

# Controlling the advancement of Savanna into southwestern Nigeria

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## ABSTRACT

International conservation policies indicate that most of the original moist forest is gone. It has been predicted that within the next decade, the remaining forest area in Nigeria would be eliminated if the depletion of forest continues. This study aims at discovering indigenous practices that prevent savanna encroachment into the forest and to demonstrate ex-situ conservation. A total of six hundred male and female informants, 200 individuals each from the three indigenous communities of Gambari, Olokemeji and Akure forest reserves were selected and interviewed about their knowledge and perception of plant conservation in their native Yoruba language. The study showed that respondents in these communities have some measures as part of their cultural practices and traditional belief system in controlling encroachment of savanna into the forested southwestern Nigeria. This study led to the establishment of a medicinal garden at the Forestry Research Institute of Nigeria (FRIN). There is no doubt that the traditional cultural belief system has contributed to the conservation of plant diversity and should be encouraged.

## RESUMEN

Políticas de conservación internacional indican que la mayor parte de la cobertura original de los bosques húmedos ha desaparecido. Se ha predicho que durante la década siguiente, el área remanente de bosques en Nigeria sería eliminada si se continúa con la extracción de los bosques. Este estudio tiene como objetivo descubrir prácticas indígenas que previenen la invasión de sabanas en el bosque y de demostrar conservación exsitu. Se seleccionaron un total de 600 informantes masculinos y femeninos, 200 individuos de cada una de las tres comunidades indígenas de las reservas forestales de Gambari, Olokemeji y Akure. Los informantes fueron preguntados por su conocimiento y su percepción de la conservación de plantas en su lenguaje nativo Yoruba. El estudio mostró que los entrevistados en estas comunidades, como parte de sus prácticas culturales y sistema de creencia tradicional, usan medidas para controlar la invasión de la sabana en los bosques del suroeste de Nigeria. Este estudio influyó el establecimiento de un jardín medicinal en el Instituto de Investigación Forestal de Nigeria (FRIN). No hay duda de que el sistema de creencia tradicional ha contribuido a la conservación de la diversidad vegetal y que debería ser incentivado.

## INTRODUCTION

Forests actively contribute to the sustenance of the global environment of the earth. They are also utilized as economic resources to produce subsistence and industrial forest products. They have cultural and recreational values and perform functions such as preventing erosion and degradation of soil, protecting watersheds and stabilizing mountainous areas. Despite the immense advantages of forests, agencies and organizations have reported great forest losses due to unfavourable forestry practices all over the world (FAO, 1997). About 50% of the original forest in the earth has been destroyed especially during the past 30 years (WRI/WCWC/WWF, 1997). Other scientists and operators of Conservation International were of the same view (Myers et al. 2000; Mittermeir et al., 2000, Conservation International, 2001).

In Africa, forests have been greatly destroyed by loggers and farmers clearing lands for agricultural use. Ninety percent of the original moist forest in West Africa is gone and the leftover is heavily fragmented and degraded (FAO, 1999). The major threats to forest sustainability in Africa are logging and commercial hunting by bush burning. Hunting eliminates the aggregation of plant species that help to maintain the natural forest ecosystems while logging creates a pathway for hunters, farmers and profit seeking individuals. In Nigeria, Federal Environmental Protection Agency (1992) showed that over 43% of the total geographic area of 923,768km<sup>2</sup> has been lost in 12 years to human activities. The federal and state governments of Nigeria are fully aware of the droughts in the country and the southward ingress of the savanna (Federal office of statistics, 1999).

The structure of the Nigerian vegetation is rapidly changing as a result of human activities which are causing the loss of forest lands. This has a significant adverse effect on conservation and sustainable use of plant diversity. Bodeker (1997) reported the reduced availability of plants which used to be the first and last resort by the populace and the need for important habitat of nature to be protected. The South Western part of Nigeria which used to be mostly in the forest zones and had big forest reserves in Oyo, Ogun and Ondo States of Nigeria now fall in the derived savanna (Fig. 1). This kind of vegetation is known to have peculiarities of reduced rainfall and consequently drier vegetation with its attendant's serious ecological and social economic problems. The Gambari, Olokemeji and Akure forest reserves and their environs were selected for this study because of the severity of savanna encroachment into this zone. This study therefore aims at knowing if there are indigenous practices that promote biodiversity conservation and to establish a medicinal garden as a demonstration of ex-situ conservation.

## METHODOLOGY

A convenience sampling of the human population of Gambari, Olokemeji and Akure forest reserves and their environs was done. Six hundred informants made up of two hundred individuals from each community were interviewed in native Yoruba language about their knowledge and perception on plant conservation after approval from village heads.

The choice of individuals interviewed was based on their knowledge of herbal medicine. Their positions as farmers, traditional healers, family heads, chiefs and village heads were also

taken into consideration. They were males and females between the ages of 25 – 85 years. Plants were identified on site and those that could not be identified on the field were labelled using herbarium sample specimens, literature and books at the Forest Herbarium Ibadan (FHI). Plants mentioned as threatened or endangered by the indigenes were collected at various locations of each site and propagated by planting their seeds, seedlings and stem cuttings at the Forestry Research Institute of Nigeria Garden to demonstrate ex-situ conservation. The list of domesticated plants was arranged in alphabetical order by Families.

### Study Sites:

The study sites comprised of three forest reserves: Gambari, Olokemeji and Akure, which are located in Oyo, Ogun and Ondo states of Nigeria respectively. The study sites have two distinct seasons, the dry and wet seasons. The wet season begins in April and ends in November while December to March are the dry months.

### Gambari Forest Reserve:

Gambari forest reserve lies within Latitude 7°23'N and Longitude 3°33'E. The reserve, which covers an area of 11,518 hectares, is situated along River Ona. A low ridge runs from north to south direction on the western side of the central part of the Gambari forest reserve. The drainage runs westwards from the north and west into River Ona. In the southeast, streams drain into River Awun, which flows southward. The topography of the study area is more or less undulating. The average altitude in the reserve is from 122 to 152 above sea level. The forest reserve which used to be part of the lowland rainforest is now in the Guinea savanna and Derived savanna zones.

### Olokemeji Forest Reserve:

Olokemeji 7°25' and 3°32' E lies approximately 32km west of Ibadan, Oyo State, Nigeria and 35km north east of Abeokuta, Ogun State, Nigeria. The vegetation was at the margin of the lowland rainforest and derived savanna zones. The reality on ground during the period of field study was that most of the reserve was in a derived savanna zone. The drier type of lowland rainforest is rich in species of the deciduous trees with relatively large proportion of Sterculiaceae, Ulmaceae and Moraceae.

### Akure Forest Reserve:

Akure forest reserve lies between longitude 5° and 5° 30'E and latitude 7° and 7°20'N. It is about 20km from Akure, Ondo State. It is specifically located in Owena town and the reserve has an area of 43.4km<sup>2</sup>. The vegetation of the area is not uniform and the forest is broken with gaps and windbreaks found in irregularly distributed patches.

## RESULTS

Seventy percent of the respondents had the cultural belief that some trees such as *Adansonia digitata*, *Bombax buonopozense* and *Melicia excelsa* should not be cut down due to spiritual

reason. The respondents believe that some spirits live in these trees and therefore should not be felled without appeasing them. *Newbouldia laevis* is also regarded as a sacred tree in these communities as its leaves are used in conferring chieftaincy titles to people, thus the plant is preserved. Other plants used for divination practices are *Datura metel*, *Dracaena fragrans*, *Schrebera arborea* and *Boerhaavia diffusa*. They are used in washing the gods in order to keep its spirits alive for divine intervention. During the field study, two shrines were seen at Akure and one at Olokemeji. Although the indigenes did not allow access into any of the shrines, plant species which were identifiable from a short distance were *Newbouldia laevis*, *Khaya grandifoliola*, *Sterculia tragacantha*, *Colocasia esculenta* and *Trema species*. Villagers use battens for removal of some barks and under no circumstance should a matchet or any other metal object be used for debarking. Although the disappearance of some plant species such as *Bridelia ferruginea*, *Croton zambesicus* and *Xylopia aethiopica* is high, the indigenes believed that plant resources can never be exhausted.

Most of the study sites had been taken over by agroforestry system of farming, which is popular among the inhabitants. *Gliricidia sepium*, a plant observed on the farmlands at the study sites is a legume of medicinal importance that has its leaf and bark juice curing itching and some other skin problems. Other plants of medicinal value used in agroforestry include *Acacia nilotica* used as antimalaria, *Dalbergia sisso* for treating gonorrhoea, *Cassia fistula* used as laxative and *Leucaena leucocephala* used for various eye sight problems.

Home gardening was a form of ex-situ conservation observed in this study. This was managed by both the young and old members of the population. Amongst the plants found in home gardens were *Ocimum gratissimum* for treating pile, *Jatropha curcas* and *J. gossypifolia* for treating skin infection, *Kigelia africana* for treating female problems like fibroids and induction of lactation and *Vernonia amygdalina* for treating pile and making soup. Some populations of *Momordica charantia* were maintained during the dry season and sold expensively on request.

As a means of biodiversity conservation, seventy-two plant species observed in the study sites and categorized as rare or threatened were established in a medicinal plant garden at the Forestry Research Institute of Nigeria to demonstrate ex-situ conservation. The plants maintained in the medicinal garden are listed in Table 1. Out of the 42 Families domesticated, Family Papilionaceae had the highest occurrence with 6 species, followed by Euphorbiaceae with 5 species while 25 Families were represented with only a plant species each. Plates 1 and 2 show sectional parts of the medicinal garden focusing some plant species. On ex-situ conservation, *Enantia chlorantha* which were seriously debarked in the study sites did not thrive by cultivation at the medicinal garden; though the local people believed that it cannot be cultivated.

## DISCUSSION

Despite the indiscriminate destruction of forests and the unsustainable harvesting of forest products, the traditional cultural system of the studied communities showed evidence of in-situ conservation. The fact that the respondents believed that trees such as *Adansonia*

*digitata*, *Bombax buonopozense*, *Newbouldia laevis* and *Melicia excelsa* are sacred and are preserved in their natural environment buttresses this fact. The establishment of shrines and grooves where cutting is prohibited is highly contributory to the conservation and biodiversity in these communities.

The practice of agroforestry by the indigenes though, enhances food production and maintain the fertility of the soil, is indirectly preserving some plant species. This is an indication that they unknowingly support awareness for the need of plant conservation. The fact that they leave trees, which serve as wind breakers preventing soil erosion while providing shade contributes to indigenous way of plant conservation. The more forest species are conserved and replanted by the indigenous people, the less the chances of savanna species which are predominantly tall grasses and plants of smaller life forms encroaching on the forest areas. Agroforestry practices known to modify soils and other ecological processes, was supported by Nazir (2007) that marginal farmers who cannot cultivate medicinal plants solely should propagate them through agroforestry. The immense knowledge of farmers on plant and environment could be attributed mainly to years of experience and close observation of nature in the opinion of Singh et al (2006).

The occurrence of home gardens in the study sites shows that plants may contribute to household income. Plants observed in such gardens are useful for attending to health problems of urgent nature. The work of Aiyelaigbe (1994) confirms that home gardens serve as resource centers for multi-use of plants in the areas of food, fodder, ornamental and medicine.

The fact that indigenes could mention some plants as scarce and becoming rare to collect contradicts the belief by the indigenous people that plants are always available in the forests for collection. The cultivation of plants as a demonstration of ex-situ conservation in a medicinal garden at FRIN highlighted plants that are becoming rare as mentioned by the indigenes. This study reveals that peoples' knowledge and perceptions towards environment are important elements of cultural identity and biodiversity conservation.

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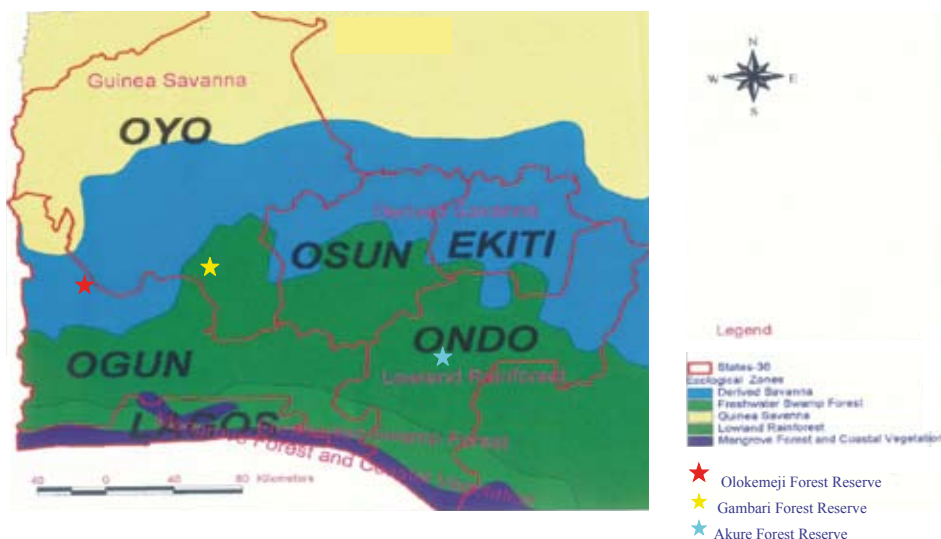
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**Table 1**

FAMILY	BOTANICAL NAMES
Anacardiaceae	<i>Spondias mombin</i> Linn.
Annonaceae	<i>Xylopia aethiopica</i> A.Rich. <i>Cleistopholis patens</i> (Benth) Engl. & Diels
Apocynaceae	<i>Rauvolfia vomitoria</i> Afz. <i>Alstonia boonei</i> De Wild <i>Hedranthera barteri</i> (Hook. f.) Pichon
Araceae	<i>Dieffenbachia</i> sp <i>Colocasia esculenta</i> (Linn.)Schott
Aristolochiaceae	<i>Aristolochia rigens</i> Vahl.
Asclepiadaceae	<i>Pergularia daemia</i> (Forssk.) Chiov.
Bixaceae	<i>Bixa orellana</i> Linn.
Bombacaceae	<i>Bombax buonopozense</i> P. Beauv.
Cactaceae	<i>Opuntia</i> sp
Caesalpinaceae	<i>Cassia fistula</i> Linn. <i>Senna podocarpa</i> Guill. & Perr. <i>Azelia africana</i> Smith <i>Senna alata</i> (Linn.)Roxb.

FAMILY	BOTANICAL NAMES
Combretaceae	<i>Terminalia superba</i> Engl.&Diels <i>Terminalia glaucescens</i> Planch
Commelinaceae	<i>Palisota hirsuta</i> (Thunb.)K. Schum
Compositae	<i>Struchium sparganophora</i> (Linn.) O. Ktze
Connaraceae	<i>Cnestis ferruginea</i> DC.
Costaceae	<i>Costus afer</i> Ker- Gawl.
Euphorbiaceae	<i>Pedilanthus tithymaloides</i> (Linn.) Poit. <i>Alchornea cordifolia</i> Muell.Arg <i>Jatropha gossypifolia</i> Linn. <i>Bridelia ferruginea</i> Benth <i>Euphorbia kamerunica</i> Pax
Icacinaeae	<i>Icacina triachantha</i> Oliv.
Ixonanthaceae	<i>Irvingia gabonensis</i> Baill. <i>Irvingia sinithu</i> Hook.f
Labiatae	<i>Ocimum gratissimum</i> Linn.
Lauraceae	<i>Persea gratissima</i> Gaertn.f.
Liliaceae	<i>Aloe buettneria</i> A Berger
Liliaceae	<i>Sansevieria liberica</i> Ger. & Labr. <i>Dracaena mannii</i> Baker
Lythraceae	<i>Lagerstroemia speciosa</i> (Linn.) Pers
Marantaceae	<i>Thaumatococcus daniellii</i> Benth.
Melastomataceae	<i>Dissotis erecta</i> (Guill. & perr.) Dandy
Meliaceae	<i>Azadirachta indica</i> A. Juss <i>Khaya anthotheca</i> (Welw.) C.DC. <i>Cedrela odorata</i> Linn.
Menispermaceae	<i>Dioscoreophyllum cumminsii</i> Diels <i>Cissampelos owariensis</i> P. Beauv. <i>Sphenocentrum jollyanum</i> Pierre
Mimosaceae	<i>Albizia lebbek</i> Benth. <i>Albizia ferruginea</i> (Guill. & perr.) Benth <i>Leucaenea leucocephala</i> (Lam.) Calliandra patens Benth De Wit
Moraceae	<i>Treculia africana</i> Decne.
Palmae	<i>Calamus deeratus</i> Mann & Wendl.
Papilionaceae	<i>Desmodium velutinum</i> (Wild) DC <i>Abrus precatorius</i> Linn. <i>Gilircidia sepium</i> (Jacq.) Walp <i>Baphia pubescens</i> Hook.f <i>Centrocema pubescens</i> Benth. <i>Pterocarpus osun</i> Craib

FAMILY	BOTANICAL NAMES
Passifloraceae	<i>Passiflora foetida</i> Linn.
Piperaceae	<i>Piper guineense</i> Linn.
Rubiaceae	<i>Chassilia kolly</i> (Schumach.) Hepper <i>Ixora coccinea</i> Linn.
Sapindaceae	<i>Blighia sapida</i> Koenig <i>Deinbollia pinnata</i> Schum.&Thonn. <i>Paullinia pinnata</i> Linn.
Sapotaceae	<i>Chrysophyllum albidum</i> G. Don
Solanaceae	<i>Datura repens</i> Linn.
Sterculiaceae	<i>Hildegardia barteri</i> (Mast.) Kosterm.
Tiliaceae	<i>Triumfetta cordifolia</i> Guill. & Perr.
Urticaceae	<i>Laportea ovalifolia</i> (Schum.) Chew
Verbenaceae	<i>Stachytarpheta cayenensis</i> Schau.



**Figure 1.** Map of Southwestern Nigeria showing Ecological zones and study sites.





**Plate 1.** Part of medicinal garden showing *Colocasia esculenta* and *Anthocleista* species.



**Plate 2.** *Icacinia trichantha* and *Alstonia boonei* in the medicinal garden