Phytodiversity, Abundance and Importance of Some Useful Plants at Mangrove Swamp Forest of Sobekiri Rivers State Nigeria

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Abstract- The mangrove swamp forest of Sobekiri I, II and III area of Rivers state Nigeria, was investigated to determine the phytodiversity, flora density, bundance, and importance of some useful plants including endangered species. three 250 x 40 transects containing (10 x 10) randomly laid quadrants for trees, 5 x 5 for shrubs and 1 x 1 for herbs was used in 1hectare plot to increase the chances of encountering and inventorying all species. Phytosociological data were collected and used to determine diversity of the forest. Nineteen (19) plant species belonging to 12 families (8 trees, 4 shrubs and 6 herbs) were encountered which represent 78.20% trees, 14.3% shrubs and 7.5% herbs in the forest.The three most abundant families in descending order were Rhizophora mangle (red mangrove), Nypa palm, (mangrove palm),Avicennia germinans (black mangrove) for trees while Chrysobalanus orbicularis, Chromophaene odorantum, are for shrubs. Crotalaria retusa and Aspilia Africana herbs.Species density ranged from 30 species ha^1 in Terminalia catapa to 5,540 ha^1 in Rhizophora mangle. The least abundant plant species for trees are Elaeis guineensis, Terminalia catapa and Dalbergia ecostaphyllum while for shrubs are Urena lobata, and Manotes spp. Crograstic tremula and Musa spp is for herbs respectively.The Shannon index measured in a scale of 10 was 5.54 and evenness index measured in a scale of 1 is 1.62 for the habitat indicating moderate species diversity.

Index Terms- Phytodiversity, Flora, Mangrove Forest, Trees, Shrubs, Herbs

I. INTRODUCTION

Diversity provides an observer a feeling of satisfaction in the natural world (young and Swiacki, 2006). The species diverse mangrove swamp forest/fresh water swamp is one of the five (5) major types of vegetation in the forest zone of Nigeria. (NEST, 1991) the others are the coastal vegetation riparian forest and lowland rainforest.

Sobekiri I, II, III and environs of Andoni river lies between latitude $4^o28'$ to 4° 45' and longitude $4^o28'$ and 4^o45 East (Francis et al, 2007). It is one of the rivers that drain into river Niger. It is brackish water habitat. The area is made up of vegetations such as red and white mangrove as well as Nypa Palms these make up the tropical rainforest of Sothern Nigeria.In the Niger Delta the mangrove swamp forest covers some $12000km^3$ or about half of the Delta (NDES, 1997) and one third of Rivers State. The forest is either partially or wholly flooded throughout the year (Agbagwa 2008). Mounds and ridges on the ground of this forest form numerous intricate narrow channels through which flood circulate on the forest floor. These channels also provide drainage network from the forest to surrounding rivers and streams.With the astronomical deforestation of the other forest zones in Nigeria even though some plants species are been endangered in the study area, the mangrove swamp forest/fresh water swamp forest remains the most extensive forest zone, due to largely swampy ground on which they exist hindered exploitation. However, the continued existence of this forest in the region is seriously threatened by the ingress of sea water through canalization to facilitate oil and gas activities (Agbagwa and Akpokodse, 2010).

The aims and objectives of this research work were investigated to determine the phytodiversity, flora density abundance, and importance of some useful plants including endangered/endemic species.

II. METHODOLOGY

2.1 The Study Area

The study was conducted in three (3) communities which includes. Sobekiri I, Sobekiri II, and Sobekiri IIIthe communities share boundaries with the opobo creeks and some within the Bonny and Andoni River Which comprises of highly disturbed (HD) area, mildly disturbed (MD) area and undisturbed (UD) area for studying the status of species diversity, flora densityabundance, and medicinal/ importance of plant species.

2.2 Sampling:

The simple random sampling method (SRS) was used to conduct the vegetation studies along 3 transects within the study area and five (5) stations were sampled in each transect for evaluation of species diversity, flora density and abundance. A quadrant was randomly laid, from each quadrant sample species of trees, shrubs, and herbs were collected and identified to species level. For vegetation analysis of the site, the plot method of Devi and Yadava (2006) was adopted using (10x10m) for trees, (5x5m) for shrubs and (1x1m) for herbs.Oral interviews

were taken in the dry field season of 2017, for medicinal and economic importance value of vegetation, protected area and conservation site. The collected data was entered into Microsoft Excel workbooks and evaluated using the programs analytical tools to compute the percentages (%) of the distribution of community vegetation structure and plant habits across the mangrove and natural swamp forest habitats.

2.3 Species diversity:

The natural and mangrove swamp forest habitat were analysed using Shannon Weiner and evenness index. This is a more valuable parameter since it takes into account the abundances of the censored species. It goes by the formulae. (Begon *et al.*, 1986)

$H=\sum piInpi$, where

H= Shannon's index, in = log.

Following formula for evenness...

$EQ = -\sum piInPi/InS$, where

EQ = equality

S = total number of species

2.4 Quantitative Analysis:

The important quantitative analysis such as flora density and abundance of tree species, shrubs and herbs species were determined as per Curtis and Memtosh(1950).

Density:

Density is an expression of the numerical strength of species where the total number of individuals of each species in all quadrants is divided by the total number of quadrants studied. Density is calculated by the equation:

$$\text{Density} = \frac{\text{Total number of individual of a specie in all quadrants}}{\text{Total number of quadrants study}}$$

Abundance:

It is the study of the numbers of individuals of different species in the community per unit area. By quadrant method sampling are done at random in several places and the number of individuals of each species was summed up for all quadrants in which the species occurred. It is represented by the equation

$$\text{Abundance} = \frac{\text{Total No of individuals of a species in all quadrants}}{\text{Total No of quadrants in which the species occurred.}}$$

III. FIELD RESULTS AND DISCUSSIONS

Geo referenced and pictorial evidence of Biodiversity sampled

Location	Co Ordinates/ Location ID	weather	Habitat Description	**Photographs**
SobekirI I	E $7^0$13'53.968" N $4^0$33'31.676"	Sunny/ low tides	Mangrove swamp Forest	

SobekirI II	E 7 ^{0} 1423.542” N 4^{0}33’3.524”	Sunny/ high tides	Mangrove swamp forest.	
Sobekiri III	E 7 ^{0} 14’23.542” N 4^{0}31’58.33”	cloudy/ High tides	Mangrove swamp Forest	

Figure: 3 Comprehensive List of Species Diversity Censored In the Study Area

Species	Common/Name	Family Name	Growth	2017 IUCN
Rhizophora Mangle	Ngala/Red mangrove	Rhizophoraceace	T	VU
Rhizophora Racemosa	White mangrove Laguncularia racemosa	Rhizophoraceace	T	VU
Avicennia germinans	Black mangrove	Acanthaceae	T	VU
Nypa Palm	Udee or Mangrove palm	Avecaceae	T	VU
Chrysobalamus Orbicularis	Atabarka or Cocoplum	Rosaceae	T	VU
Urena lobata	Caesar weed or Congo Jute	Malvaceae	S	VU
Aspilia Africana	Bush Marigold	Compositae	H	VU
Crotalaria retusa	Devil- beam	Papilionaceae	H	VU
Terminalia Catappa	Country-almond, Sea-almond	Combretaceae	T	VU
Chromophaena Odorantum	Siam weed	Compositae	H	VU
Dalbergia ecostaphyllum	Roseweed	Fabaceae	T	VU
Inugotera Spicata	Mediterranean thyme	Papilionaceae	H	VU

Manotes Spp		Comaraceae	S	VU
Kyllingia erecta	Spikes edges	Cyperaceae	H	VU
Sporobulus pyramidalis	Giant rat's tail	Granmeae	H	VU
Cocus Nucifera	Coconut tree	Arecaceae	T	UV
Musa Spp	Banana	Musaceae	H	VU
Cragrostis tremula	Love grass, canegrass	Gramineae	H	VU
Elaensis guineensis	Palm tree	Arecaleae	T	VU

Keys* T=trees *H=herbs *S=shrubs *VU=vulnerable

The species diversity of the natural/mangrove swamp forest using Shannon wiener index and evenness index the two indices used to evaluate species diversity for the habitat measuring in a maximum scale of 10 was 5.54 for the habitat indicating moderate species diversity. The evenness index on the other hand, measured in a maximum scale of 1 this informs on the relative distribution of the number of individuals (abundance) of each species. A value of 1.65 was calculated for the evenness index.

Figure 5: **showing the most abundant species in the mangrove /natural swamp forest habitat in descending order.**

Flora	Species	Commom Name	Abundance
Trees	Nypa Palm	Udee(mangrove palm)	6,475
	Rhizophora Mangle	Red Mangrove (Ayaringa)	4,760
	Avienna Africana	White Mangrove	1,170
Shrubs	Chrysobalanus Orbicularis	Atabaka(coco plum)	1,860
	Chromophaena Odorantum	Siam weed	380
Herbs	Crotalaria retusa	Devil beans	375
	Aspilia Africana	Bush marigold	314

Bar Chart

Table 5 most abundance species.

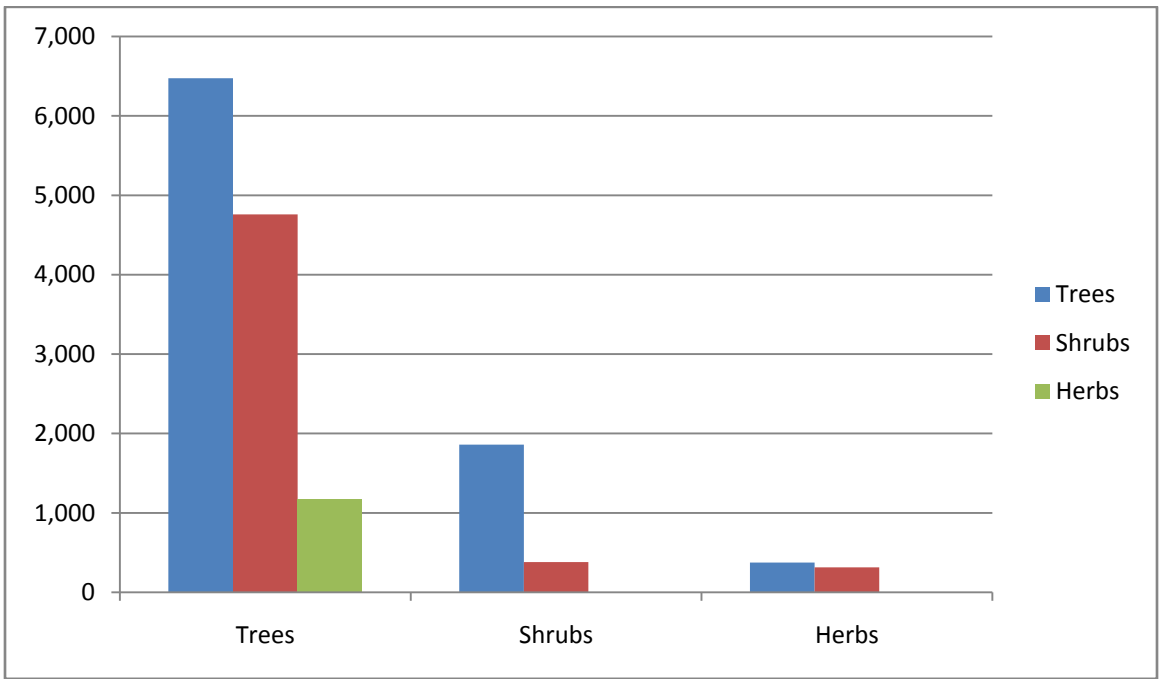
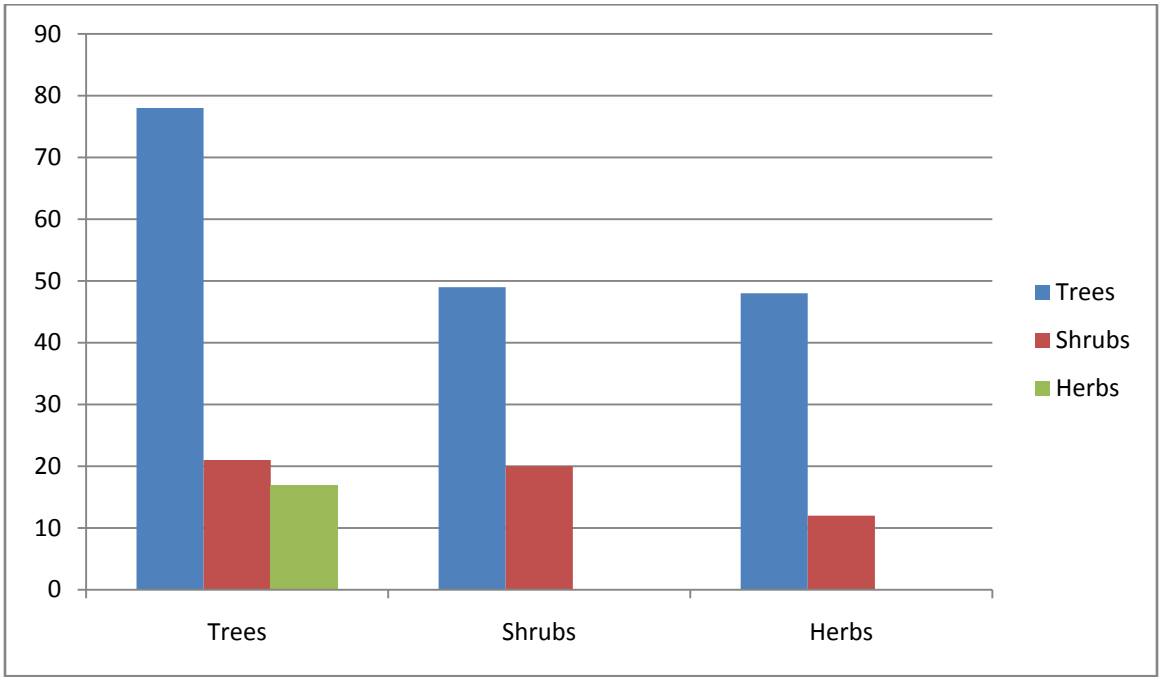


Figure.6Showing three (3) least abundant species of the mangrove / natural forest habitat.

Flora	Species	Common Name	Least Abundance
Trees	Elaensis guineesis	Palm tree	78
	Terminalia catappa	Sea-Almond	21
	Dalbergia Ecostaphyllum	Rose wood	17
Shrubs	Urena Lobata	Caesar wood(congo jute)	49
	Manotes Spp		20
Herbs	Cragrotis tremula	Love grass(cane grass)	48

Musa Spp	Banana Spp	12

Table 6 Least abundance species.



Communities Vegetation Structure and Species Growth Habit of Mangrove / Natural Swamp Forest Habitat of the Study Area: The communities structures and growth habit of the habitat was evaluated using simple random sampling method (SRS). This concept indicates how the vegetation of the habitat is structured and the form in which species exist.

Figure 6: shows the flora (trees, herbs, shrubs) and the number of their families.

Trees family	Shrubs family (4)	Herbs family (5)
Rhizophoraceae	Rosaceae	Compositae
Acanthaceae	Malvaceae	Papilionaceae
Arecaceae	Compositae,	Cyperaceae
Combretaceae	comaraceae	Gramineae
Fabaceae	Musaceae	

Figure 7: shows the distribution of community vegetation structure and plant habits across the mangrove and natural forest habitats. It also shows from the distribution that the vegetation in the study area is **homogenous**.

S/N	Plant Habitat		No. of Plant Species	Percentage%
1.	Trees	8	78.20	
2.	Shrubs	4	14.3	
3.	Herbs	7	7.5	
	Total	19	100	

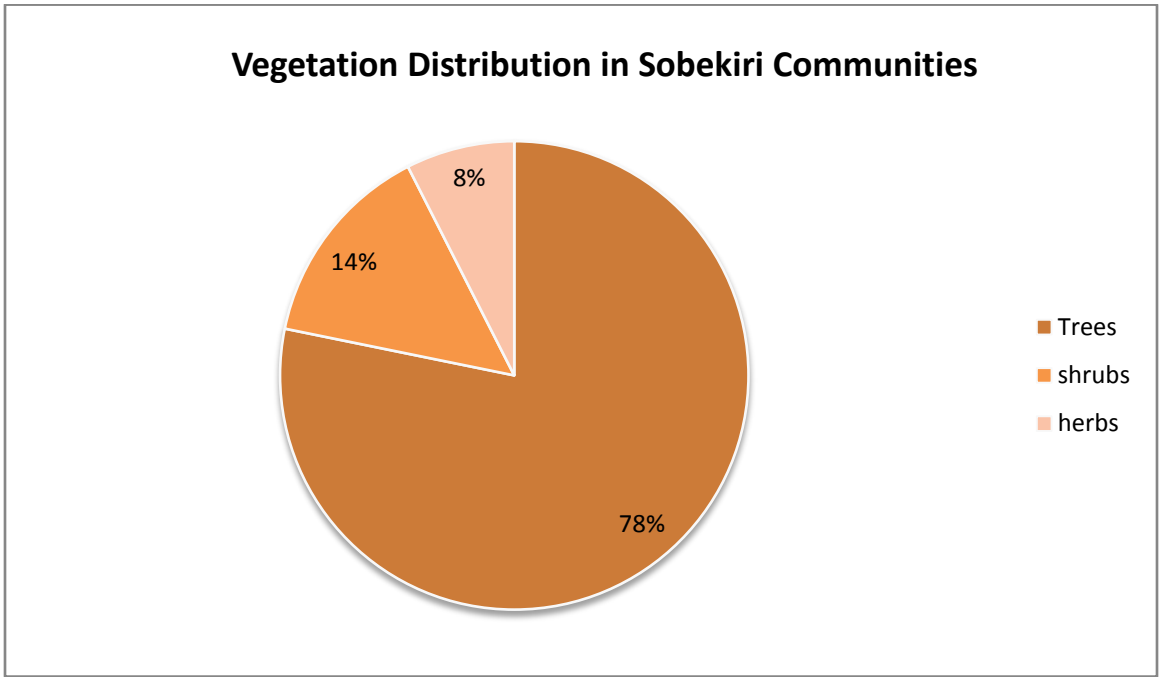


Figure 8: Medicinal and Economic Importance of Species Censored In Study Area.

Species	Medicinal and Economic Importance	No. of uses
Rhizophora mangle (Red mangrove)	Source of timber, making of fish traps, habitat for marine fishes	3
Rhizophora racemosa (White mangrove)	Fodder grass, use in fine texture, Lawns erosion control	3
Avicennia Africana (Black mangrove)	Treatment of ulcer, malaria, maturative poultice, use as aphrodisiac	3
Nypa Palm	thatching, roofing houses, alcoholic beverages, Edible fruits, erosion control	5
Urena Lobata	Treatment of stomach-ache, diarrhoea, Dysentery, gonorrhoea, malaria, induce abortion	6
Terminalia catapa	Timber for roofing houses, boat building, Treatment of rheumatic joints	3
Cocos nucifera	Provision of food, making of fashion food, Caps, helmet, mats, brooms, brushes, rugs.	8
Aspilia Africana	Prevent conception and anti. Fertility, Control bleeding from fresh wounds	3
Chromophaena odorantum	Improve soil fertility	1
Musa Spp	Fibres used for making ropes and mats	2
Elaesis guineensis	Making palm oil, soup, soap, kernel oil	4
Chrysobalanus orbicularis	Treatment of diarrhoea, dysentery, Source of oil from seed, treatment of Flaccid scrotum from by men.	4
Crotalaria retusa	Flowers and leaves sweet flavour and Edible as vegetable, treatment of cough, Treatment of fever, lung disease, treatment Of skin infection in children	5
Dalbergia Ecostaphyllum	Timber for roofing, firewood for cooking, Making woodwind musical instrument.	3
Inugotera Spicata	As incense placed on coffins during Funerals, purifications of room	2
Manotes Spp	Treatment of stomach-ache	1
Kyllingia erecta	Control soil erosion	1
Sporobulus pyramidalis	Straw mosaic, seed is edible for food	2

Cragrostis tremula	Livestock fodder, source of food, Use in making traditional beads	2

IV. Conclusion

The tropical rainforest in Nigeria which is predominantly in the southern part of the country is threatened. The threat is worsened in the Niger Delta where the study area is located, by oil and gas exploration production activities which are the main source of income to the Nigerian nation. This study also observed that though these activities have been ongoing for long, the tropical rainforest and particularly the mangrove swamp forest of the area is still rich in floristic composition and diversity. However, there is no protected area or site of conservation, most of the forest has been affected by human activities as seen evidence of introduced/secondary species and the gradual reduction in the overall forest height is seen.There is, therefore need for further study of the area to determine measures for preservation of the biodiversity of the forest.

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