

# CHAPTER FIFTEEN

## BIODIVERSITY MANAGEMENT AND CONSERVATION OF OBOT NDOM FOREST RESERVE, INI LOCAL GOVERNMENT AREA OF AKWA IBOM STATE, NIGERIA

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### **Abstract:**

The conservation of Obot Ndom was studied with the understanding that the biodiversity of forest reserve can be threatened by the communities living around. Hence the composition of the reserve for both plants and mammals was conducted using transects survey, nine plots with measurement of 25m<sup>2</sup> for each was carried out. Also, to determine the threats to the forest biodiversity, the activities that can constitute threats, were examined using structured questionnaire, interview and observation methods. A total of 96 respondents were drawn from households of the three families who donated the land for the reserve. The respondents from the community were purposively selected from amongst village head, youth leader, farmers, hunters, chiefs, forest guards and others that are direct custodians of the forest reserve. However, those selected were not below the age of 31 years. Data were collected based on the threats to biodiversity, composition of the reserve and socio-demographic of the people. Data were analysed using descriptive statistics. The major plant and animal composition and the threats identified during the study were expressed using tables. It is recommended that because of the serious degradation of the reserve indigenous trees should be planted to regenerate the reserve. Findings revealed that there are still more than 60 different species of plants and 18 species of mammals that can be found in the reserve. Also, farming among others constitute a major threat to the reserve. It is recommended that the conservation of the reserve be intensified to save what is left of it from further degradation.

### **INTRODUCTION**

Biodiversity is the greatest treasure given to mankind (Sido-Holm 2021). The most unique feature of the earth is the existence of life and the most extraordinary feature of life is in its diversity According to Hamilton (2005), biodiversity diversity is a widely used term in ecological and natural resources management. The Convention on Biological Diversity (CBD)(1992), defined biodiversity as the variability among living organisms from all sources including inter alia, terrestrial, marine and other aquatic eco-systems and the ecological complexes of which they are part, these include diversity within species, between species and ecosystems. This is perhaps the most acceptable definition for biodiversity and it is contained in the CBD of the United Nations Convention on Biodiversity (Gaston and Spicer, 2004).

More than half of the biodiversity habitable surface of the earth has been significantly

affected by human activity. Human activities have greatly reduced the biological diversity of the world in various ways: Habitat lost by altering land for agriculture, grazing livestock, draining wetland, dredging rivers, deforestation, air pollution, soil and water pollution through indiscriminate use of chemical compounds such as herbicides, pesticides and insecticides have greatly affected biodiversity (Ejeta and Bekele, 2017). Nigeria is blessed with rich ecological potentials necessary for human development and transformation but presently threatened with decline in quality and quantity at an alarming rate due to over exploitation and misuse. Biodiversity is seriously under the threat of extinction from climate change, economic development, land use changes for agriculture, invasive species, pollution, deforestation, hunting, road and residential constructions, (Anwadike, 2020). Furthermore, Jacob *et al* (2013) opined that there is a prediction that an unabated continuation of the tropical forest destruction will result in the loss of about three-quarter of original forest cover by the turn of the next century.

Habitat destruction also termed habitat loss and habitat reduction is the process by which a natural habitat becomes incapable of supporting its native species. The biodiversity that previously inhabited the site are displaced or dead thereby reducing species abundance. Habitat destruction is the predominant factor leading to biodiversity loss in the anthropocene (Chase *et al*, 2020). According to Ukpong (2020), habitat destruction occurs when there is increased encroachment into wild areas by human activities in the form of road construction and extraction of resources. Despite the enormous value and benefits from biodiversity, the threats to species and the ecosystems are increasing at an alarming rate and almost all threats are as a result of the mismanagement of the ecological biodiversity by human beings. As human population increases so does the pressure on the ecosystems.

Various concerns are raised by environmental advocates and agencies with regards to the threats posed on many of the world's ecosystems. According to the International Union for the Conservation of Nature (IUCN, 2021) there are more than 134,400 species on the IUCN Red List with more than 37,000 species threatened with extinction including 41% amphibians, 34% of conifer, 33% of reef building corals, 26% of animals and 14% of birds. Many biologists think we are currently going through the 6th mass extinction in history. The decline of biodiversity is one of the most urgent problems facing humanity (IUCN, 2021).

Global targets have been set by the Convention on Biological Diversity (CBD) to significantly reduce the current pace of biodiversity loss (Goethem and Zanden, 2021). The United Nations Development Programmes (UNDP), United Nations Environmental Programme (UNEP), Global Environmental Facility (GEF) and Biodiversity Support Programme (BPSP), to mention but a few, have a mandate to provide assistance to nations on biodiversity planning as they develop and implement their national strategies, plans programmes and policies (Diaz, 2002).

Hope for halting and reversing the ongoing global biodiversity crisis is largely pinned on protected areas (Cazalis *et al* 2020). Forest reserve is defined as any geographical space that is recognised as protected area, dedicated and managed to achieve long term conservation of nature, they are expected to buffer ecosystem and species population against some of the most destructive impacts of human activities, particularly those of habitat loss or degradation and over-exploitation of wildlife. Forest Reserve refers to forest that has been accorded a certain level of protection against unauthorised usage by individuals and group of people. Such reserves are usually protected under the laws of the particular country where they are located. In the colonial days many parts of Nigeria were protected and designated as forest reserves. Also, before the coming of the colonial masters, indigenous people had areas that were preserved and protected (Imasuen *et al* 2013). Forest reserves have numerous advantages ranging from economic to ecological in various areas of the globe. Recently, there have been increased anthropogenic activities in the forest reserves for subsistence, commercial and ecological purposes (Ngwembe *et al*, 2022). Among the protected areas created and gazetted in Nigeria is the Forest Reserve Obot Ndom.

Akwa Ibom State belongs to the tropical rainforest and its original form is made up of forests that are rich in floristic composition ranging from trees, shrubs, climbers and herbs. This gives rise to stratification of the forest, whereby plant lifeforms are arranged in layers. The stratification includes the upper layer, the middle layer and the understorey (Etuket *et al*, 2020). Adewumiet *et al*, (2022) found 17 mammal species in Ini Local Government Area. However, most of the forests have been replaced by secondary forests due to the human interference. The biodiversity of both flora and fauna are very important for human wellbeing especially in the rural communities and needs to be sustainably conserved for optimum production. Hence, the study examined the distribution and threats to Obot Ndom Forest Reserve. The main objective of the study was to **examine the distribution of biodiversity commonly encountered in the study area and to assess the threats to biodiversity in the area with the view of sustainable management and conservation.**

Biodiversity distribution is constantly changing over different scales due to the different scales turnover of biological units across all spatial and temporal scales. The distribution of biodiversity is not uniform throughout the world but shows a rather uneven distribution throughout the world, so that species diversity decreases as we move away from the equator (Gizachew, 2021). Akwa Ibom State where Obot Ndom Forest Reserve is located, around the equator, it is a hotspot rich in both plants and animals distributed across the reserve.

Poverty remains a big threat to biodiversity conservation in the rural communities of Nigerians who reside in the rural communities which harbour a large chunk of its biodiversity. They are extremely poor, biodiversity becomes their resort. Nigeria has a high population of poor people, the official poverty rate stood at 10.5%, estimated 87 million people living on less than \$1.90 a day (Imarhiagbe and Egboduku, 2019; Ukpog, 2020). It may be difficult for the rural poor to explore alternative livelihoods; therefore, in order to ensure proper conservation of biodiversity in the reserve, the level of poverty needs to be addressed, even in the rural communities.

Population is recognised as an indirect driver of biodiversity loss, human demands for food, fresh water, medicine among others. Growing population is a major challenge to biodiversity conservation. People utilise biodiversity to take care of their basic needs and desires, as population increases, demand and exploitation of biodiversity also increase. It is becoming difficult to maintain a balance and proper use of biodiversity with growing population (Nelson *et al.*, 2021).

Illegal wildlife trade is one of the key threats to global biodiversity loss and it belongs to the categories of transnational crime posing a security challenge to law enforcement authorities globally. Trade in wildlife parts and products are mainly determined by market demand and utilisation in pharmaceuticals, foods, pets, clothing, trophies, bracelets, religious amulets and traditional chieftaincy regalia (Omifolaji and Luan, 2020). Nigeria is not only a source of wildlife products but also a major transit country for wildlife shipment. For example, the January 2021 seizure at the Apapa Port by the Nigeria Customs Service of 20 feet container containing the remains of various endangered species (Okorundu, 2021). The value of international trade on wildlife resources such as pangolin scales and elephant tusk have resulted in the increase of the list of wildlife species that are threatened with extinction from the unsustainable trade and overexploitation (Omifolaji and Luan, 2020; Okorundu, 2021).

The overexploitation of biodiversity is a common trend in Nigeria including Akwa Ibom State, as a result of poverty, poor pricing of biodiversity resources, unlimited access to biological resources, regarded communal resources, illegal wildlife poaching and trade, also the failures of government intervention programmes. Nowadays, fruits such as pear, mango, and oranges are sold wholesale on the trees to buyers who harvest them in an unsustainable manner (Phil-Eze, 2020).

As far back as 18<sup>th</sup> century many naturalists including Charles Darwin and Augustin Decandolle observed the phenomenon of non-native species. These were defined as species outside of their bioregion which can possibly threaten native ones. The father of Invasion Biology, Charles Elton defined biological invasion as ecological explosions meaning the enormous increase in number of some organisms in newly invaded ranges (Gentili, *et al.*, 2021). A combination of colonial rule, rapid economic development and increasing global trade exchanges across continents and borders have had a key role in human mediated movement of species and have led to the subsequent establishment of non-native species in new regions outside their natural range (Gentili *et al.*, 2021). Invasive species have attracted much attention because of their economic costs and because they may reduce native biodiversity. Invasive plant is said to have threatened the effectiveness of agricultural and natural systems throughout the world, because a small fraction of introduced species becomes invasive. The impacts of invasive species depend on their biological attributes, the environmental characteristics of invaded ecosystem and the biotic interactions with the receptive community (Ogbemudia, *et al.*, 2015).

One of the most commonly known causes of agricultural growth in developing countries in the last few decades is the increasing demand for food, fuel, fibre induced by growth in the size of human population (Perring and Halkos, 2015; Dudley and Alexander, 2017). More mouths to feed, means more people to farm and more land to cultivate. Specifically, where traditional land tenure and resources access regimes prevail and where credit markets are poorly developed, increasing demand for food can only be met by land clearing. Agricultural expansion at the expense of the species habitat has been an essential human survival strategy. Moreover, majority of the rural poor in developing nations still make a living from the exploitation of biodiversity mostly in agricultural systems (Perring and Halkos, (2015).

### Study Area;

The research was carried out in Obot Ndom Forest Reserve which has an area of 2.59km<sup>2</sup>, gazetted along with Stubbs Creek and OguItu forest reserves, situated in the tropical rain forest of Ini Local Government Area, Akwa Ibom State (Nelson *et al* 2018). The Local Government Area lies between latitudes 5°20' and 5°31' and longitude 7°38' and 7°53'E (Adewumiet *al* 2022). It is bounded by Ikono, Obot Akara Local Government Areas and Arochukwu in Abia State (Akwa Ibom State Government, 2012). The topography of the land is flat and undulating with some areas having very high altitudes. The mean annual temperature of the area is between 20°C and 29°C. The study area is characterised by two seasons, rainy season and dry season. The rainy season starts from February to March and lasts till the middle of November. The period marked by the little dry season and occurring four weeks in August, sometimes referred to as August Break. The dry season is always occurring between the month of November to the month of February. Annual rainfall ranges from 2000mm -3000mm. The people of Ini are predominantly peasant and cash crop farmers. The major crops produced are cocoa, rice, oil palm, cassava, cocoyam, plantain and banana (Tiku and Odo, 2012).

## MATERIALS AND METHODS

Multi-stage sampling procedure was employed for this study. First stage, Obot Ndom Forest Reserve was purposively chosen from among the three forest reserves in Akwa Ibom State (1<sup>st</sup> Stage), Stage two was the use of snowballing method to select 96 respondents from the three major families that make up Obot Ndom Community. Preference was given to the village head, youth leader, farmers, hunters, fuelwood gatherers, medicinal, non-timber gatherers and forest guards from the Forestry Division of the Ministry of Environment Akwa Ibom State and structured questionnaire was administered to the 96 respondents to gather information. Also, for the distribution of both flora and fauna, transect survey of 45m<sup>2</sup> was laid parallel to the forest entrance and five quadrats measuring 25m<sup>2</sup> was located on the transects. The data was analysed using descriptive statistics.

## RESULTS AND DISCUSSION

**Diversity and the distribution of plants in Obot Ndom Forest Reserve:** The diversity and distribution of plants species play an important role in the function and delivery of the ecosystem services. Table 1 revealed the different plants species that were identified during the study.

**Table 1; Major Plants Identified in Obot Ndom Forest Reserve**

S/No.	Botanical Name	Vernacular Name	English Name	Species Structure
1.	<i>Allanblackia floribunda</i>	UdiaEbiong		Tree
2.	<i>Brachystegia eurycoma</i>	Okung	Achi	Tree
3.	<i>Tectona grandis</i>		Teak	Tree
4.	<i>Coelocaryon preussi</i>	Uno Idim	-	Tree
5.	<i>Sacoglottis gabonensis</i>	Edat	-	Tree
6.	<i>Pentaclethra macrophylla</i>	Ukana	African oil bean	Tree
7.	<i>Diplazium sammantii</i>	NyamaIdim		Fern
8.	<i>Nauclea diderrichii</i>	Opepe	African peach	Tree
9.	<i>Napoleon avangeli</i>	EtoNduoduo ho		Shrub
10.	<i>Cola millenii</i>	EkpamfetEk po		Shrub
11.	<i>Bambusa vulgaris</i>	Nyayaha	Forest bamboo	Shrub
12.	<i>Costus afer</i>	Mbitem	Bush cane	Shrub
13.	<i>Voacanga africana</i>	Mmongeba	Milk tree	Shrub
14.	<i>Anthonotum macrophylla</i>	Nya		Tree
15.	<i>Milletia thonongii</i>	Isara		Shrub
16.	<i>Macaranga barteri</i>	Akpap	African thorn tree	Tree
17.	<i>Maesobotrya barteri</i>	Nyatet	Squirrel cherry	Tree
18.	<i>Alchornea cordifolia</i>	Mbom	Christmas bush	Shrub
19.	<i>Balphia nitida</i>	Afuo	Canewood	Shrub
20.	<i>Monodora myristica</i>	Enwun	African nutmeg	Tree



21.	<i>Coulaedulis</i>	Ekom	African walnut	Tree
22.	<i>Boerhaviaerecta</i>	Okponkoron	Hogweed	Shrub
23.	<i>Monodoraspp</i>	Enwun	Afrciannutgmeg	Tree
24.	<i>Xylopiiiaethiopica</i>	Ata	Guinea pepper	Tree
25.	<i>Lonchocarpusgriffone anus</i>	Ududu		Shrub
26.	<i>Anthocleistadjalonensi</i>	Ibu		Shrub
27.	<i>laporteaestuans</i>	Ntan	Stinging flower	Shrub
28.	<i>Musangacecropioides</i>	Uno	Corkwood/ umbrella tree	Tree
29.	<i>Imperatacylindricum</i>	Nsai	Spear grass	Grass
30.	<i>Daclyladieniabarteri</i>	Ukan	Monkey fruit	Shrub
31.	<i>Cola argentea</i>	Ndiya		Tree
32.	<i>Dracaena arborea</i>	Okono	Dragon tree	Tree
33.	<i>Voacanga Africana</i>	Mmongebae bot	Milk bush	Shrub
34.	<i>Emilia coccinea</i>	Utimense	Tassel flower	Shrub
35.	<i>Albizziaenglis</i>	Ubam		Tree
36.	<i>Theobroma cacao</i>	Coco	Cocoa	Tree
37.	<i>Cyrtospermasenegale nse</i>	Nyorotong		Shrub
38.	<i>Brachystegiaspp</i>	Ukpaototong		Tree
39.	<i>Ikacinatrichantha</i>	EfikIsong	false yam	Shrub
40.	<i>Maniophytonfulvum</i>	Ekonikon	Grasso nut	Shrub
41.	<i>Eliaesisguineesis</i>	Eyop	Palm tree	Tree
42.	<i>Invingiagabonensis</i>	Uyo	Bush mango	Tree
43.	<i>Microdesmispuberula</i>	Ntabit		Shrub
44.	<i>Ficulisexasperater</i>	Ukuok	Sand paper tree	Tree

45.	<i>Combretum racemosum</i>	Asaka		Tree
46.	<i>Carpobolus lutea</i>	Ikpafin	Cattle stick	Shrub
47.	<i>Gnetum Africana</i>	Afang	African salad	Climber
48.	<i>Discorea bulbifera</i>	Edomo	Aerial yam	Climber
49.	<i>Pterocarpus spp</i>	Mkpa		Tree
50.	<i>Cola millenil</i>	Ekpamfeteko		Shrub
51.	<i>Dacryodes edulis</i>	Eben	pear	Tree
52.	<i>Mucuna aurens</i>	Ibaba	velvet bean	Climber
53.	<i>Sacoglottis gabonensis</i>	Edat		
54.	<i>Tetrapleuratetraptera</i>	Uyayak		Climber
55.	<i>Discorea aestuans</i>	Edomo	Aerial yam	Climber
56.	<i>Uapaca spp</i>	Nkpenek		Tree
57.	<i>Homalium racemosum</i>	Ofong Idim		Tree
58.	<i>Mammea Africana</i>	Edeng		Tree
59.	<i>Blighia sapida</i>	Oto		Tree
60.	<i>Gongronema latifolium</i>	Otasi		Climber
61.	<i>Treculia Africana</i>	Adian	African breadfruit	Tree
62.	<i>Phyllanthus Amarus</i>	Oyomokisoa mankedem	Woman egg	Shrub
63.	<i>Pilea muscosa</i>	Nditop	Artillery plant	Climber
64.	<i>Pterocarpus santalinoides</i>	mkpat Inyang	water side canewood	Tree
65.	<i>Bryophyllum pinnatum</i>	Ndodop	Life plant	Shrub
66.	<i>Thaumatococcus daniellii</i>	Nkongaya	Wrapping leave	Shrub
67.	<i>Caladium bicolor</i>	Ikponekpo	Elephant ears	Shrub

Source: Field Survey, 2023

The plants identified to be the dominant floral species in the reserve, closely followed by 25 shrubs, seven climbers among others Etukudo (2000) and Etuk (2020) work were used to reconcile the local names of plants with their botanical names. It was observed during the study, that the sizes of trees were not merchandisable because their girths of the trees were small. The reserve though highly depleted but can still be considered as hotspot for biodiversity.

**The animal species that are still encountered by the hunters in the study area:** Table 2 shows the major animals that were identified in Obot Ndom Forest Reserve, ranging from small to big animals.

**Table 2: Major Animals Identified in the Reserve**

S/No.	Botanical Name	English Name	Vernacular Name
1.	<i>Thronomysswinderianus</i>	Grass-cutter	Ine
2.	<i>Civettictiscivetta</i>	African civet	EbuaIkot
3.	<i>Crossarchusobscurus</i>	Dwarf Mongoose	Nkukwa
4.	<i>Hippotragusequilius</i>	Antelope	Edop
5.	<i>Atherurusaffricanus</i>	Porcupine	Ebiong
6.	<i>Funiscillrus spp.</i>	Squirrel	Adua
7.	<i>Potamochoerusporcus</i>	Bush pig	Edi ikot
8.	<i>Galagoidesdemidovii</i>	Dwarf galago	Nte-eboh
9.	<i>Hyemoschusaquaticus</i>	Chevrotain	Esoh
10.	<i>Tragelaphus scriptus</i>	Bush buck	Okoyo
11.	<i>Cricetomysgambianus</i>	Rabbit	Oyot
12.	<i>Philantombamontiola</i>	Blue duiker	Aso
13.	<i>Genettapeonsis</i>	King genet	Atan
14.	<i>Cercopitheusspp</i>	Putty nose monkey	ebok
15.	<i>Ceropithecusmona</i>	Mona monkey	ebok
16.	<i>Synceruscaffer</i>	Buffalo	Mporo
17.	<i>Rattusrattus</i>	Rat	Ekpu
18.	<i>Potamochoerus</i>	Bush pig	Edi ikot



Table 3 indicates the names of mammals that were in existence in the forest but have long ceased to be seen for over 30 years.

**Table 3: Extinct animals**

S/No.	Botanical Name	English Name	Vernacular Name
1.	<i>Cervidae spp.</i>	Deer	
2.	<i>Loxodonta Africana</i>	Elephant	Enin
3.	<i>Giraffa peralta</i>	Giraffe	
4.	<i>Macropus spp.</i>	Kangaroo	
5.	<i>Panthera pardus</i>	Leopard	
6.	<i>Panthera leo</i>	Lion	Ekpe
7.	<i>Pan troglodytes</i>	Chimpanzee	Idiok

The data as indicated in table 3 and 4 show 18 animals that are still available and seven that have become extinct. The data were obtained from hunters, observations of footprints and dungs produced by the animals. Except for the discovery of the existence of buffalo, the finding is similar to Adewumiet *al* (2022) who reported 17 mammal species and the disappearance of some species in Ini Local Government Area.



Fig. 2: Bridge that links the community to the reserve.



Fig. 3: Swampy Area in the reserve.



Fig. 5: The farming in the Heart of the Reserve



Fig. 6: Bush Pig killed by one of the Hunters.

The pictures show the various points within the catchment of the reserve, some of the activities are responsible for the degradation of the forest.

**Threats to Biodiversity Conservation:** The gender of the respondents was predominately male, as males are majorly the custodian of forests, 92% of the respondents were male while 8% were female. The age distribution of the respondents reveals that the respondents between the ages of 41-50 accounted for the largest (50%), next to this category are those between the ages of 31-40 years, 51 and above 32% and 18% respectively. This is an indication that the activities in the forest are mostly done by the people within the age grade of 41-50 years. Individual highest level of education attained to some degree determines the kind of socio-economic activities someone can engage in (Aderibige and Gbadamosi, 2018). The study revealed that those with tertiary education accounted for the least percentage of the respondents with 4%, while those with secondary education were next 32%. About 39% and 25% of the respondents had primary education and non-formal education respectively. According to Suleman and Wasonga (2021), opined that the more educated a person is the more likely to support biodiversity conservation. Occupational activity in the study area is very important as this determines the activities and threats to biodiversity in the community of study. The major occupation of the respondents is farming, 64% of the respondents are farmers, whose activities contribute to the degradation of the reserve, closely followed by traders 26%, 7% and 3% of the respondents are hunters and unemployed respectively.

Table 3 indicates the threats to biodiversity which are a common phenomenon in the rural areas because the people depend on forest to meet their essential needs.

**Table 3: Threats to Biodiversity**

Threats to Biodiversity	Respondents	Percentage
Agricultural land for cultivation	46	48%
Over exploitation	10	10%
Fuelwood gathering	7	7%
Wildlife hunting	5	5%
Invasive species	2	3%
Logging in the forest	8	8%
Population Increase	3	3%
Climate Change	1	1%
Poverty	8	8%
Medicinal/non-timber plants collection	6	6%
Total	96	100%

Source: Field Survey 2023

The Table 3 shows information gathered from the respondents concerning the threats to biodiversity in the reserve. Agricultural land for cultivation is a major threat to the forest biodiversity conservation. This is in line with the study done by Adewumiet *al* (2022) whose investigation revealed that the people in the study area are predominantly farmers. Moreover, it can be seen from the table that over exploitation, wildlife hunting, logging, fuelwood gathering and poverty are the major threats to biodiversity conservation in the reserve. People also depend on medicinal plants to take care of their medical issues. These activities constitute threats to biodiversity conservation and need to be addressed to save the reserve from further degradation.

## CONCLUSION AND RECOMMENDATIONS

Generally, it is a fact that forest reserves play role important in the conservation of biodiversity, protected areas globally are the cornerstone for biodiversity conservation. But in Nigeria and particularly in Akwa Ibom State conservation approaches are weak and limited. However, because of the composition and distribution of plants and animals that still exist in the reserve, the reserve needs urgent and proper conservation policies and implementation strategies to save what is left of the reserve. The various threats to the existence of the reserve need to be addressed, all the stakeholders, ranging from the state government to the non-governmental organization and people in the community should project a novel method that will help in managing and conserving the reserve. The degraded parts of the reserve should be regenerated by planting indigenous trees.



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