Disturbances		
Garbage	17	Moderate disturbances
Cuttings	22	Heavy disturbances
Overall Conditions	2 parameters rated as "excellent"	Good

Just like in some other areas being observed, the species present in regenerated mangroves were bakhaw, bungalón, bakhaw lalaki, bakhaw babae while for matured mangroves, the species found were pagatpat, bungalón, and bakhaw babae.

Table 15. List of mangrove species found in East Valencia

Regeneration		Mature Trees	
Local Name	Scientific Name	Local Name	Scientific Name
1. Bakhaw	<i>Rhizophora sp.</i>	1. Pagatpat	<i>Sonneratia sp.</i>
2. Bangalon	<i>Avicennia sp.</i>	2. Bangalon	<i>Avicennia sp.</i>
3. Bakhawan babae	<i>Rhizophora sp.</i>	3. Bakhawan babae	<i>Rhizophora sp.</i>
4. Bakhawanlalaki	<i>Rhizophora sp.</i>		

Barangay: East Valencia (Mampay)

Mampay has an overall mangrove condition of fair. The Average height for mature trees was 6.34m described as excellent as excellent, the present crown cover was good (59%) and the regeneration per m² was poor (0.42). As to the disturbances, the area was moderately disturbed by garbage and while cutting of trees were described as heavily disturbed

Table 16. Assessment of the mangrove condition in Mampay (East Valencia)

Particular	Rating/Data	Description
Average height for mature trees	6.34 m	Excellent
Percent crown cover for mature trees	59%	Good
Mangrove Regeneration per M ²	0.42	Poor
Disturbances		
Garbage	19	Moderate disturbances
Cuttings	24	Heavy disturbances
Overall Conditions	1 parameter rated as "excellent"	Fair

The species present there are just the same as with the species present in pagatpat in terms of regeneration and matured trees.

Table 17. List of Mangrove species found in Mampay, East Valencia

Regeneration		Mature Trees	
Local Name	Scientific Name	Local Name	Scientific Name
1. Pagatpat	<i>Sonneratia sp.</i>	1. Pagatpat	<i>Sonneratia sp.</i>
2. Bangalon	<i>Avicennia sp.</i>	2. Bangalon	<i>Avicennia sp.</i>
3. Bakhawan babae	<i>Rhizophora sp.</i>	3. Bakhawan babae	<i>Rhizophora sp.</i>
4. Bakhawan lalaki	<i>Rhizophora sp.</i>		

Barangay: Taminla

The overall condition for the mangroves present in the observed areas in Taminla was good. The area has an excellent condition in terms of the average height for mature trees (5.35m) and in terms of regeneration per m² (5.2). The area was good in terms of crown cover for mature trees (70%). As to the disturbances present, the area exhibited moderate disturbances.

Table 18. Assessment of the mangrove condition in Taminla

Particular	Rating/Data	Description
Average height for mature trees	5.35 m	Excellent
Percent crown cover for mature trees	70%	Good
Mangrove Regeneration per M ²	5.2	Excellent
Disturbances		
Garbage	17	Moderate disturbances
Cuttings	19	Moderate disturbances
Overall Conditions	2 parameters rated as "excellent"	Good

As to the areas, almost the same species of mangrove can be found in Taminla as presented in Table 19.

Table 19. of Mangrove Species present:

Regeneration		Mature Trees	
Local Name	Scientific Name	Local Name	Scientific Name
1. Bakhaw	<i>Rhizophora sp.</i>	1. Pagatpat	<i>Sonneratia sp.</i>
2. Bangalon	<i>Avicennia sp.</i>	2. Bakhaw	<i>Rhizophora sp.</i>
3. Bakhawan babae	<i>Rhizophora sp.</i>	3. Bangalon	<i>Avicennia sp.</i>
4. Bakhawan lalaki	<i>Rhizophora sp.</i>	4. Bakhawan babae	<i>Rhizophora sp.</i>
		5. Bakhawan lalaki	<i>Rhizophora sp.</i>
		6. Tabigi	<i>Xylocarpus sp.</i>
		7. Baras baras	-----

Barangay : Montpiller

The overall conditions of mangroves in the observed areas in brgy Montpiller was good. The area has an excellent condition in terms of the average height of mature trees (5.82m) and in terms of regeneration per m² (1.78). The area was excellent in terms of crown cover for mature trees (70%). As to the disturbances present, the area exhibited moderate disturbances.

Table 20. Assessment of the mangrove condition in Montpiller

Particular	Rating/Data	Description
Average height for mature trees	5.82m	Excellent
Percent crown cover for mature trees	68%	Good
Mangrove Regeneration per M ²	1.78	Excellent
Disturbances		
Garbage	23	Moderate disturbances
Cuttings	20	Moderate disturbances
Overall Conditions		Good

On top of the five common species found in the previous areas in Buenavista, Guimaras, other species such as Nipa, baras-baras and tawalis were found to be thriving in the mangrove area along the coast of Brgy. Montpiller showed more variation. It simply shows that the condition of the area is suitable for these additional mangrove species.

Table 21. List of mangrove species found in Montpiller

Regeneration		Mature Trees	
Local Name	Scientific Name	Local Name	Scientific Name
1. Bakhaw	<i>Rhizophora sp.</i>	1. Pagatpat	<i>Sonneratia sp.</i>
2. Bungalon	<i>Avicennia sp.</i>	2. Bakhaw	<i>Rhizophora sp.</i>
3. Bakhawan babae	<i>Rhizophora sp.</i>	3. Bungalon	<i>Avicennia sp.</i>
4. Bakhawan lalaki	<i>Rhizophora sp.</i>	4. Bakhawan babae	<i>Rhizophora sp.</i>
5. Baras baras	<i>Ceriops sp.</i>	5. Bakhawan lalaki	<i>Rhizophora sp.</i>
		6. nipa	<i>Nypa sp.</i>
		7. tawalis	<i>Orbomia sp.</i>



CONCLUSIONS

Based on the results of the study, the following conclusions are made:

1. The mangrove species in the 6 sampling areas are the same and only two areas showed higher species diversity when compared to the rest of the area;
2. The average height of mangroves in each area for matured trees showed excellent rating;
3. Only 50% of the areas evaluated have excellent forest cover and the rest have good forest cover only.
4. The overall regeneration across areas is excellent.
5. Getulio got high disturbance for both the presence of garbage and cutting of mangrove trees.

RECOMMENDATIONS

Based on the aforementioned conclusions, the following recommendations were made:

1. The mangrove resources in Buenavista will be continually monitored for its status/condition in order to maintain its good condition. The values of the people in the different localities and other man-made activities pose as a threat to the maintenance of the good condition of the trees;
2. Areas with excellent regeneration must be acted upon by the people in the community by protecting the saplings/seedlings by making some barriers against tidal action and garbage strangulation.
3. Coastal clean-up drive will be done periodically in the different localities to avoid strangulation of the saplings/seedlings from the garbage;
4. Continuous education campaign among the localities will be done to educate people that mangroves are important in the fish life cycle and for the protection of the coastal areas against climate change.
5. Community police must be established in order to apprehend illegal loggers cutting matured mangrove trees.
6. A follow-up study for the other four municipalities in the province is done in order that LGUs will have data on the status of their mangrove resources.

REFERENCES

Alcala, A.C. 1986. Philippine Land Vertebrates. Manila: New Day Publishers.

Alcala, A.C. 2001. Nature is not free pp. 49-50. In: Science, Conservation, and Development in the Philippine Setting: A collection of articles on the environment. Dumaguete City: Silliman University – Angelo King Center for Research and Environmental Management.

Alcala, A. C. 2004. Biodiversity research in the Philippines from 1998 – 2003. ASEAN Biodiversity 26 – 31. Available at: http://www.aseanbiodiversity.org/pdf/magazines/volno4/asean_biodiversity Retrieved: May 25 2008.

Allen, D. 2006. New records and other observations of birds on the island of Tablas, Romblon province, Philippines. Forktail 22: 77 – 84.

Allen, D., C. Espanola, G. Broad, C. Oliveros, and J. C. T. Gonzales. 2006. New bird records for the Babuyan islands, Philippines, including two first records for the Philippines. Forktail 22: 57–70.

Asian Development Bank. 2005. Country environmental analysis for the Republic of the Philippines. Available at: www.adb.org/Documents/Reports/CEA/phi-jan-2005.pdf. Retrieved: May 23, 2008.

Avillanosa, Arlene L. 2005. Biomass analysis of catch data in central Philippine waters for the period 1978-1987. M.S. thesis, College of Fisheries and Ocean Sciences, University of the Philippines in the Visayas, Miag-ao, Iloilo. 126 leaves.

Broad, G., Oliveros, C. 2004. Biodiversity and conservation priority setting in the Babuyan Islands, Philippines. Sylvatrop, The Technical Journal of Philippine Ecosystems and Natural Resources 15 (1&2): 1-30

Brooks, T.M., T.D. Evans, G.C. Dutson, G.Q.A. Anderson, D.C. Asane, R.J. Timmins and A.G. Toledo. 1992. The conservation status of the birds of Negros, Philippines. Bird Conservation International 2: 273-302.



- Brown, R. M., and A. C. Diesmos. 2009. Philippines, Biology. Pp. 723–732 In Gillespie, R., and D. Clague (eds.). *Encyclopedia of Islands*. University of California Press, Berkeley.
- Brown W.C. and A.C. Alcala. 1970. The zoogeography of the herpetofauna of the Philippine Islands, a fringing archipelago. *Proceedings of the California Academy of Sciences* 38(6): 105–130.
- Brown, W.C., and A.C. Alcala. 1978. *Philippine Lizards of the Family Gekkonidae*. Silliman University Natural Science Monograph Series No. 1. Dumaguete City, Philippines: Silliman University Press: 131 pp.
- Brown, W.C., and A.C. Alcala. 1986. Comparison of the herpetofauna species richness on Negros and Cebu Islands, Philippines. *Silliman Journal* 33(1-4): 74-86.
- Canencia, O. P., C. R. M. Lituañas and V. V. Ansigbat. 2007. Urban biodiversity and water plankton analysis in Cagayan de Oro City, Philippines. In: Amoroso, Victor B. (ed.) *Proceedings of the 2nd symposium on long-term ecological and biodiversity research in the East Asia Region*. Central Mindanao University, Musuan, Bukidnon.
- Cariño, A.B. 2004. Studies of fruit bats on Negros Island, Philippines. *Silliman Journal* 45: 137-157.
- Chace, F.A., Jr. and A.J. Bruce. 1993. *The Caridean Shrimps (Crustacea: Decapoda) of the Albatross Philippine Expedition 1907-1910. Part 6: Superfamily Palaemonoidea*, Smithsonian Institution Press, Will behington, D.C., U.S.A.
- Department of Environment and Natural Resources. Revised Effluent Regulations of 1990, Revising and Amending the Effluent Regulations of 1982.
- Ebreo, M.F. 1993. Biology of purple heron (*Ardeaperporeamanillensis*) and the preservation of Samponong Bolo (Sara, Iloilo Province, Philippines) as its sanctuary. *Asia Life Sciences* 2 (2): 149 – 162.
- Environmental Management Bureau. 2006. National water quality status report 2001 to 2005.
- Goodman, S. M., D.E. Willard, and P.C. Gonzales. 1995. The birds of Sibuyan Island, Romblon province, Philippines, with particular reference to elevational distribution and biogeographic affinities. *Fieldiana Zool.* 82: 1–57.
- Greenpeace Southeast Asia. 2007. *The state of water resources in the Philippines*. Quezon City: Greenpeace Southeast Asia.
- Haribon Foundation. 1989. The Philippines. Pp. 921–928. In: D. A. Scott (ed.) *A directory of Asian wetlands*. Gland, Switzerland: IUCN.
- Heaney, C.D., Sams, E., Wing, S., Marshall, S., Brenner, K. Dufour, A. P. and Wade, T. 2009. Contact with beach sand among beachgoers and risk of illness. *Am. J. Epidemiol.* 170(2): 164-172.
- Heaney, L.R. and Collaborators. 1997. *A Synopsis of the Mammalian Fauna of the Philippine Islands*. Fieldiana Zoology. Field Museum of Natural History. Series number 88. 61p.
- Heaney, L. R., P. D. Heideman, E. A. Rickart, R. C. Uzzurum, and J. S. H. Klompen. 1989. Elevational zonation of mammals in the central Philippines. *Journal of Tropical Ecology*, 5: 259-280.
- Heaney, L. R. and J.C. Regalado, Jr. 1998. *Vanishing Treasures of the Philippine Rain Forest*, The Field Museum, Chicago.
- Herre, A.W.C.T. 1953. Checklist of Philippine fishes. *Res. Rep. U.S. Fish Wild. Serv.*, (20): 977 p.
- Herre, A.W. C. T., and M. Boeseman. 1956. Marine fishes in fresh water. *Science* 8(123): 1035-1036.
- Inger, R.F. 1954. Systematics and zoogeography of Philippine Amphibia. *Fieldiana Zoology* 33: 181-531.
- Ingle, N.R. and L.R. Heaney. 1992. *A Key to the Bats of the Philippine Islands*. Fieldiana Zoology. Field Museum of Natural History. Series number 69. 44 p.



- Kennedy, R.S., P.C. Gonzales, E.C. Dickinson, H.C. Miranda, Jr., and T.H. Fisher. 2000. A Guide to the Birds of the Philippines. Oxford University Press. 369 p.
- Kepler, C.B. and J.M. Scott. 1985. Conservation of island ecosystems. In: Moors, P.J. ed. Conservation of island birds: case studies for the management of threatened island species, pp. 255-271. ICBP Tech. Publ. No. 3. Cambridge, International Council for Bird Preservation, United Kingdom.
- Kinzelman, J., Ng, C., Jackson, E., Gradus, S. and Bagley, R. 2003. Enterococci as indicators of lake Michigan recreational water quality: comparison of two methodologies and their impacts on public health regulatory events. *Applied and Env. Microbiol.* 69(1): 92-96.
- McGregor, R.C. 1909-1910. A manual of Philippine birds. Manila. Beureau of Printing.
- Madulid, D.A. 2001. A dictionary of Philippine plant names Vol. 2. Bookmark Inc., Makati City. 153p.
- Magsalay, P.M., R.P. Rigor, H.I. Gonzales and A.M. Mapalo. 1989. Survey of Olango Island, the Philippines with Recommendations for nature conservation. Asian Wetland Beureau Philippines Foundations Inc., Cebu City.
- Magsalay, P.M. and R. S. Kennedy. 2000. First record of Eurasian Oystercatcher *Haematopus ostralegus* from the Philippines. *Forktail* 16: 175-176.
- Ng, P. R. L. 1992. On some freshwater crabs (Crustacea: Brachyura: Potamidae, Parathelphusidae, and Grapsidae) from Peninsular Malaysia. *Bull. Natn. Sci. Mus., Tokyo, Ser. A.* 18 (3):103116.
- Ng, P. R. L. and B. Sket. 1996. The freshwater crab fauna (Crustacea: Decapoda: Brachyura) of the Philippines, IV. On a Collection of Parathelphusidae from Bohol. *Proceedings of the Biological Society of Will behington* 109(4):695-706.
- Noakes, P. 2009. Philippine Birding Trip. April 17 to may 16 2009. Unpublished manuscript.travellingbirder.com/tripreports/...?id=10721 (June 17, 2010)
- Nuytemans, H. 2008. Notes on Philippine birds: interesting records from northern Luzon and Batan Island. *Forktail* 14: 29 – 32.
- Oliveros, C., G. Broad, C. Española, M. Pedregosa, M.A. Reyes, H.J. Garcia, J.C. Gonzales, A. Bajarias, Jr. 2004. An Avifaunal Survey of the Babuyan Islands, Northern Philippines with Notes on Mammals, Reptiles, and Amphibians. Final Report. Manila
- Ong, P. S., L. E. Afuang and R. G. Rosell – Ambal (eds.). 2002. Philippine Biodiversity Conservation Priorities: A Second Iteration of the National Biodiversity Strategy and Action Plan. DENR – PAWB, Conservation International Philippines, Biodiversity Conservation Program UP Center for Integrative and Development Studies and Foundation for the Philippine Environment, Quezon City.
- Peterson, A. T., L. G. Ball, and K. W. Brady. 2000. Distribution of the birds of the Philippines: biogeography and conservation priorities. *Bird Conservation International* (2000) 10:149–167.
- Philippines Environment Monitor. 2003. Water resources, quality, and availability.
- Roxas, H.A. and A.G. Agco. 1941. A review of Philippine Carangidae. *Philippine Journal of Science* 74(1): 1-82.
- Stattersfield, A.J., M.J. Crosby, A.J. Long, and D.C. Wege. 1998. Endemic Bird Areas of the World: Priorities for Biodiversity Conservation. *BirdLifeConservation Series No.7.* Cambridge.
- Tello, J. G., J. F. Degner, J. M. Bates, and D. E. Willard. 2006. A new species of Hanging-Parrot (*Loriculus*) from Camiguin Island, Philippines, pp. 58-72. In Heaney, L. R., ed., *The Mammals and Birds of Camiguin Island, Philippines, a Distinctive Center of Biodiversity.* *Fieldiana Zoology, n.s.*, 106:1-72.
- US EPA. Updated Feb. 23, 2010. <http://water.epa.gov/type/oceb/beaches/basicinfo.cfm>.
- Van Weerd, M. and J.V. Der Ploeg. 2004. Surveys of wetlands and waterbirds in Cagayan Valley, Luzon, Philippines. *Forktail* 20: 33-39.
- Participatory CoastalResource Assessment Training Guide, 2004