ENDANGERED SPECIES IN NIGERIA

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Classification and types of Nigerian Vegetation

Since this presentation is dealing with endangered plant species in Nigeria, it is necessary to introduce the subject of vegetation which is the composition of plant forms of all plant species. There are two broad types of vegetation in Nigeria namely forest and savanna. Forest is defined as vegetation dominated tree species in open or closed canopy from which grasses are virtually absent. Most of the trees are not fire tolerant (Keay 1959) savanna vegetation on the other hand consists of woodland dominated by tall grassy ground layer with scattered trees and shrubs, usually with open canopy. Most of the trees are somehow fire tolerant.

Detailed descriptions of the structure, floristic composition and physiognomy of Nigerian vegetation types and their zonal and local variations especially in relation to climatic, edaphic and topographic factors have been given in the past by various workers (Richards 1966, Keay 1959, Charter 1970, Onochie 1979 and others).

Based on climatic, edaphic and biotic factors Keay (1959) for instance subdivided the vegetation of Nigeria into:

(1)The forest regions comprising:
- (a) Mangrove forest and coastal vegetation
- (b) fresh water swamp forest and other wetlands
- (c) lowland rain forest

(2) The savanna regions consisting of
- (a) Southern Guinea zone
- (b) Northern Guinea zone
- (c) Sudan zone
- (d) Sahel zone and

(3) Montane vegetation. According to Keay, the lowland rain forest has been degraded to "derived" savanna in many densely populated areas of southern Nigeria as a result of fire, grazing and other farming activities. Riparian forests (Kurmis) occur in river or stream banks in savanna region. The phenomenon of endangered plant species, sometime culminating in species extinction can be considered in terms of genetic erosion and/or loss in species richness and structure in each of the above vegetation types.

1.3. Exploitation and Major Uses of Nigerian plants and sites.

Forest products which are which are derived from the forest ecosystem are subdivided into
(a) Timber and
(b) Non timber.

The latter namely NTFPS are subdivided into (1) woody and non wood products. See Fig 1 of Okafor et al 1994, reproduced below.

Each vegetation type provides several commodity groups. The exploitation and utilization of such products can contribute to, or exacerbate the incidence of loss or endangered status of plant species as will be elaborated in greater detail later in this presentation. Similarly, the conversion of environmental habitats into infrastructural developments generally referred to as anthropogenic factors also lead to species loss as also explained later.

DEFORESTATION AND LOSS OF BIODIVERSITY

Definition and causative factors.

Deforestation is the removal of forest and other forms of vegetative cover from a site without its replacement (NEST 1991). The incidence of deforestation is now on the increase due to increased socio-economic activities.

Major causes of deforestation in Nigeria include: population growth, the expansion of economic activities such as logging and timber exploitation, farming, urbanization, bush burning, firewood collection, grazing, and infrastructural development often associated with large scale clearing of forests and woodland, for example, the construction of infrastructural facilities such as roads, airports, educational establishments, markets, hospitals, and gas pipelines have consumed large areas of forests.

Loss in Biodiversity and genetic resources.

Gbile et al (1981) compiled a list of 484 species in 112 families out of 4600 species in Nigeria. About 205 of the Nigerian species are endemic in the region, implying that their loss will result in extinction from the earth (Okafor 1991). Furthermore WWF (1989) also estimated that over 90% of the natural vegetation has already been cleared and lost in Nigeria while up to 350,000 ha of forest and vegetation is still being lost annually over the country due to deforestation (NEST 1991).

Reforestation

One of the best ways of countering deforestation is reforestation which means replanting or reestablishing of forest where deforestation has taken place. Conversion of poorly stocked, forests with monocultures of economic plantation species can also be regarded as reforestation. Similarly reclamation and stabilization of ecological disaster areas, resulting

from erosion or flooding, as well as degraded savanna woodlands, are all aspects of reforestation.

Line enrichment planting within the forest vegetation is furthermore, an aspect of reforestation. It enriches the stacking of economic species which may have been over exploited or originally deficient in stocking of economic species such as mahoganies.

Introduction of conservation and agroforestry practices in degraded or marginal sites is also a valuable reforestation strategy (Okafor & Lamb 1994) Okafor and Caldecotte 1990)

CONSERVATION MEASURES

Methods of conservation

The issues of biodiversity loss or lost crops or even endangered plant species should be taken hand in hand with conservation measures which are necessary in order to stem the tide of the process. The forestry sector has played an important rule in the conservation of forest resources. Two methods of conservation namely in-situ and ex-situ have been adopted as indicated earlier (Roche 1975, Kio et al 1985).

The establishment of forest reserves, strict nature reserves and National Parks (which are nature habitats of useful plants such as food yielding and medicinal plants) refer to in-situ conservation. Programmes in in-situ conservation have been implemented by state forest services, Forestry Research Institute of Nigeria (FRIN), World Wide Fund for Nature (WWF), Man and the Biosphere (MAB), Nigerian Conservation Foundation (NCF) etc. (Onochie 1975, Okali 1990, Okafor and Caldecotte 1990).

The programmes on ex-situ conservation refer to seed storage, pollen storage, clone banks, botanic gardens and arboreta, tissue and meristem culture, undertaken outside the natural habitats. Such programmes have also been under taken by FRIN, Forestry Development and Investigation Branch (FDIB), the National Centre for Genetic Resources Conservation (NACGRAB), National Institute of Horticulture (NIHORT), and Fame Agriculture Centre (FAC) etc (Kio et al 1985, Okafor 1978, 1981, 1991)

Despite the above attempts in in-situ and ex-situ conservation measures, the problem of endangered plant species in Nigeria is still persisting as discussed further, in this presentation.

Threat of Extinction

The factors which affect the extinction or disappearance of plant species in Nigeria as indicated earlier include (Okafor 1993):

- endemism in which the species are confined or restricted to a particular habitat
- over utilization by which even wide spread species are prone to danger of

extermination except if adequately conserved.

- inadequate policy measures, resulting in neglect in research, development and utilization (RDU) and conservation of indigenous plants in various habitats.
- destructive methods of harvesting such as uprooting.
- overall deforestation practices as already discussed leading to habitat modification and destruction of forests and loss of biodiversity.

These factors in general, contribute to the status of endangered species in Nigeria as will be elaborated under various categories in the next section with suggestion on possible remedial measures.

SCOPE AND CATEGORIES OF ENDANGERED PLANT SPECIES

Scope

The scope or range of endangered plant species include (i) wild species which are in restricted habitats, (ii) wide spread but intensively harvested and utilized (iii) so called uneconomic species e.g. timber species (iv) recalcitrant species which lose viability early (v) under utilized or neglected species (vi) primitive cultivars and wild relatives of crop plants.

Categories of endangered plant species

Arising from the above scope the following categories of endangered plant species can be specified

1 Wild plants which are hardly cultivated occurring in the various vegetation zones and habitats. These include a wild range of trees, erect shrubs climbers and herbs. Habitat modification can pose a threat e.g. swamp species. This category encompasses the various vegetation types including forest and savanna zones.

2 Economic and highly utilized species yielding both timber and non timber forest products such as food and medicine e.g. Irvingia wombola, *Gnetum* spp, *Piper guineense*. Harmful harvesting such as uprooting is adversely affecting *Gnetum* spp. through picking of fruits of Irvingia spp for kernel is also harmful.

3 Uneconomic timber species. Since forest management practices emphasize timber produce, silvicultural practices eliminate the uneconomic species during thinning and tropical shelter wood system (TSS) in order to favour the well known economic species. This is a major threat. It is also an error in judgment since some previously uneconomic species are now known to be highly ranked e.g. *Afrormosia alata*.

4 "Minor" forest species which are now re-designated as other forest products (Okafor 2001) including fruit and vegetable species, as listed in Okafor 1979. The neglect in

RDU method to this category represents a threat. Examples include *Treculia africana, Pentaclethra macrophylla, Plukenatia conophora, Mondia whitei.*

5 Recalcitrant species. This category includes species which lose viability early e.g. Chrysophyllum albidum or which have delayed germination e.g. *Garcinia kola*

6 Primitive cultivars and wild relatives of popular crop plants. e.g. *Dioscorea, Sphensstylis, Vignia, Amaranthus, celosia, vernonia and citrullus.*

7 Trees of mystic and cultural significance whose branches and other parts are intensively collected and utilized for masquerades and display of magic and native power. Examples of such plants which are thus seriously endangered include Octoknema affinis and Okoubaka anbrevillei (both believed to kill other trees around them) as well as Detarium senegalense, Adenia spp. On the contrary, some plants are protected on account of their cultural significance e.g. *Albizia ferruginea, Newbouldia laevis, Milicia excelsa, Chrysophyllum albidum, Dracaena arborea*, among others.

8 Aquatic or stream banks species. Aquatic species are endangered generally because adverse habitat modification put the existence of such plants in jeopardy. Examples include water lilies, Raphia spp. edible fern, and wetland species.

Checklists of under-utilized, neglected, fast disappearing and/or endangered plant species in Nigeria.

Examples of important forest food and medicinal plant resources that are ecologically and socio-economically accepted in various parts of Nigeria include the following (Okafor 1991, Okafor & Ham 1999). These species are endangered and progressively in the process of being lost (Okafor 1993); they therefore need increased conservation efforts.

Forest zone

Food plants

	Species	**Family**	**Life form**	**Status of domestication**
1	Beilschemeidia mannii	Lauraceae	Tree	Wild
2	Blighia sapida	Sapindacea	Tree	Wild
3	Chrysophyllum albidum	Sapotaceae	Tree	Wild
4	Cola acuminata	Sterculiaceae	Tree	Wild, cultivated
5	C. lepidota	Sterculiaceae	Tree	Wild

6	C. pachycarpa	Sterculiaceae	Tree	Wild
7	Dacryodes edulis	Burseraceae	Tree	Wild, cultivated
8	Dennettia tripetala	Annonaceae	Tree	Wild, cultivated
9	Dialium guineense	Caesalpiniaceae	Tree	Wild
10	Dioscoreophyllum cumminsii	Menispermacea e	Climber	Wild
11	Elaeis guineensis	Palmae	Tree	Wild, planted
12	Garcinia kola	Guttiferae	Tree	Wild, planted
13	Gnetum spp	Gnetaceae	Shrub	Wild, planted
14	Gongronema latifolium	Asclepiadaceae	Climber	Wild, planted
15	Irvingia gabonensis	Irvingiaceae	Tree	Wild, planted
16	R. wombolu		Tree	Wild, planted
17	Monodora myristica	Annonaceaa	Tree	Wild
18	Myrianthus arboreus	Moraceae	Tree	Wild
19	Ocimum gratissimum	Labiatae	Shrub	Wild
20	Pentaclethra macrophylla	Mimosaceae	Tree	Wild
21	Piper guineense	Piperaceae	Climber	Wild, planted
22	Pterocarpus spp	Papilionaceae	Tree	Wild, planted
23	Raphia hookeri	Palmae	Tree	Wild
24	Spondias mombin	Anacardiaceae	Tree	Wild
25	Synsepalum dulcificum	Euphorbiaceae	Tree	Wild
26	Plukenatu conophorum	Euphorbiaceae	Climber	Wild
27	Thaumatoccus danielili	Morantaceae	Herb	Wild
28	Treculia Africana	Moraceae	Tree	Wild

29	Vemonia amygdalina	Compositae	Shrub	Cultivated
30	Monodia whitei	Periplocaceae	Climber	Wild

Medicinal plants

List of medicinal plants that are endangered due to intensive use and distribution in the wild (Okafor and Ham 1999)

	Species	**Family**	**Life form**	**Status of domestication**
1	Cnestis ferruginea	Connaraceae	Shrub	Wild
2	Sphenocentrum jollyanum	Menispermaceae	Shrub	Wild
3	Microdesmis puberula	Euphorbiaceae	Shrub	Wild
4	Cissus spp	Ampelidaceae	Climber	Wild & semi wild
5	Mallotus oppositifolius	Euphorbiaceae	Shrub	Wild
6	Cassia alata	Caesalpiniaceae	Shrub	Wild & semi wild
7	Acanthus montanus	Acanthaceae	Shrub	Wild & semi wild
8	Leea guineensis	Ampelidaceae	Climber	Wild
9	Anthocleista djalonensis	Loganiaceae	Tree	Wild
10	Strophanthus gratus	Apocynaceae	Climber	Wild
11	Enantia chlorantha	Annonaceae	Tree	Wild
12	Buchholzia coriaceae	Capparidaceae	Tree	Wild and cultivated
13	Schumanniophytun magnificum	Rubiaceae	Tree	Wild & semi wild
14	Rauvolfia vomitoria	Apocynaceae	Tree	Wild & semi wild
15	Anchomanes difformis	Araceae	Herb	Wild
16	Dalbergia saxatilis	Papilionacea	Shrub	Wild & semi wild
17	Moringa oleifera	Moringaceae	Tree	Cultivated
18	Sida acuta	Malvaceae	Under shrub	Wild
19	Talinum triangulare	Potulaceae	Herb	Wild & cultivated
20	Euphorbia heterophylla	Euphorbiaceae	Herb	Wild
21	Hoslundia opposita	Labiatae	Shrub	Wild
22	Phyllanthus amarus	Euphorbiaceae	Herb	Wild
23	Jatropha curcas	Euphorbiaceae	Shrub	Cultivated

24	Millettia thonningii	Papilionaceae	Tree	Wild
25	Ritchiea longepedunculata	Capparidaceae	Shrub	Wild
26	Ocimum gratissium	Labiatae	Shrub	Cultivated, wild
27	Ricinus communis	Euphobiaceae	Shrub	Cultivated
28	Dennettia tripetala	Annonaceae	Tree	Cultivated, wild
29	Cassia tora	Caesalpiniaceae	Shrub	Wild
30	Bryophyllum pinnatum	Crassulaceae	Herb	Wild & cultivated
31	Vernonia conferta	Compositae	Tree	wild
32	Abrus praecatorius	Papilionaceae	Shrub	Wild
33	Diodia scandens	Rubiaceae	Shrub	Wild
34	Psychotria psychotrioides	Rubiaceae	Shrub	Wild
35	Draecena arborea	Agavaceae	Tree	Wild & planted
36	Peperomia pellucida	Piperaceae	Herb	Wild
37	Cyathula prostrata	Amaranthaceae	Herb	Wild
38	Ceiba pentandra	Bombaceae	Tree	Wild
39	Piptadeniastrum africanum	Mimosaceae	Tree	Wild
40	Aubrevillea kerstingii	Mimosaceae	tree	Wild
41	Acanthospermun hispidum	Compositae	Herb	Wild
42	Emlia coccinea	Compositae	Herb	Wild
43	Ficus exasperate	Moroceae	Tree	Wild
44	Combretum platypterum	Combretaceae	Climber	Wild
45	Millettia zechiana	Papilionaceae	Tree	Wild
46	Morinda lucida	Rubiaceae	Tree	Wild
47	Costus afer	Zingiberaceae	Shrub	Wild
48	Portulaca oleracea	Portulacaceae	Herb	Wild
49	Gomphrena globosa	Amaranthaceae	Herb	Wild
50	Lonchocarpus cyanescens	Papilionacea	Shrub	Wild & semi wild
51	Combretum paniculatum	Combretaceae	Shrub	Wild
52	Spondias mombin	Anacardaceae	Tree	Wild
53	Nauclea latifolia	Rubiaceae	Tree	Wild
54	Aloe barteri	Liliaceae	Herb	Wild
55	Sansiviera liberica	Agavaceae	Herb	Wild & cultivated
56	Uvaria chamae	Annonaceae	Shrub	Wild

. **Savanna zone**

	Species	Family	Life form	Status of domestication
1	Adansonia digitata	Bombaceae	Tree	Wild
2	Afzelia africana	Caesalpiniaceae	Tree	Wild
3	Annona senegalensis	Annonaceae	Shurb	Wild
4	Balanites aegyptiaca	Zygophyllaceae	Tree	Wild
5	Borassus aethiopum	Palmae	Tree	Wild
6	Ceiba pentandra	Bomboceae	Tree	Wild
7	Detarium microcarpum	Caesalpiniaceae	Tree	Wild
8	Ficus capensis (F. sur)	Moraceae	Tree	Wild
9	Grewia mollis	Tiliaceae	Shrub	Wild
10	Irvingia smithii	Irvingiaceeae	Tree	Wild
11	Moringa oleifera	Moringaceae	Tree	Cultivated
12	Parkia biglobosa	Mimosaceae	Tree	Wild
13	Phoenix reclinata	Palmae	Tree	Wild
14	Prosopis africana	Mimosaceae	Tree	Wild
15	Raphia sudanica	Palmae	Tree	Wild
16	Pterocarpus santalinoides	Papilionaceae	Tree	Wild
17	Syzgium guineense	Myrtaceae	Tree	Wild
18	Tamarindus indica	Caesalpiniaceae	Tree	Wild
19	Vitellaria paradoxa	Saposaceae	Tree	Wild

Policy Frame Work and Action Plan.

- **Conservation: a shared concern**

NEST (1991) has described conservation as a shared concern in Nigeria indicating the involvement of several Government and Non Governmental establishments such as Federal, State and Non Governmental organizations (NGOs) including Forestry Research Institute of Nigeria (FRIN), state forestry services, Nigerian Field Society, Forestry Association of Nigeria, Nigerian Man and Biosphere (UNESCO) Programme, Nigerian Conservation Foundation (NCF), Cross River National Park in Cross River State, the Nigerian Environmental Study / Action Team (NEST), among others. Thus the policy guiding this important subject is to adopt a multidisciplinary as well as multi locational approach, in the planning and execution of conservation programmes. Throughout the country.

- **Conservation action.**

An important action taken by the forest services is the enaction of laws which protect natural vegetation from damage particularly laws against illegal felling of trees and bush burning. However the damage to natural vegetation and its constituent species has continued because of ineffective enforcement of such laws. Recently the Nigeria National Biodiversity strategy and Action Plan was produced by the Federal Ministry of Environment under the Presidency, National Resources Conservation Council. In chapter 3, of the Biodiversity Strategy and Action Plan, an account on the Flora is presented, citing Gbile et al 1978. summarized in Table 3.1 (op cit) reproduced below:

Distribution of threatened plant species within families.

Family	No. of Threatened Plant spp.	Family	No. of Threatened Plant spp.
Acanthaceae	26	Loganiaceae	4
Adiantaceae	5	Lomariopsidaceae	2
Agavaceae	2	Loranthaceae	1
Amarantaceae	1	Lycopodiaceae	1
Anacardaceae	7	Malvaceae	1
Annonaceae	15	Marantaceae	1
Apocynaceae	19	Melastomataceae	8
Araceae	3	Meliaceae	2
Araliaceae	1	Menispernaceae	2
Aristolochiaceae	3	Mimosaceae	3
Asclepiadaceae	2	Monimiaceae	2
Aspidiaceae	7	Moraceae	9
Aspleniaceae	6	Myriticaceae	2
Athyriaceae	2	Myrtaceae	1

Balsaminnaceae	1	Najadaceae	1
Begoniaceae	2	Orchanaceae	1
Boraginaceae	4	Octoknemataceae	1
Burseraceae	1	Olacaceae	1
Butomaceae	1	Olaceae	1
Caesalpiniaceae	13	Onagraceae	1
Capparidaceae	2	Opiliaceae	2
Caryophylaceae	2	Orchidaceae	23
Celastraceae	6	Orobanchaceae	1
Combretaceae	9	Oxalidaceae	2
Commelinaceae	3	Papilionaceae	8
Compositae	36	Pedaliaceae	1
Connaraceae	6	Pittosporaceae	2
Convolvulaceae	3	Plantaginaceae	1
Cruciferae	1	Podostemaceae	2
Cucurbitaceae	6	Protaceae	1
Cytheaceae	1	Ranunculaceae	2
Cyparaceae	21	Rosaceae	3
Dennstaedtiaceae	1	Rubiaceae	16
Dichapetalaceae	11	Rutaceae	3
Ebenaceae	7	Salvadoraceae	1
Ericaceae	2	Santalaceae	1
Eriocaulaceae	3	Sapindaceae	8
Euphorbiaceae	31	Sapotaceae	2
Flacourtaceae	7	Scrophulariaceae	2
Gentinaceae	2	Scytopetalaceae	2
Geraniaceae	1	Selaginellaceae	1
Gnetaceae	1	Simaroubaceae	2
Goodeniaceae	1	Solanaceae	1
Graminae	19	Sterculiaceae	4
Guttiferae	4	Thelypteridaceae	2
Hymenophylacelae	4	Thymelaeaceae	3
Hypericaceae	3	Tiliaceae	2
Icacinaceae	2	Ulmaceae	1
Iridaceae	1	Umbelliferae	3
Labiatae	6	Urticaceae	2
Lauraceae	2	Verbenaceae	2
Lecythidaceae	2	Violaceae	2
Lemnaceae	1	Vittariaceae	1
Lentibulariaceae	1	Vochysiaceae	1
Liliaceae	2	Xyridaceae	1
Lobeliaceae	3	Zingiberaceae	2

The checklist of endangered plant species presented section 4.3 is based on recent assessment made by me for the purpose of this presentation arising from anthropogenic factors and status of domestication of the species listed. It is essential that conservation strategies should be developed and adopted for most of the wild species that are intensively harvested and utilized, since the wild habitats where they occur are not secure, even inspite of the laws prohibiting indiscriminate forest clearance, bush burning and such environmental degrading factors.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

1 Attention has been drawn to the fact that ever increasing plant species are endangered owing to various factors of threat, as outlined in the paper.

2 For instance, Local livelihood pursuit, urbanization and industrialization, generally discussed under deforestation pressures, have negatively impacted on the Flora and Vegetation in Nigeria, through depletion of edible plants, medicinal plants, wildlife and aquatic plants.

3 The paper has also identified many plants whose fruits, leaves, barks, rots and other parts have medicinal properties which are yet to be fully popularized.

4 In-situ conservation strategies are not always adequate to preserve wild plants because their natural habitats are indeed vulnerable due to forest destruction and uncontrolled and unsustainable, exploitation of both rare and abundant species.

5 Plants of medicinal values should be preserved, protected and popularized, due to the large number of ailments they can be used to treat, as well as their wealth creation potentials.

Recommendations

1 A survey of the country's ecosystems including farming systems should be regularly carried out with a view to determining those species that are in serious danger of extinction and immediate action should be taken to collect such species or conserve them in-situ in their natural habitats. Ex-situ conservation in botanic gardens and compound farms are useful.

2 Wherever possible all living plant collections of endangered species grown for conservation purpose should be stored in the form of seeds in the gene bank.

3 conservation oriented botanic gardens should be established in different ecological zones in the country by universities and Government Institutions among others.

4 Furthermore, action is needed at various levels if endangered plant species of

medicinal, nutritional and socio-economic importance are to be popularized and protected. Thus, action is required at the individual, community level, Government level and International level. As suggested incentive structure, including funds, land allocation, capacity training, and employment opportunity, among others, should be provided to local communities and other agencies, to encourage conservation, research, development and enhanced utilization of endangered useful plant species in Nigeria, such as those highlighted in this presentation. This action is intended to enhance the prospects of their preservation and sustainable use.

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