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# Assessment of floristic composition of Ologbo Concession, Edo State, Nigeria, for conservation planning

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**Abstract**

*A floristic inventory of woody plants in Ologbo Forest Concession was carried out to characterise the different habitat types within the concession in order to assess its conservation value for land use planning. Three habitat types; swamp, rainforest and fallow land were studied. A total of 630 individual trees representing 71 species in 27 families were enumerated in 15 (25m x 25m) plots of the forest concession. Total number of individual trees were higher in rain forest 327 (51.91%) than in the swamp forest 210 (33.33%) and fallow forest 93 (14.76%). Shannon-Wiener species diversity index H'was 3.08 for the rainforest, 3.02 for the swamp forest and 2.16 for the fallow forest. Three IUCN Red Data Listed species (Entrandrophragma sp., Lovoa trihilioides andMillettia sp.) were recorded in the rainforest, two species (Lovoa trichilioides and Millettia sp.) in the swamp forest and none in the fallow forest. All the habitat types contained important fruiting species (Cleistopholis patens, Ficus spp. and Musanga cecropioides) which are of feeding importance for many wildlife species. The study concluded that the floristic value of the concession conservation area had been eroded but some of the biological components could still be salvaged if natural regeneration could be allowed.*

**Keywords**: *Ologbo Concession, Conservation value, forest conservation, land use planning, biological components*

**Résumé**

*Un inventaire floristique des plantes ligneuses dans la concession forestière d'Ologbo a été menée pour caractériser les différents types d'habitats dans cette concession afin d'évaluer sa valeur de conservation pour l'établissement d'un mode d'utilisation des terres. Trois types d'habitats ont été étudiés : le marécage, la forêt dense et la jachère. Un total de 630 arbres représentant 71 espèces dans 27 familles ont été répertoriés dans 15 placettes (25m x 25m) dans la concession forestière. Le nombre total d'arbres sur pied est plus grand dans la forêt dense, 327 (51,91%) que dans le marécage, 210 (33,33%) et la jachère, 93 (14,76%). L'index de Shannon – Wiener de la diversité des espèces H' était de 3,08 pour la forêt dense, 3,02 pour le marécage et 2,16 pour la jachère. Trois espèces de la liste rouge des données de l'IUCN ont été inventoriées dans la forêt dense (Entrandrophragma sp., Lovoa trihilioides et Millettia sp.), deux espèces (Lovoa trichilioides et Millettia sp.) dans le marécage et aucune dans la jachère. Tous les types d'habitats contenaient d'importantes espèces fruitières (Cleistopholis patens, Ficus spp. et Musanga cecropioides) qui ont une importance nutritive pour plusieurs espèces animales. L'étude a conclu que la valeur floristique de l'aire de conservation de la concession a été entamée mais quelques composantes biologiques peuvent encore être sauvées si une régénération naturelle est conduite.*

**Mots clés :** *Concession d'Ologbo, Valeur de Conservation, conservation de la forêt, mode d'utilisation des terres, composantes biologiques*

## 1. Introduction

Site prioritization for conservation action, the setting aside of reserves and delineation of sanctuaries and biodiversity plots is usually based on biodiversity measures such as species richness, abundance, complementarily taxonomic and functional diversity at different scales and indices (Magurran, 2004). Species richness their relative abundances are basic attributes of biotic communities that can be used as simple and integrative measures to investigate the relationships between population structure and abiotic patterns of habitats, to quantify anthropogenic disturbances, and to monitor biodiversity management plans (Begon et al., 1996; Gotelli and Colwell, 2001). In conservation programs, habitat management and assessment of ecosystem status require the

determination of the richness and the abundance of target species, as baseline data for management.

Floristic potential of a site is often an indication of the potential value of the site to conservation. Floristic inventories in tropical rain forests do not always include all vascular plants, because a complete inventory would be excessively time consuming. This is mainly due to the high alpha diversity, the taxonomically poorly known flora and the presence of some life-forms, such as climbers and epiphytes that are more difficult to sample and quantify (McCoy and Bell, 1991; Akinsoji, 2003; Moffatt et al., 2005). Most inventories therefore focus on trees, which traditionally have been considered as woody self-supporting stems with a diameter at breast height (dbh) greater than or equal to 10 cm (e.g. Gentry, 1988; Smith and Killeen, 1998; Phillips et al., 2003a; Ter Steege et al., 2003; Ogunjemite et al., 2013). Focusing on trees is logical, because they define the overall physical forest structure, contribute the main part of forest biomass and represent a substantial part of plant species diversity. However, other woody plants life-forms such as lianas, contribute notably to species richness of a given region but only a minority of woody plants studies include the inventory of trees and lianas within the same localities (Gentry and Dodson, 1987; Clinebell et al., 1995; Akinsoji, 2003).

Biodiversity are lost when forested estates are converted for farming. In order to minimize this scenario conservation inclined agriculturists are beginning to evolve a balance in the management of production agriculture alongside biological diversity mainly through agro-ecology. There are two basic approaches proposed as solution (Green, et al 2005; Balmford, 2005; Matson and Vitousek 2006): these are (i) wildlife-friendly farming which boosts densities of wildlife populations on farmland but may decrease agricultural yield and (ii) land sparing which minimizes demand for farmland by increasing yield. These are new ideals that had not been substantiated by empirical data in tropical West African ecozone.

In West Africa, agriculture generally has expanded into areas of former wildlife habitat (Happold, 1987), this often has included protected areas because historically wildlife conservation has been regarded as secondary to agricultural production (Agbelusi, 1996; Onadeko, 2004). Significantly, agriculture expansion often follows logging in forested areas, because logging operations improve access to forests and reduces the labour needed to clear field. Forest concessions are major player for conserving biodiversity. The management of forest on sustainable bases makes a profound contribution to development through their outputs which include both material products and environmental services (Onukube and Ashimi, 2008). Demands on forest products is paving ways to a broader discussion linking conservation to development and economic realities (Olayide, 1981; Nwa, 1991; Bisong, 1994; Ekong and Ettah, 2005; Max-Neef, 2010). It is therefore necessary that agricultural lands be incorporated into biodiversity conservation.

Nigeria has suffered major losses of biological diversity as a result of excessive logging and conversion of forests to plantations and farmland (Oguntala, 1993; Agbelusi, 1996; Okali, 2010). Particularly in south-western Nigeria, the conversion of forest to monoculture plantation of Cocoa, Kolanut, Oil-palm, Rubber and forestry plantation of Gmelina and Teak and the ever increasing population associated with these activities had been a major threat to biological diversities in the region (Oates et al., 2008; Chima, et. al., 2009; Agbelusi and Ogunjemite, 2013). Many forest reserves in the region had been badly encroached and several species of plants and animals driven onto blink of extinction e.g. *Cercopithecus erythrogaster* (Oates, 1999), *Pan troglodytes* (Ogunjemite, et al., 2006; Greengrass, 2008). Ologbo Forest reserve suffered this fate before it was granted to PRESCO Plc for sustainable oil-palm development.

The degree of biodiversity in agro-ecosystems depends, in part, on the diversity of vegetation that had originally supported the system. This is the premise on which the PRESCO/ Ologbo Project is conceived for sustainable Oil Palm Plantation Development. The present study is therefore necessitated in order to properly characterize the vegetation as solid foundation on which a sound ecological framework for sustainable oil palm plantation development and biodiversity conservation could be built.

## 2. Material and Methods

### Study area

Ologbo Project (Figure 1) which is about 7295 ha in area is located N 06° 02' - 06° 08'; E 78° and 05° 30' – 05° 40'and acquired by PRESCO Plc for oil palm plantation development. The project area is made up of 6000 ha formal Ologbo Forest and 1,295 ha of former Obasuyi Concession. The plot has undergone much disturbance from previous clearance for farming. The original vegetation of the environment is typical of the lowland moist rainforest (Keay, 1959). The area is part of the coaster plain of southern Nigeria. The climate is governed by two seasons; the wet season from April

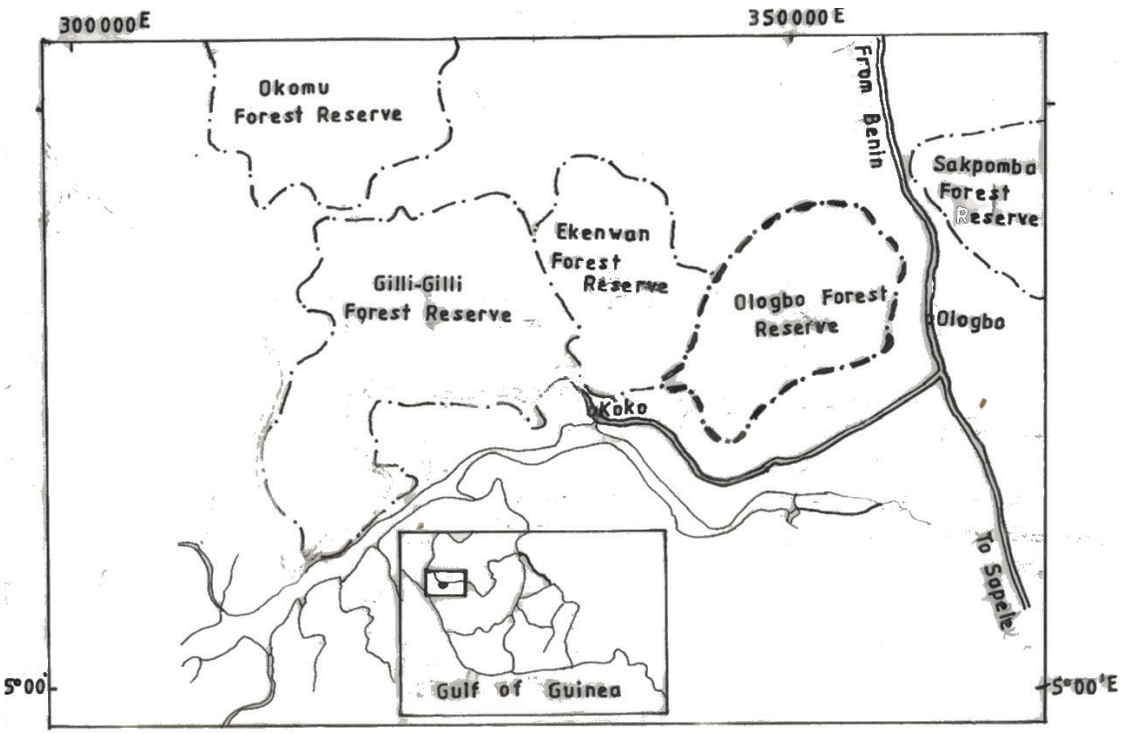


**Figure 1 : Map of Ologbo Forest Reserve in relation to other reserves of the region**

to November and the dry season from December to March. The mean annual rainfall is about 2100 mm and temperatures reaches an average of 23-37°C.

**History of Ologbo Concession**

The present Ologbo concession was part of Ologbo Forest Reserve established under the Benin Native Authority in 1927 (Decker, 2007). It was a single contiguous block of forest with Okomu, Giligili, Ekenwan and Sakpomba forests. Ologbo Forest Reserve underwent the first major cycle of exploitation in the days of African Timber & Plywood in the seventies. The second and most devastating cycle of exploitation started in the middle 1980s with the establishment of Plymont Timber Company at Ologbo Village. The village soon became one of the fast growing settlements along Benin – Sapele road as it attracts labour forces to the Timber Factory from all over the southern regions. With the unsustainable exploitation of timber, the operations of the factory folded up around the year 1995.The expatriate Italian Management team that were operating the factory left and abandoned their equipment and machinery with the large work forces that had been assembled. This workforce made up of migrants from different parts of the country had in frustration turned to the forest they knew very well in the days of their exploitation for farming, leading to complete degradation of the reserve vegetation.

**Data collection**

A total of 15, (25 x 25 m) plots were assessed at Ologbo Concession (Fig. 1). The selection of the sites was based on reconnaissance survey carried out and on satellite imagery map of the concession obtained from PRESCO Plc, Benin. Three main habitat (Swamp, rainforest and fallow forests) types were recognised from the reconnaissance survey. Five plots 0.0625-ha (25 x 25 m)each waslaid in each of the habitat types. Plots within the same habitat type were at least 500 m apart. All woody plants with stems rooted independently within a plot and with a dbh (measured at 1.3 m above ground for all life-forms) equal to or greater than 2.5 cm were measured, inventoried and identified to species level. Multiple stems were measured separately, but all stems rooting in the same place were counted as one individual. Specimens were collected in April and May 2007. All specimens were sorted to species level and identified by matching them with vouchers identified by specialists or professional botanists (Professors Obot, E. A. of Nigeria Conservation Foundation and Akinsoji, A. A., of University of Lagos). DBH measurement was taken with simple tape measure

while height of trees was taken using Haga Altimetre. The conservation value of the habitat types were determined by examining the level of threatened plant within the sampled plots.

**Data analyses**

Species diversity, floristic composition and similarity were measured with quantitative and qualitative indices. The frequency of a species for each habitat type is defined as the number of 0.0625-ha (25x25m) plots in which it is present, and the sum of all frequencies as the total number of plots per site. Species diversity values were expressed in terms of species richness for each habitat type. To quantify and compare floristic composition between habitats, the species Important Value Index (IVI) was calculated as the sum of its relative density, its relative dominance and its relative frequency (Curtis and McIntosh 1951). To analyse the degree of floristic similarity within and between habitats the Shannon-Wiener species diversity index was calculated.

Shannon Index, H'

$$H' = -\sum_{n=1}^{\infty} (\text{pi In pi}) - [\frac{(S-1)}{2N}] \quad \textbf{Eq. 1}$$

Where

- Ni The number of individuals in species i ; the abundance of species i in each habitat type.
- S The number of species also called species richness in each habitat.
- N The total number of all individuals enumerated in each habitat
- pi The relative abundance of each species, calculated as proportion of individuals of a given specie to the total number of individuals in each habitat type enumerated.
- H' is the index

Height class of tree stands were defined according to Longman and Jeniks (1987)

## 3. Results

**Species diversity and density**

A total of 630 individual trees representing 71 species in 27 families were enumerated in 15 (25 x 25m) plots of Ologbo Forest Concession (Table 1). Total number of individual trees were higher in rain forest 327 (51.91%) than in the swamp forest 210 (33.33%) and fallow forest 93 (14.76%). Ten most common species in terms of number of individuals were *Diospyros sp*. (75), *Musanga cecropioides* (73), *Mitragyna stipulosa* (41), *M. ledermannii* (31), *Discoglypremna caloneura* (31), *Rauvolfia vomitoria* (30), *Raphia hookeri* (26), *Canthium vulgare* (25), *Strombosia sp*. (24) and *Zanthoxylum zanthoxyloides* (24); they accounted for 60.32 % of individual trees enumerated. Species that are represented with only one individual tree include; *Bateria fistulosa*, *Buchholzia coriacea*, *Celtis sp*., *Cordia millenii*, *Drypetes gilgiana*, *Entrandrophragma sp*., *Lecaniodiscus sp*., *Macaranga barteri, Olax sp*., *Oncoba sp*. and *Parinari robusta*. The family *Euphorbiaceae* is the most diversified having eight species.

Table 2 presents the summary of the phytosociological indices of the different habitat types. Fifty-two (52) tree species were recorded in the rainforest habitat, 37 in swamp forest and 18 in fallow forest. Tree density in the rainforest was calculated to be 944 trees / hectare with the basal area of 23.14 $m^2$/ hectare, in the swamp forest it was 745.6 trees / hectare with the basal area of 29.47 $m^2$ / hectare and in the fallow was 640 trees / hectare with basal area of 0.59$m^2$ / hectare. The Shannon-Wiener species diversity index H' was 3.08 for the rainforest, 3.02 for the swamp forest and 2.16 for the fallow forest.

**Community Structure**

Trees in the height class 2-5 m are the most abundant in the rainforest and fallow forests accounting for 37.38 % and 93.0 % respectively (Table 3). However, the class 6–10 m was the most abundant in the swamp forest recording 38.78 % of all the tree stands in the habitat type. The height class 11–20m and 21m above were completely not recorded in the fallow forest. While the height class 11–20m were fairly represented in both the rainforest and swamp forest. The emergent tree in the height class 21m above are seriously depleted in all habitat types represented by only 4.56 % and 4.18 % in rainforest and swamp forests respectively. It was not observed in fallow forest at all.

**Conservation value**

Three IUCN Red Data Listed species (*Entrandrophragma sp, Lovoa trihilioides* and *Millettia sp*) with IV values of 3.67, 1.64 and 2.42 respectively were recorded in the raiforest forest, two species (*Lovoa trihilioides* and *Millettia sp*) with IV values of 10.59 and 8.22 respectively in the swamp forest and none in the fallow forest. All the habitat types contain important fruiting species (*Cleistopholis paten, Ficus spp* and *Musanga cecropioides*) which are of dietary importance for many wildlife species.

**Table 1: Species diversity and frequencies of occurrence in the habitat types of Ologbo Concession - 1st part**

| Species | Family/ subfamily | Rainforest | | Swamp forest | | Fallow | |
|---|---|---|---|---|---|---|---|
| | | Frequency | Density in sampled plots | Frequency | Density in sampled plots | Frequency | Density in sampled plots |
| *Alchornea cordifolia* | Euphorbiaceae | - | - | - | - | 3 | 7 |
| *Albizia adianthifolia* | Caesalpinioideae | 1 | 1 | - | - | - | - |
| *Albizia feruginea* | Mimosoideae | - | - | 1 | 1 | 4 | 4 |
| *Albizia zagia* | Mimosoideae | - | - | 1 | 1 | 3 | 7 |
| *Alstonia boonei* | Apocynaceae | 1 | 3 | 2 | 2 | 3 | 5 |
| *Alstonia congensis* | Apocynaceae | - | - | 1 | 1 | - | - |
| *Anthonotha macrophylla* | Caesalpinioideae | 1 | 1 | - | - | - | |
| *Antiaris africana* | Moraceae | - | - | - | - | 2 | 2 |
| *Antiaris toxicaria* | Moraceae | 1 | 1 | - | - | - | - |
| *Balphia nitida* | Papilionoideae | 1 | 2 | 1 | 1 | - | - |
| *Bateria fistulosa* | Passifloraceae | 1 | 1 | - | - | - | |
| *Bridelia sp* | Euphorbiaceae | 2 | 4 | - | - | 4 | 6 |
| *Buchholzia coriacea* | Apocynaceae | - | - | 1 | 1 | - | - |
| *Canarium schwienfurthii* | Burseraceae | 1 | 2 | - | - | - | - |
| *Canthium palma* | Compositae | 3 | 8 | 1 | 2 | - | - |
| *Canthium vulgare* | Compositae | 4 | 13 | 2 | 11 | 1 | 1 |
| *Ceiba pentandra* | Bombacaceae | 1 | 3 | - | - | - | |
| *Celtis sp* | Ulmaceae | 1 | 1 | - | - | - | - |
| *Cleistopholis patens* | Annonaceae | 5 | 9 | 3 | 11 | - | - |
| *Cordia millenii* | Boraginaceae | 1 | 1 | - | - | - | - |
| *Desplatia sp* | Tilliaceae | - | - | 2 | 4 | - | - |
| *Dialium guinense* | Caesalpinioideae | 1 | 1 | - | - | - | - |
| *Diospyros dendo* | Ebenaceae | - | - | 1 | 1 | - | - |
| *Diospyros sp* | Ebenaceae | 4 | 61 | 1 | 7 | 4 | 7 |
| *Discoglypremna caloneura* | Euphorbiaceae | 4 | 31 | - | - | - | - |
| *Drypetes floribunda* | Euphorbiaceae | - | - | 1 | 4 | - | - |
| *Drypetes gilgiana* | Euphorbiaceae | - | - | 1 | 1 | - | |
| *Elaeis guinensis* | Palmae | 2 | 3 | - | - | - | |
| *Entrandrophragma sp* | Meliaceae | 1 | 1 | - | - | - | - |
| *Fagara leprioris* | Rutaceae | - | - | - | - | 1 | 1 |
| *Ficus capensis* | Moraceae | - | - | - | - | 2 | 3 |
| *Ficus exasperate* | Moraceae | - | - | - | - | 2 | 4 |
| *Ficus mucoso* | Moraceae | 1 | 2 | - | - | - | - |
| *Funtumia Africana* | Apocynaceae | 1 | 2 | - | - | - | - |
| *Funtumia elastic* | Apocynaceae | 1 | 3 | - | - | - | - |
| *Gilbertiodendron dewevrei* | Caesalpinioideae | - | - | 1 | 3 | - | - |

**Table 1: Species diversity and frequencies of occurrence in the habitat types of Ologbo Concession - 2nd part**

| Species | Family/ subfamily | Rainforest | | Swamp forest | | Fallow | |
|---|---|---|---|---|---|---|---|
| | | Frequency | Density in sampled plots | Frequency | Density in sampled plots | Frequency | Density in sampled plots |
| *Hunteria umbellate* | Apocynaceae | 4 | 7 | - | - | - | - |
| *Lecaniodiscus sp* | Sapindaceae | 1 | 1 | - | - | - | - |
| *Lovoa trichiliodes* | Meliaceae | 1 | 2 | 2 | 9 | - | - |
| *Lophira alata* | Ochnaceae | 1 | 1 | 3 | 13 | - | - |
| *Macaranga barteri* | Euphorbiaceae | 1 | 1 | - | - | - | - |
| *Massularia sp* | Rubiaceae | 1 | 2 | - | - | - | - |
| *Maranthes robusta* | Chrysobalanaceae | 1 | 2 | 2 | 5 | - | - |
| *Militia thonningii* | Papilionoideae | 1 | 1 | 1 | 15 | - | - |
| *Mitragyna stipulosa* | Rubiaceae | 1 | 7 | 5 | 34 | - | - |
| *Mitragyna ledermannii* | Rubiaceae | 2 | 2 | 5 | 26 | | 3 |
| *Musanga cecropioides* | Moraceae | 4 | 43 | 3 | 10 | 3 | 20 |
| *Myrianthus arboreus* | Moraceae | 2 | 2 | 1 | 1 | 3 | 5 |
| *Nauclea diderrichii* | Rubiaceae | 2 | 3 | - | - | - | - |
| *Morus mesosagia* | Moraceae | 1 | 2 | - | - | - | - |
| *Napoleona vogelii* | Lecythideaceae | 3 | 5 | - | - | - | - |
| *Olax sp* | Olacaceae | 1 | 1 | - | - | - | - |
| *Oncoba sp* | Flacourticeae | 1 | 1 | - | - | - | - |
| *Parinari robusta* | Chrysobalanaceae | - | - | 1 | 1 | - | - |
| *Pausinystalia sp* | Rubiaceae | 1 | 6 | - | - | - | - |
| *Pentaclethra macrophylla* | Mimosoideae | 1 | 1 | 1 | 1 | - | - |
| *Picralima nitida* | Apocynaceae | 2 | 2 | 1 | 5 | - | - |
| *Piptadeniastrum africanum* | Mimosoideae | 3 | 5 | - | - | - | - |
| *Pterocarpus sp* | Papilionoideae | 1 | 1 | 1 | 1 | - | - |
| *Pycnanthus angolensis* | Myristicaceae | 2 | 2 | 1 | 3 | 1 | 1 |
| *Raphia hookeri* | Palmae | - | - | 3 | 26 | | |
| *Rauvolfia vomitoria* | Apocynaceae | 3 | 16 | - | - | 4 | 14 |
| *Ricinodendron heudelotii* | Euphorbiaceae | 2 | 2 | - | - | - | |
| *Rothmannia sp* | Rubiaceae | 1 | 2 | - | - | - | - |
| *Strombosia sp* | Olacaceae | 4 | 24 | - | - | - | - |
| *Terminalia* | Combretaceae | 1 | 1 | - | - | - | - |
| *Trema orientalis* | Ulmaceae | 1 | 3 | - | - | 2 | 3 |
| *Uapaca staudtia* | Euphorbiaceae | - | - | 1 | 3 | - | - |
| *Uapaca heudolotii* | Euphorbiaceae | - | - | 2 | 6 | - | - |
| *Xylopia sp* | Annonaceae | 1 | 1 | - | - | - | - |
| *Zanthoxylum Zanthoxyloides* | Rutaceae | 5 | 24 | - | - | - | - |

**Table 2: Summary of phytosociological indices of the different habitat types of Ologbo Concession**

| Habitat types | No of species recorded | Tree density/ hectare | Basal area ($m^2$) | Cumulative Important value | Shannon-Wiener index (H') |
|---|---|---|---|---|---|
| Rainforest | 52 | 994 | 23.14 | 284.21 | 3.08 |
| Swamp forest | 37 | 745.6 | 29.47 | 298.73 | 3.02 |
| Fallow forest | 18 | 640. | 0.59 | | 2.16 |

**Table 3: Stratification within the different habitat types of Ologbo Concession**

| Stratification | Rainforest | | Swamp forest | | Fallow forest | |
|---|---|---|---|---|---|---|
| | Mean no of trees | % | Mean no of trees | % | Mean no of trees | % |
| Shrub Layer 2-5m | 24.6 | 37.38 | 12.6 | 23.95 | 19.6 | 93.0 |
| Under Storey 6 – 10m | 21.4 | 32.52 | 20.4 | 38.78 | 1.4 | 7.0 |
| Middle Storey 11 – 20m | 16.8 | 25.53 | 17.4 | 33.08 | - | - |
| Upper Storey 21 above | 3.0 | 4.56 | 2.2 | 4.18 | - | - |

## 4. Discussions

Anthropogenic factors were the primary cause of biodiversity depletion in the forest zones of south western Nigeria. Ologbo Forest had undergone several cycles of exploitation from the time of Africa Timber Company, Sapele leading to total collapse of the whole forest structure. In this study only 71 species of woody plants in 27 families were enumerated, confirming the serious depletion of the original forest as compared to between 127 and 150 species that had been recorded in Okomu National Park which was once a contiguous block of forest with the concession (Orhriere, 1992, Oduwaye et al, 2002; SPDC 2006a & b). Much of the original species composition had been lost leading to almost a monodominant species forest formation. The preponderance of *Musanga cecropioides, Mitragyna stipulosa*, and *M. ledermannii* were attested facts to the constant disruption of the forest structure which was originally dominated by timber trees such as *Piptadeniastrum africanum*, *Triplochiton scleroxylon*, *Antiarix toxicaria*, *Ceiba pentandra*, *Raphia hookeri* and *R. Vinifera* (Keay, 1959; White, 1983). The occurrence of these early succession trees species that do not persist more than 15 – 20 years before they die-of to be replaced by more stable species (Oke and Isichei,1997) and the observed diversity of the family *Euphorbiaceae* are good proof of the degradation of the forest concession. Generally the climax vegetation of the region is usually dominated by the families *Meliaceae*, *Ulmaceae*, *Moraceae* and the *Leguminoceae* (Onochie, 1984; Ola-Adams, 1996; Okali 2010). Some of the characteristic species by which the Benin forest formation (as commonly referred to) were noted for include *Entrandrophragma sp, Terminalia sp*, and *Piptadeniastrum africanum* were found to be very rare in this study. This is a serious departure from the past species composition in the forest formation. Nevertheless, a consolation factor is the occurrence in large number of *Diospyros sp, Lovoa trichiliodes, Lophira alata* and *Strombosia sp* which are essential components of a healthy rainforest environment of the southwestern Nigeria Ecozone (Oguntala, 1993; Oke and Isichei, 1997; Ojo, 2004). Given the right attention this is an indication that the remaining fragmented forests could regenerate and replenish to save some of the original species composition of the concession.

In terms of land-use classification the most diversified of the three habitat types enumerated in Ologbo Forest Concession is the rainforest. It recorded the highest Shannon-Wiener Index of H'3.08 followed by the swamp forest H'3.02. The swamp forest habitat appeared to be the most productive judging from the basal area of 29.47$m^2$ / hectare it supported as against 23.14$m^2$/ hectare of the rainforest and 0.69 $m^2$/ hectare of the fallow forest. This shows that edaphic factors could play important role in preventing biodiversity losses. Swamp forest habitat are not easily accessible and thus exploitation of timber are restricted and could only be carried out within very short period of dryness of about 2 – 3 months of December – February / March in the zone. The structure of the vegetation is a far departure from the five layering arrangement commonly observed in the rainforest environment in the region (Hall and Okali 1979; Longman and Jenik, 1987; Ola-Adams, 1999). Only three layers of forest were of serious importance in the current structure of the concession. These are the shrubby, undergrowth

and middle layer. The habitats are seriously deficient in upper and emergent layer. The implication of this is that the arboreal life of the concession is highly deficient. This is the area where the diversity of life in rain forests is unique and exemplary.

**Conservation Value**

The result of the study had also showed that there are important threatened species that demanded urgent attention for conservation. These include most of the species that occurred only ones in the sampled plots, particularly the IUCN listed threatened species of *Entrandrophragma sp, Lovoa trihilioides* and *Millettia sp. Enlisting* degraded areas into conservation of biological diversity is becoming a worthwhile venture for obvious economic realities (Olayide, 1981; Nwa, 1991). If such areas are not included, the loss will be total and nothing could be salvaged (Chapman and Lambert, 2000, Ogunjemite et al., 2005). Incorporating such areas enhances the chance of mitigating the factors that had impaired negatively on diversity of life and giving opportunity for improvement in their conservation and management. Whatever had happened in Ologbo, it is a good thing that some of its original components would be salvaged and some that had been lost may be restored.

**5. Conclusion**

It is obvious from this study that the floristic value of Ologbo Forest Concession had been eroded. Nevertheless, some of its important biological components could still be salvage if natural regeneration could be allowed. Setting aside some portion of the forest (about 20% of the total area of the concession) before planting it up with oil-palm is recommended. This has becomes inevitable in order to secure the gene bank of some of the threatened trees in the concession. The bulk of the area to be speared or set aside should come from the rainforest since this is the most diversified of the three habitat types in the concession.

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