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## WORKSHOP ON THE RAIN FOREST OF SOUTH EASTERN NIGERIA AND SOUTH WESTERN CAMEROON.

OBUDU CATTLE RANCH AND RESORT
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# ENVIRONMENTAL IMPACT ASSESSMENT OF THE RAINFOREST VEGETATION IN AGBARA INDUSTRIAL ESTATE, SOUTHWESTERN NIGERIA.

by

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## ABSTRACT

*The vegetation of Agbara industrial estate, South-western Nigerian was studied with a view to determining the floristic and structural composition before the full take off of the various industries. The area is a lowland rain forest, drier - type with the major growth forms including trees, shrubs, palms and climbers. A total of 897 plants were enumerated in five transect of 2 km. Species diversity index for the area is in the range of 0.01 - 0.24 while dominance values range from 0.00 - 0.01. Tree density was estimated to be 56.1 stems per km sq. The study shows evidences of regrowth vegetation, subsistence farming activities involving arable crops of previous land use. The area is also shown to have suffered previous encroachment or early succession. No particular species is dominant.*

*It is suggested that adequate pollution control measures need to be put in place if the biotic communities of the estate are not to be endangered. Resettlement of the inhabitants away from the vicinity of the operating industries is also proposed.*

## INTRODUCTION

Tropical rain forest is the most complex type of vegetation in the world (Whittaker, 1975). It has a characteristic general appearance which is easily recognisable, though the may be different grades of complexity depending on communities, age and influence of man.

Human encroachment on an ecosystem constitutes a major disturbance to the stability of that ecosystem. The impact of vegetation disturbance and or changes are usually felt by all forms of biotypes in and around such vegetation Vegetation for instance, when disturbed lead to migration of animals to more favourable places. Often there is also loss of potentially useful plants. The practical objective of environmental impact assessment study of vegetation is to predict changes in the environmental and social systems of plants that might result from proposed projects

Agbara Industrial estate is an estate set aside for industrial development in Ogun state, South-western Nigeria. Industrial production requires extensive on-site industrial activities involving construction of roads and buildings movement of machines, emission and spillage of chemical substance in the environment which consequently leads to the removal of the vegetation and some modifications of topography. Sensitive ecological areas and endangered plants species can be inadvertently damage or destroyed.

It is in the light of the above that we embarked upon the environmental impact assessment study of the Agbara Industrial Estate. This study describes the vegetation of the area with particular emphasis on the floral composition of the area, species density, diversity, frequency and dominance. Reference is also made to observe endangered forest flora, if any, and plants species of economic relevance.

## METHOD OF STUDY

The study area was divided into five transects of 2 km length and each transect separated from the other by a distance of 2 km. This was done to cover all representation of plan s species in the area.

The vegetation was studied using floristic and structural attributes. In each transect, the vegetation's major growth-forms were noted and recorded.

Furthermore, plant species > 2m in height were identified and listed while unidentified species were collected, pressed and taken to the University of Ibadan herbarium for identification and authentication. A plant species once identified, enumerated or collected is given a mark to avoid double enumeration.

Information from above were use to estimate:

(a) Diversity index $H' = - p_i \ln p_i$ (Simpson, 1949)

where $p_i = n_i/N$
$n_i$ = number of individuals of the $i^{th}$ species
N = total number of individuals

(b) Dominance index = $(n_i)^2/N$

where $n_i$ = Number of individuals of the $i^{th}$ species
N = total number of individuals

(c) Density of stands = Te / Tc

where Te = Total number of stands enumerated
Tc = Total area covered.

## RESULTS

The vegetation of this area is low-land rain forest drier-type. The major growth-forms are trees, shrubs, palm and climbers forming a thicket with closed canopy except in areas which have been subjected to one form of biotic disturbance or the other. Adjoining some of the transects are fallow land with scared tall trees and weeds which include *Chromolaena odorata, Panicum maximum, Pennisetum polystachion, Sporobolus pyramidalis, Aspilia africana, Cynodon dactylon, Ocimum basilicum, Sida sp. and Triumphetta sp.* These weeds were intermixed with trailers and twinners such as *Calopogonium mucunoides, Legenaria breviflora and Momordica charantia.* This part of the area is dominated by farms (mostly cassava, maize, kola, and tomatoes).

The species list for the area shows that a total of 897 plants were enumerated, see appendix 1. The species diversity index for the area is in the range of 0.1 - 0.24 while dominance value range from 0.00 - 0.01. The highest dominance value of 0.01 was contributed by *Alchornea codifolia, Cocos mucifera, Cola nitida, Elaeis guineensis* and *Musa sp.* Tree density in this area is estimated to be 56.1 stems per km. sq.

## DISCUSSION

The vegetation of Agbara Industrial Estate is basically low land rain forest drier-type. The occurrence of phanerophyte species is a characteristic of tropical origin (Hall and Okali, 1979; Aweto, 1981, a, b, c). The presence of some plants species within the study are shows evidence of regrowth vegetation or subsistence farming activities involving production of arable crops (Ross, 1954; Chukwuka, 1986). Some of the species include *Alchornea cordifolia, Anacardium occidentile, Chromolaena odorata, Dialium guineense, Annona senegalensis, Cola species, Mangifera indica, Carica papaya, Psidium guajava, Musa* species, *Manihot esculenta, Zea mays* and *Lycopersicum esculentum*. The presence of cash crops with the area suggest an evidence of land use or previous land us (Ahn, 1961, Hall and Okali, 1979). The cash crop recorded include *Cola acuminata, Cola nitida, Citrus aurantium, Citrus reticculata, Cocos nucifera, Chrysophyllum albidum, Elaeis guineesis, Theobroma cacao, Hevea brasilliensis, Garcinia kola,* and *Lycopersicum esculeltum.*

Deferent diversities indices have been reported for tropical rain forest vegetation (Hall and Swaine 1976, Hall and Okali, 1979 and Chukwuka, 1986). The diversity indices for this study were found to be in the range of 0.01 - 0.24. Hall and Okali (1979) reported diversity indices 0.05 - 0.15 in a woody fallow vegetation near Ibadan while Hall and Swaine (1976) reported indices bellow 0.25 in a closed canopy forest in Ghana. In another study in Ile-Ife, South-western Nigerian, Chukwuka (1986) reported diversity indices in the range of 0.04 - 0.27.

The high indices reported in this studies showed that the area is still young due to previous encroachment. No dominance by any plant was observed in the area. Species with high index value in the study were those encountered in the farms or plantations. It is noted that the impact of any vegetation encroachment in this estate will lead to a disappearance of this economic species via cutting of trees, movement of people and machines. These will create forest gaps and of course create rooms for unlawful exploitation of timber and thus leave no hope for biodiversity conservation. However, no endangered species was encountered in the study.

It would be expected that when the chemical industries cited in the estate start to operate at full capacity emission of industrial wastes - gasses or liquids would have their toll on the biotic community. It is here by suggested that efficient means of pollution control should be put in place to minimise the destructive effects of this by-products. Further more, it is imperative that the inhabitants of the immediate vicinity of these operating industries be adequately resettled to avoid casualties.

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## APPENDIX 1. SPECIES COMPOSITION OF AGBARA INDUSTRIAL ESTATE, SOUTH WESTERN NIGERIA

| S/NO | NAME OF SPECIES | FREQUENCY | DIVERSITY INDEX | DOMINANCE INDEX | ECONOMIC SPECIES |
|---|---|---|---|---|---|
| 1 | Acacia farnesiana | 6 | 0.03 | 0 | |
| 2 | Albizia glaberrima | 15 | 0.07 | 0 | |
| 3 | A. zygia | 3 | 0.02 | 0 | |
| 4 | Alchornea cordifolia | 75 | 0.021 | 0 | |
| 5 | Alstonia boonei | 2 | 0.01 | 0 | |
| 6 | Anacardium occidentale | 3 | 0.02 | 0 | * |
| 7 | Andropogon gayanus | dominant weed | | | |
| 8 | Annona senegalensis | 2 | 0.01 | 0 | * |
| 9 | Aspilia africana | Dominant weed | | | |
| 10 | Anthocleista djalonensis | 36 | 0.13 | 0 | |
| 11 | Antiaris toxicaria | 1 | 0.01 | 0 | |
| 12 | Artocarpus communis | 13 | 0.06 | 0 | * |
| 13 | Azadiraetha indica | 5 | 0.03 | 0 | |
| 14 | Bombusa vulguris | 40 | 0.14 | 0 | * |
| 15 | Bauhinia tomentosa | 1 | 0.01 | 0 | |
| 16 | Bombax sp | 3 | 0.02 | 0 | |
| 17 | Brachystegia sp. | 2 | 0.01 | 0 | * |
| 18 | Calopogonium mucunoides | dominant weed | | | |
| 19 | Calotropis procerl | 1 | 0.01 | 0 | |
| 20 | Canna indica | 4 | 0.02 | 0 | |
| 21 | Carica papaya | 24 | 0.1 | 0 | * |
| 22 | Cassia alata | 5 | 0.03 | 0 | |
| 23 | C. occidentalis | 13 | 0.06 | 0 | |

| | | | | | |
|---|---|---|---|---|---|
| 24 | C. siamea | 12 | 0.06 | 0 | |
| 25 | Ceiba pentandra | 5 | 0.03 | 0 | |
| 26 | Cromolaena odorata | dominant weed | | | |
| 27 | Chrysophyllum albidum | 3 | 0.02 | 0 | * |
| 28 | Citrus Aurantium | 16 | 0.07 | 0 | * |
| 29 | C. reticulata | 12 | 0.06 | 0 | * |
| 30 | Clerodendron polycephalum | 1 | 0.01 | 0 | |
| 31 | Cnestis farruginea | 2 | 0.01 | 0 | |
| 32 | Cocos nucifera | 85 | 0.22 | 0 | * |
| 33 | Cola acuminata | 23 | 0.09 | 0 | * |
| 34 | C. millenii | 3 | 0.02 | 0 | |
| 35 | C. nitida | 75 | 0.21 | 0 | * |
| 36 | Combretunm sp. | 15 | 0.07 | 0 | |
| 37 | Cynodon dactylon | dominant weed | | | |
| 38 | Dialium guineense | 1 | 0.01 | 0 | |
| 39 | Desmodium triflorum | dominant weed | | | |
| 40 | Dracaenia arorea | 1 | 0.01 | 0 | |
| 41 | Eliaeis guineensis | 85 | 0.22 | 0 | * |
| 42 | Ficus exasperata | 23 | 0.09 | 0 | |
| 43 | Funtumia elastica | 1 | 0.01 | 0 | * |
| 44 | Garcinia kola | 1 | 0.01 | 0 | * |
| 45 | Gmelina arborea | 25 | 0.1 | 0 | * |
| 46 | Heliotropiun indicum | dominant weed | | | |
| 47 | Hevea brasilliensis | 1 | 0.01 | 0 | * |
| 48 | Holarrhena floribunda | 2 | 0.01 | 0 | |
| 49 | Jatropha gossipifolia | 20 | 0.08 | 0 | |
| 50 | J. curcas | 8 | 0.04 | 0 | |
| 51 | Lagenaria dreviflora | dominant weed | | | |
| 52 | Lecaniodiscus cupanioides | 5 | 0.03 | 0 | |
| 53 | Lycopersiaim esculentum | farm land | | | |
| 54 | Macaranga balteri | 1 | 0.01 | 0 | |
| 55 | Margaritorius discoides | 1 | 0.01 | 0 | |
| 56 | Mangifera indica | 12 | 0.06 | 0 | * |
| 57 | Manihot esculenta | farm lands | * | | * |
| 58 | Marantochloa leucantha | 1 | 0.01 | 0 | |
| 59 | Milicia Excelsa | 1 | 0.01 | 0 | * |
| 60 | Millattia thonningii | 3 | 0.02 | 0 | |
| 61 | Mitragyna ciliata | 2 | 0.01 | 0 | * |
| 62 | Momoridica charantia | dominant weed | | | |
| 63 | Musa sp. | 98 | 0.24 | 0 | * |
| 64 | Musanga secropioides | 9 | 0.05 | 0 | |
| 65 | Myranthus arboreus | 5 | 0.03 | 0 | |
| 66 | Newbouldia laevis | 10 | 0.05 | 0 | |
| 67 | Nicotiana tabacum | 1 | 0.01 | 0 | * |
| 68 | Ocimum basilicum | dominant weed | | | |
| 69 | Palisota hirsuta | 6 | 0.03 | 0 | |
| 70 | Panicum maximum | dominant weed | | | |

| | | | | | |
|---|---|---|---|---|---|
| 71 | Paullinia pinnata | 10 | 0.05 | 0 | |
| 72 | Pennisetum polistachion | dominant weed | | | |
| 73 | Phoenix reclinala | 2 | 0.01 | 0 | |
| 74 | Psidium Guajava | 4 | 0.02 | 0 | * |
| 75 | Raphia hookeri | 25 | 0.1 | 0 | * |
| 76 | Roystonea oleracea | 3 | 0.02 | 0 | |
| 77 | Sida sp. | dominant weed | | | |
| 78 | Sporobolus pyramidalis | dominant weed | | | |
| 79 | Sterculia trangacantha | 1 | 0.01 | 0 | |
| 80 | Tectona grandis | 7 | 0.04 | 0 | * |
| 81 | Terminalia catappa | 10 | 0.05 | 0 | |
| 82 | Tetrochidium didymostemom | 1 | 0.01 | 0 | |
| 83 | Theobroma cacao | 2 | 0.01 | 0 | * |
| 84 | Trichilia prieuriana | 1 | 0.01 | 0 | |
| 85 | Triumphetta sp. | dominant weed | | 0 | |
| 86 | Urena lobata | dominant weed | | 0 | |
| 87 | Waltheria indica | 2 | 0.01 | 0 | * |
| 88 | Xanthosoma sagittifolia | farm land | | 0 | * |
| 89 | Zea mays | farm land | | 0 | * |