

**POPULATION STATUS AND ENCOUNTER RATES OF WEST AFRICAN MANATEE
(*Trichechus senegalensis*) IN PANDAM WILDLIFE PARK, PLATEAU STATE,
NIGERIA**

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Abstract

Effective conservation measures for West African manatee in Nigeria have been very slow in progression. This study provides information on the conservation status of West African manatee through the determination of the abundance, seasonal movement and encounter rate of manatee in Pandam Lake. The visual non-motorized boat point scan survey was adopted for this study. Six transect lines were established. Two lines run along the shores/banks of the Lake, Gurugun (GU), and Zuzurfa (ZU); one line each at the main Lake (ML) and manatee stream (MS). Point scans were conducted on each transect line one day per week and thrice daily (6-10am, 11-3pm,4-7pm) 3months each, both in the rainy and dry seasons for two years (2011-2012). Population estimation was done using outer-bound method. Manatees were sighted 21 times through both direct (5 times) (23.81%) and indirect (16 times) (76.19%) means. Eighteen (85.71%) of the sightings were recorded in the dry season with a probability of 0.15 and 3 (14.29%) recorded in the wet season with a probability of 0.02. Manatees were mostly sighted in a group of 2-4 individuals sighting of one manatee is rare. The population estimate is 5 individuals. All the direct sighting of manatees occurred between 18-20hr, while the indirect sightings varied. Manatees were encountered 6 times (10%) and 15 times (25%) in the year 2011 and 2012 respectively with probability values of 0.25 and 0.1 respectively. The daily probability of encountering manatee varies from 0.0 to 0.52. The park should be taken over by the Federal government and there should be collaborative management of natural resources through a participatory approach with the local communities.

Key Words: *Conservation status, African Manatee, Abundance and Distribution, Collaborative management*

Introduction

West African manatees (*Trichechus senegalensis*) belong to the Order

sirenian, an ancient and diverse group of aquatic mammals dating back over 50 million years. However, there are four

species in two families remaining today. The family Trichechidae includes the West African (*T. senegalensis*), West Indian (*T. manatus*) and Amazonian (*T. inungus*) manatees. The family Dugongidae includes the indo-pacific dugong (*Dugong dugong*) and recently extirpated (1768) Steller's sea cow (*Hydrodamalis gigas*) (Self-Sullivan 2005). The four extant sirenians are large herbivorous marine mammals (Hershkovitz, 1969) and totally aquatic mammals that fill a unique ecological niche in tropical lakes, rivers and coastal regions around the world (Reeves *et al.*, 1988). Unfortunately, all four sirenian species are endangered (threatened with extinction) despite their protected status under local and international laws.

The West African manatee populations are widely distributed along the coastal regions, rivers, estuaries and lagoons from Southern Mauritania to Southern Angola and as far inland as 2,000km, often trapped above dams (Powell, 1996). In Nigeria many authors have reported the occurrence of West African manatee (*T. senegalensis*) in Rivers Niger and Benue and in most of the larger and smaller Rivers as well as in coastal areas, lagoons and lakes from South Western to South Eastern Nigeria (Happold, 1987; Powell, 1996; Ita, 2005).

Studying the aquatic fauna of estuaries, lagoons, and turbid lakes and rivers is challenging because of the difficulty of observing animals in murky and muddy waters (Gonzalez-Socoloske *et al.*, 2009). Mildly social, cryptic species, such as manatees, which use these waterways throughout most of their range, are particularly difficult to study because they spend large amounts of time below the surface where they cannot be

visually detected (Gonzalez *et al.*, 2009). When they do come at the surface to breathe, they often only briefly expose the tip of their snout. In addition, in areas with traditionally high hunting pressure, manatees may avoid human presence or may exhibit greater nocturnal activity (Gonzalez *et al.*, 2009). It is then challenging to design a survey technique that would go beyond the elusiveness of the species and at same time, be cost and time efficient.

Most West African manatee populations are thought to be small, fragmented, and in continuous decline, making the species vulnerable to extinction under IUCN Red list criteria A4cd and C1 (Powell and Akoi, 2006). Data are extremely limited with little new information since the last IUCN assessment in 1996. It appears that illegal manatee hunting and habitat loss continues to increase throughout the species range at high rates due to human poverty levels, lack of awareness, and limited law enforcement by local authorities.

Among the specially protected animals in Nigeria is the West African manatee, yet there is no known protected area or water body set aside for the conservation of this animal. Today, limited lakes has been legalized for cultural festivals, but illegal hunting of manatee for their meat, fat and medicinal values has reduced their numbers such that they have become rare in comparison with some years ago (Happold, 1987; Ita, 2005).

At the Regional level it has been recommended that the range countries should; conduct a more detailed survey of the West African manatee to review the current status of its abundance,

occurrence, distribution and habitat conditions; develop a conservation management programme for the species, which should incorporate community based programs such as ecotourism (UNEP/CMS, 2005). Nigeria was represented in the drawing of the regional action plan for the conservation of West African manatee and has since signed the agreement. However, effective conservation measures for the species in Nigeria have been very slow in progression as little/scanty information is available on manatee status, and ecology. Only few studies have been carried out on manatees in Nigeria, so there is very little information specific to Nigeria. Moreover, some of the existing information is outdated and needs to be reassessed. These large gaps in the knowledge of the West African manatee heightens the difficulties in determining the appropriate ecological status of the species (Dodman *et al.*, 2008), its current distribution area, and particularly its status in Nigeria. Consequently, the development and the implementation of a conservation strategy which will be at the same time efficient and sustainable are very difficult. It is important to understand seasonal movement of manatees in order to determine where and when more conservation efforts and more surveillance have to be implemented for better protection of the species. Additionally, an understanding of daily movement can provide a means for designing a strategic ecotourism plan in Pandam Lake. This study therefore

provides information on the conservation status of West African manatee in Pandam Wildlife Park through the determination of the abundance and seasonal distribution/movement of manatee in the study area.

Methodology

Study Area

The study was carried out in Pandam Wildlife Park, Plateaus State located in the middle belt region of Nigeria (Figure 1). It lies between Latitude 8° 35' N and longitude 8° 55' N and latitude 8°00' E and longitude 10°00' E. It covers an area of 224 km² and is located 58km along the Lafia-Shendam road to the north of Benue River (Ezealor, 2002) and south of Plateau state (Akosim *et al.*, 2007) in Quanpan local government area. It is bounded on the East by Namu and Kuagarda, on the west and north by Dep River and in the South by Aningo and Pandam communities (Akosim *et al.*, 2007). The entire area is drained by Dep and Li Rivers and joins to make a Y-shape before emptying into Benue River. The land slopes gradually south wards and form a basin – “Pandam lake” – wetland complex of approximately 22km (Figure 1). The entire park lies within the guinea savannah eco-zone. Thus the vegetation of the park is typical Sudan-Guinea savannah with gallery forest in riparian areas. Pandam Wildlife Park is managed by the Plateau state Tourism Corporation. The wet season lasts from April to October and annual rainfall is 1,000 – 1,500 mm.

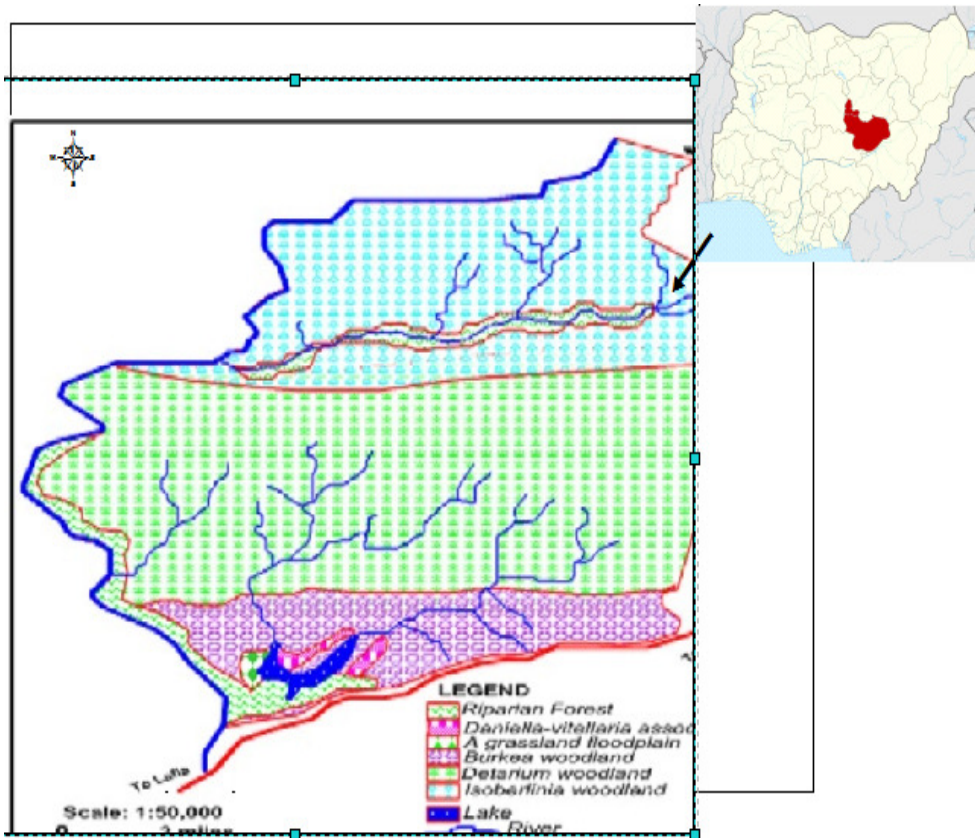


Figure 1: Map of Pandam Wildlife Park showing the location of Pandam Lake

Method

Determination of the Abundance and Seasonal Distribution of Manatee

The visual non-motorized boat point scan survey (La Commare *et al.*, 2008; Self-Sullivan, 2008; Bacchus *et al.*, 2009) was chosen for this study. Six transect lines were established. Two lines run along the shores/ bank on each of the two arms of the Lake, Gurugun (GU), and Zuzurfa (ZU); one line each at the main Lake (ML) and the third arm of the Lake, manatee stream (MS). During each sample period, the boat was tied in position using the pole, and an area with radius of 50 m around the survey boat was scanned for 30-minutes to determine whether manatee were present or not and another 30 to 60 minutes were use to look

for indirect signs of manatee presence, such as faeces (dung) and grazed vegetation, to observe the behavior of a manatee if sighted, and to collect environmental variables within the habitat.

Point scans were conducted on each transect line one day per week and thrice daily (morning between 6-10am, 11-3pm afternoon and evening between 4-7pm). This was done 3 months each, both in the rainy and dry seasons (July- September and January-March) respectively. Sampling order for each site was randomized, as period and site were both chosen randomly. For each sighting, the distance between the point where the manatee was sighted and the survey boat was visually estimated. If present, the

total number of manatees detected and the time of detection were recorded. These data were used to calculate the frequency of encountering manatees (i.e., total manatees/total scans).

Population estimation was done using outer-bound method:

$N = 2nk - nk - 1$ where

N = population estimate,

nk = highest number

$nk-1$ = next highest value/ number

Statistical Analysis

Data obtained were analysed both by descriptive (Tables, bar and pie charts) and inferential statistics. Significant difference in the seasonal probability of sighting manatee was tested using t-test while the probability of sighting manatee at each of the four locations was tested using One-way ANOVA.

Results

Frequency of Sighting Manatee

The result of the frequency of sighting manatee presented in figure 2 showed that manatees were sighted 21 times through both direct (5 times) (23.81%) and indirect (16 times) (76.19%) means. The probability of encountering manatee directly is 0.05 while the probability of encountering indirect signs is 0.13. The indirect sightings were recorded as follows; 25% each of the sightings was obtained from grazing, trail/ sound of water and dung, 18.75% recorded for torn nets with 6.25% recorded for water bubble figure 3. There was a significant difference ($p < 0.05$) in the probability of direct and indirect sightings of manatee in Pandam Lake. Eighteen (18) (85.71%) of the sightings were recorded in the dry season with a probability of 0.15 and 3 (14.29%) sightings recorded in the wet

season with a probability of 0.02 figure 4. There was a significant difference ($p < 0.05$) in the probability of sighting manatee in the dry and wet seasons. However, in the rainy season, the animal was sighted along MS (1 time) and ZU (2 times) with no sighting in ML and GU, but manatees were sighted in MS (4 times), ZU (10) and GU (4 times) in the dry season with no sightings in ML figure 5. There was a significant difference ($p < 0.05$) in the probability of sighting manatee in the various locations in Pandam Lake. The activities of manatees when sighted and the distances to boat are presented in Table 1. The distance of manatee when sighted to boat ranged from 45m to 75m with a mean of $56.33m \pm 0.02$.

Abundance of Manatee in Pandam Lake

During the survey manatee were mostly sighted in a group of 2-4 individuals (4 times) with one sighting of one manatee. The population estimate based on outer-bound method is 5 individuals.

Period of the day when Manatees are Sighted in Pandam Lake

During the survey all the direct sighting of manatees occurred between 18-20hr, while the indirect sightings varied as follows; grazing 4 times between 18-20hr; Trail/sound of water were sighted 3 times between 18-20hr and once between 5-11hr; manatee dungs were sighted 3 times between 5-11hr and once between 11-14hr; water bubble was recorded once between 14-18hr, while torn nets were recorded between 5-11hr when fishermen were checking their nets Table 2.

Daily Probability of Encountering Manatees

The daily probability of encountering manatee during a point scan varied from 0.0 to 0.52, with no manatee sighted during any scan on 19 days (47.5%) with one or more manatee sighted in 21 days (52.5%) of the 40 days (30/10, dry/wet seasons) of scanning. There was a significant difference ($p < 0.05$) in the daily probability of sighting manatees between locations in Pandam Lake Table 3.

Yearly Probability of Encountering Manatees

The points within Pandam Lake were scanned 60 times in 2011 and 60 times in 2012. Manatees were encountered 6 times (10%) and 15 times (25%) in the year 2011 and 2012 respectively. The probability of encountering manatees in 2012 is higher than the probability of encountering manatee in 2011 with values of 0.25 and 0.1 respectively Fig. 6.

Discussion

The result obtained on the number of manatee mostly sighted both from the field survey and questionnaire revealed that manatee in Pandam Lake are not mostly moving alone, though there has been reported sighting of only one manatee. This may be as a result of the size of the Lake. This agrees with the findings of Aristide (2011), who recorded highest sightings of 3-4 manatees in Lake Ossa, Cameroon and Akoi, (2004) who reported that manatees live in a group of 2-3 individuals, sometime five and even more in Cote De Ivoires. The low probability of sighting manatee in Pandam Lake may be due in part to the clarity of the water, the slow movement habit of the animal or the fishing pressure

in the area. However, it is still between the probability obtained by Self- Sullivan (2008) in Belize who recorded that During 333 dry-season scans, manatees were detected 119 times 38 for a probability of 0.36; during 396 wet-season scans, manatees were detected 151 times for a probability of 0.38. This also support the statement by Gonzalez-Socoloske (2009) that studying the aquatic fauna of estuaries, lagoons, and turbid lakes and rivers is challenging because of the difficulty of observing animals in murky and muddy waters. Mildly social, cryptic species, such as manatees, which use these waterways throughout most of their range, are particularly difficult to study because they spend large amounts of time below the surface where they cannot be visually detected and when they do come at the surface to breathe, they often only briefly expose the tip of their snout. This may be the reason why the direct sighting is low in Pandam Lake. The response of manatee to human presence in that when the distance between the boat and the animal is below 50m, the animal will run away also agrees with the statement by Gonzalez-Socoloske (2009) that in areas with traditionally high hunting pressure, manatees may avoid human presence or may exhibit greater nocturnal activity. The low number of manatee recorded may be as a result of the size of the Lake, human threat (fishing and hunting) and the behavior of the animal (migratory).

Based on the findings the following is therefore recommended: The park should be taken over by the Federal government for effective protection of manatee; further study should be conducted with modern equipment to determine the actual number of manatee in Pandam

Lake; the implications of the findings should be taken into consideration by the management of Pandam Wildlife Park and should foster collaborative management of natural resources through a participatory approach with the local communities.

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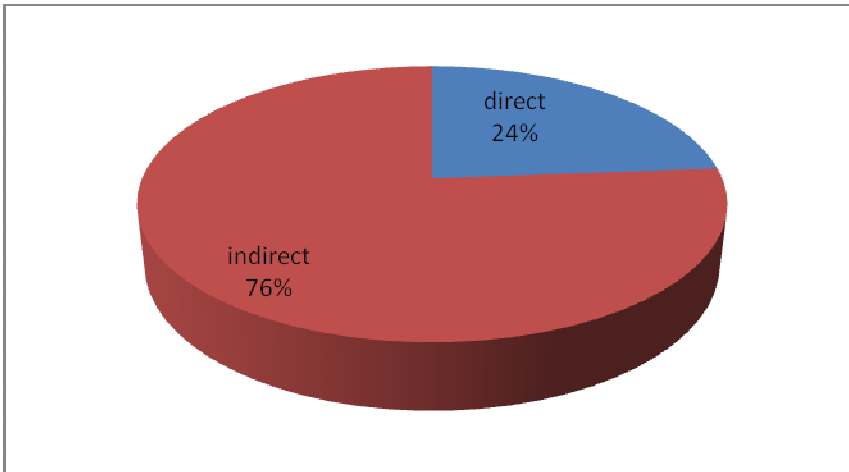


Figure 2: Percentage frequency of manatee sightings in Pandam Lake

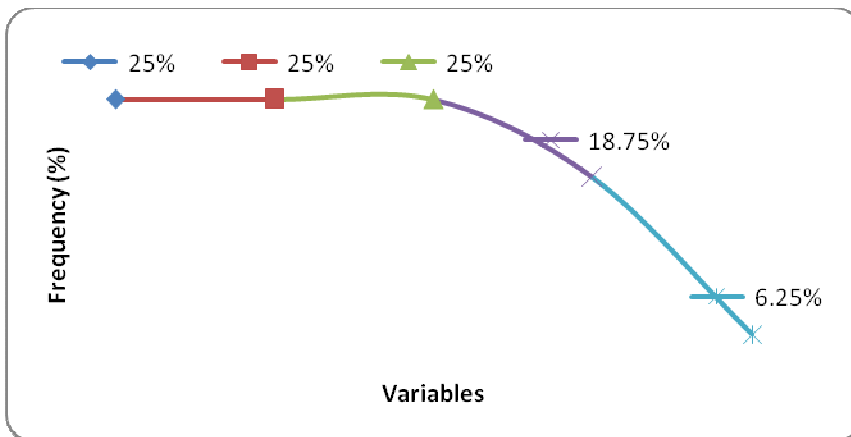


Figure 3: Percentage frequency of the indirect sightings of manatee in Pandam Lake

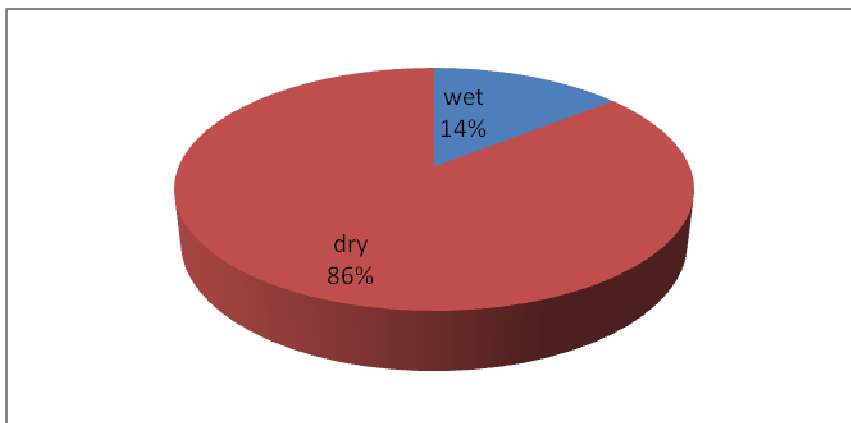


Figure 4: Percentage seasonal frequency of manatee sightings in Pandam Lake

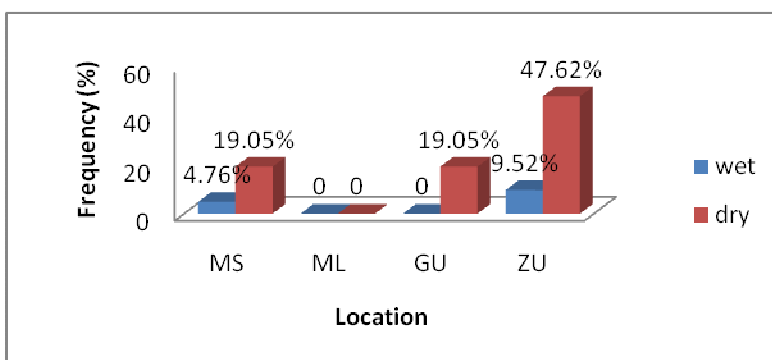


Figure 5: Percentage frequency of manatee sightings at different locations in Pandam Lake

Table 1: Activity of manatees sighted in Pandam Lake

Location	Direct	Indirect	Activity when sighted	Distance to boat (m)
MS	+	-	Moving	50
MS	+	+	Moving/Cloudy water	45
MS	+	+	Breath air/Water bubbles	53
ZU	+	-	Travelling	65
ZU	+	-	Moving	75
MS/GU	-	+	Feeding	50

Table 2: Period of the day when manatees are sighted in Pandam Lake

Period of the day	Direct sightings	Indirect sightings
5 – 11 hr	-	7
11 – 14 hr	-	1
14 – 18 hr	-	1
18 – 20 hr	5	7
Total	5	16

Table 3: Probability of encountering manatee in each of the four locations

Variables	Locations			
	MS	ML	GU	ZU
No. of points	2	2	4	4
No. of scan/survey	20	20	40	40
No. Of times Manatees were detected	5	0	4	12
Probability	0.25 ^a	0	0.1 ^b	0.3 ^a

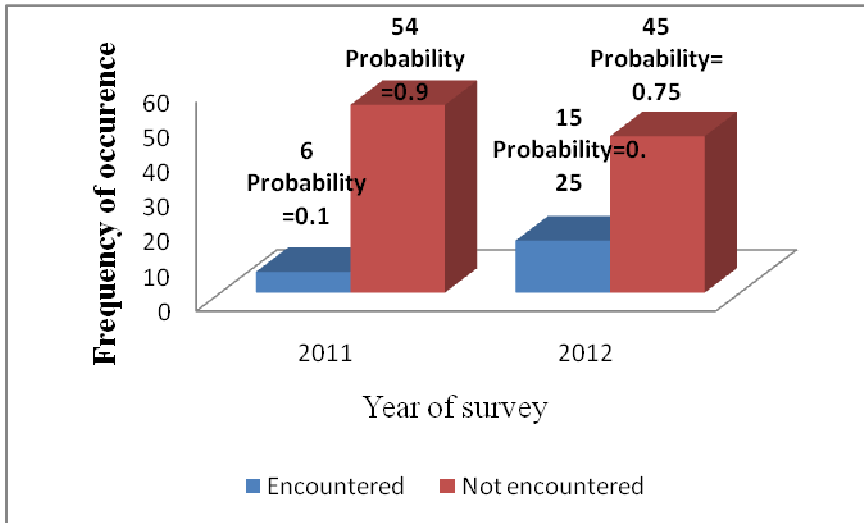


Figure 6: Yearly manatee encounter rate in Pandam Wildlife Park