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# Need for biodiversity conservation in Nasarawa State, Nigeria

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**Abstract**

This paper highlighted the need for biodiversity conservation in Nasarawa State. The data for this study were collected from the State's Ministry of Agriculture Headquarters. The data collected included the number of natural forest reserves in the State, number of available forest guards and number of fish ponds in the State. The State has a total of 41 natural forest reserves, 20 forest guards and 25 fish ponds. A bird eye review of conservation status of biodiversity in Nasarawa State was also done. The study revealed a dismal conservation performance. All the natural forest reserves were not protected. The State has only 20 forest guards to police a forest cover of 145, 228.12 hectares which amounts to a ratio of 1 forest guards to 7,261 hectares. The only proposed game reserve is yet to be legally constituted, as a result the fauna and flora within this enclave are exposed to poaching and massive exploitation. All the 25 fish ponds are not functional. Threats to conservation efforts and strategies for their mitigation were highlighted. Appropriate recommendations were also made that can help Nasarawa State to come out of its lackluster biodiversity conservation efforts. After all said and done, it is very pertinent that every country including Nigeria and Nasarawa State in particular should take measures to ensure biodiversity conservation in order to forestall the extinction of the very many valuables species that play major roles in the ecosystems.

**Keywords**: Need; Biodiversity; Conservation; Nasarawa State, Nigeria

## 1. Introduction

Biodiversity or biological diversity is the total heritable variation or differences in characteristics that exists in all living things, individual and their species in different parts of the earth. In order words, biodiversity consists of all the heritable variation caused by the presence of genes or units of heredity offspring from one generation to another in different climatic and vegetation zones of the earth in the ground or in the atmosphere (Ayodele and Lameed, 1999)

In essence, Anon (2000) said that biodiversity entails three major aspects, which are genetic, species and ecosystems. The genetic aspects cover the variation of genes and genotypes between and within the species; diversity refers to the variety of species within a given area while the ecosystem consists of interdependent communities of species and the environment. Globally, biodiversity provides mankind with the source of food, fuel, clothing and medicine. According to Anon (2000), in the developing world, biodiversity provides up to 90 percent of the needs of the rural poor. Such needs include the assurance of food, fiber for clothing, materials for shelter, organic manure, fuel medicines and source of work energy in form of animal traction.

Over the years, according to Kokwaro (1994), human activities have contributed largely to the loss of biodiversity. Such activities include the clearing of land for agriculture, overgrazing, bush burning, logging, fuel wood collection, inappropriate use of fertilizers and pesticides, urbanization, pollution of air and water. All these contribute significantly in the degradation of our biological resources.

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Although the exact number of species in the world is not known, it is estimated according to Anon (2000) that over 70 percent of the genetic diversity among crops have been lost. The reduction in genetic diversity affects the ability of crops and animals to adapt to different environments and growing conditions. Another important aspect of the biodiversity problem is that, in the world, a small number of countries within the tropics and subtropics accounts for a very high percentage of the world's biodiversity. For example, while tropical forests cover only 7 percent of the earths land surface, they are estimated to contain at least 50 percent of all species. The reason for the high biodiversity in the tropics is the high amount of energy, water and nutrients.

The uses and values of biodiversity cannot be overemphasized. According to Ayodele and Lameed (1999), these uses and values of biodiversity can be classified into three namely economic uses, biotechnological and socio-cultural uses, while the values were divided into two viz-educational and scientific values; recreational and aesthetic values.

The term conservation implies wise use of resources for the sustainable management at present and supporting availability in the future generations to come (NEST, 1991). The main scope of biodiversity conservation according to the International Union for the Conservation of Nature of which flora and fauna are inclusive are as follows (IUCN, 1991):

1. to maintain essential ecological processes and life supporting systems upon which human survival and development depend
2. to preserve genetic diversity, on which depend the breeding programmes necessary for protection and improvement of cultivated plants, innovation, and security of many industries utilizing these living resources;
3. to ensure sustainable utilization of species and ecosystem, which support millions of rural communities as well as major industries like medicine, food and tourism

A cursory look at the Nigerian biodiversity, Nasarawa State inclusive shows that a vast array of food, drugs, timber, building materials, fuels, fiber, ornamental, spices, resins, gums and other cash crops that provide significant support to the nations' economy is obtained from the wild. According to Anon (2000), the current status - of Nigeria's biodiversity shows that there are about 500 viral species; 3,423 fungal species; 748 algae and 5,103 species of higher plants in addition to about 274 species of mammals; 23 species of primates; over 800 species of birds; 115 forest and savanna snake species; 109 amphibian species and a very rich invertebrate fauna. The objective of this paper is to highlight the need and conservation strategy for biodiversity in Nasarawa State.

## 2. Materials and methods

### *2.1 Study Area*

Nasarawa State is situated in the North Central Nigeria between latitude $8^0 54^/$ N and Longitude $8^0 39^/$ E. it is in the guinea savanna eco-vegetation and has mean annual rainfall of 1550mm and annual temperature of $27^0$C

### *2.2 Data Collection*

The data for this study were collected from the Headquarters of the State's Ministry of Agriculture using structured questionnaire and inter personal oral interview. The data collected included the number of natural forest reserves in the State, number of forest guards and number of fish ponds owned by the state government. Secondary data was also collected showing Nigeria's sites of in-situ conservation.

## 3. Results

The state has sites like forest reserves, a proposed game reserve and fish ponds, which ought to serve as a baseline for biodiversity conservation in the state but records, have shown (Table 1 and 2) that this is not the case. In respect of forest reserves in the State there are forty one (41) of them 37 gazetted and 4 ungazetted. Their management/conservation status depicted as protected or not protected is as shown in Table 1. Though, these reserves ought to be protected and managed sustainably, the reverse is the case. There is free entry and exit into these reserves due to inadequate number of forest guards to patrol and secure them. The State has only twenty (20) forest guards (Source: Ministry of Agriculture and Natural Resources, Lafia) to police a forest reserve area of 145,228.12ha. This is a ratio of 1:7, 261 i.e. 1 forest guard to police 7,26/ha. This is grossly inadequate and something should be done in order to protect the biodiversity of the State. The irony of it is that, if the forest reserves are not protected, what then

become of the free areas-areas outside the reserves that are not legally protected. Certainly unrestrained exploitation and degradation will have a free reign as it is presently.

It is important to also point out that Nasarawa State has no single game reserve. The proposed Bakono game reserve covers an area of 12,160ha (Table 1). It is yet to be legally constituted; as a result, the fauna and the flora within this enclave are exposed to poaching and massive exploitation.

Attempts by Nasarawa State to evolve a conservation and management strategy for its fishery resources have not yielded much result. Table 2 shows that the state has a total of twenty five (25) fishponds but all are not functioning. They are all out of operation.

Table 1: Natural Forest Reserves in Nasarawa State.

| S/No. | Name of Forest Reserves | Size Ha | Legal Status | Degree of Protection |
|---|---|---|---|---|
| 1 | Karama | 291.84 | Gazetted | Not Protected |
| 2 | Utuga | 677.20 | Gazetted | Not Protected |
| 3 | Gwanje | 20.48 | Gazetted | Not Protected |
| 4 | Righa | 40.96 | Gazetted | Not Protected |
| 5 | Kurmin Tagwaye North | 25.60 | Gazetted | Not Protected |
| 6 | Kurmin Tagwaye South | 28.16 | Gazetted | Not Protected |
| 7 | Mada River North | 3,013.12 | Gazetted | Not Protected |
| 8 | Mada River South | 1,845.70 | Gazetted | Not Protected |
| 9 | Kurmin Agyaga | 50.00 | Gazetted | Not Protected |
| 10 | Kurmin Nunku | 179.12 | Gazetted | Not Protected |
| 11 | Kurmin Nunkuchu | 56.32 | Gazetted | Not Protected |
| 12 | Kanje | 200.00 | Gazetted | Not Protected |
| 13 | Rafin P (Azara) | 156.16 | Gazetted | Not Protected |
| 14 | Doma | 86,374.40 | Gazetted | Not Protected |
| 15 | Ambakar | 15.462.40 | Gazetted | Not Protected |
| 16 | Marhai | 6,883.84 | Gazetted | Not Protected |
| 17 | Kurmin Agyaragu | 43.52 | Gazetted | Not Protected |
| 18 | Kurmin Agudu | 23.04 | Gazetted | Not Protected |
| 19 | Kurmin Akanga | 2,808.70 | Gazetted | Not Protected |
| 20 | Kyakale | 22.00 | Gazetted | Not Protected |
| 21 | Adevi | 213.00 | Gazetted | Not Protected |
| 22 | Baba | 122.00 | Gazetted | Not Protected |
| 23 | Akaleku | 102,000 | Gazetted | Not Protected |
| 24 | Doka | 1,800.00 | Gazetted | Not Protected |
| 25 | Keffi Town (Sabon Gari) | 181.76 | Gazetted | Not Protected |
| 26 | Dutsen Karaga | 2,508.80 | Gazetted | Not Protected |
| 27 | Keana | - | Proposed | Not Protected |
| 28 | Kaffa Kurmin (Kugbaru) | 194.56 | Gazetted | Not Protected |
| 29 | Agudu | 161.28 | Gazetted | Not Protected |
| 30 | Kurmin Mai Akuya | 568.28 | Gazetted | Not Protected |
| 31 | Arikya | 20.00 | Gazetted | Not Protected |
| 32 | Kurudu | 100.00 | Proposed | Not Protected |
| 33 | Bakyano | - | Proposed | Not Protected |
| 34 | Obi | 2,040.32 | Gazetted | Not Protected |
| 35 | Atabla | 150.00 | Gazetted | Not Protected |
| 36 | Zano | 1,088.00 | Gazetted | Not Protected |
| 37 | Bakono (Game Reserve) | 12,160.00 | Proposed | Not Protected |
| 38 | Gitata/Jaja | 3,417.60 | Gazetted | Not Protected |
| 39 | Sheriga (Buku) | 27.18 | Gazetted | Not Protected |
| 40 | Tokan River | 1,868.80 | Gazetted | Not Protected |
| 41 | Wamba | 302.08 | Gazetted | Not Protected |
| | Total | 145,228.12 | | |

Source: Ministry of Agriculture and Natural Resources, Lafia, Nasarawa State.

Table 2: Fish Ponds in Nasarawa State

| S/No. | Location | Size (Ha) | No of Ponds | Operational Status |
|---|---|---|---|---|
| 1 | Kantsakuwa | 7.2 | 13 | Not Operational |
| 2 | Lafia | 2.0 | 4 | Not Operational |
| 3 | Rutu | 15.0 | 8 | Not Operational |
| | Total | 24.2 | 25 | |

Source: Ministry of Agriculture and Natural Resources, Lafia, Nasarawa State.

*4.1 Threats to Biodiversity Conservation*

The convention on biological diversity signed by 157 governments at the 1992 UNCED Earth summit in Rio de Janeiro is an important indication of growing international concern about biodiversity loss, and in transformation from a scientific issue to a popular political and ultimately diplomatic issue. With the convention now in place, a great challenge lies ahead in transiting international political commitment back into effective action at the national, regional, scientific and popular levels.

The need for the convention of genetic resources of species and ecosystems in Nigeria has been exhaustively discussed (Gbile et al, 1978; Osemebo, 1991, Morakinyo, 1994). Biodiversity is under threat in Nigeria, nay Nasarawa State for exactly the same underlying reason as elsewhere in Africa and the world at large. The conflict between supply and demand in terms of the limited supply of the earth's resources and an increasing demand on them to meet the needs of a growing population and the growing aspiration of that population is quite enormous. In most places, a greater demand is placed upon species and ecosystems than they are able to meet by themselves at natural rates of increase.

Major threats to biodiversity in Nigeria, Nasarawa State inclusive include the following habitat alteration; increase in human population; climatic changes; chemical pollution; non-viable population of species; over harvesting; and communal land use practices, which are discussed below.

*4.2 Habitat Alteration*

Habitat alteration covers usually from highly diverse natural ecosystems to far less (often monoculture) agro-ecosystems. Agbelusi (1994) in a study conducted in some forest reserves in Ondo State observed that 12% of the reserved areas have been converted to forest plantations. Also, at present the reserves are threatened by encroachment and by alienation to other forms of land use, their exploitation for both timber and non-timber forest products has become virtually unregulated to an extent that endangers the very existence of the forest. Also, Powell (1994) reported that Niger Delta which was generally inaccessible to early naturalists and which was rich in wildlife is now being altered especially with the creation of European Community (EC) sponsored RISONPALM OIL palm plantation. In a study of land use impact on population of small games, Osemebo (1991) noted that tree plantations planted by man altered the natural ecosystems and created mono-specific agro-ecosystems which do not exactly replace the natural environment. This, he said, leads to migration of animals. Logging, he observed damages the forest seedlings and tree saplings through felling, track construction and transportation of logs. This reduces cover for animals.

*4.3 Increase in Human Population*

Small population of people, living at low densities by means of traditional patterns of agriculture, pastorals and hunting-gathering have for many centuries been able to use natural resources sustainably simply by not removing the natural product faster than it can produce itself. However, Nigeria with a population of about 140 million (NPC, 2006) is one of Africa's most densely populated countries. This large population and high rate of increase has resulted in massive environmental changes. Many of these changes signify that the environment is being overexploited and that natural processes of regeneration are not able to cope with the over-exploitation of this magnitude (Happold, 1987)

Associated with this effect is urbanization. Towns are becoming larger, new villages are being established; farms and wood cutting activities are extending further and further from each settlement. New roads and tracks enable farming, hunting and wood cutting to occur in previously undisturbed habitats.

*4.4 Climatic Changes*

Biodiversity is also under threat, at least in Africa, from a variety of climatic changes, in particular decreased rainfall. West Africa has undergone a series of alternating wet and dry periods as well as times of cold weather and low

rainfall due to severe glaciations in Northern Europe (Happold, 1987). He went further to declare that at the present time, the climate is mid-way between the two extremes of Pluvial (wet) and inter-pluvial (dry) periods as indicated by the absence of rainforest zones in Benin, Togo and eastern part of Ghana. These climatic changes are often associated with drifts in vegetable pattern.

*4.5 Chemical Pollution*

Chemical pollution, which has been implicated as responsible for forest damage in Europe, for deformities in birds, for premature births in seals has become a major concern in virtually all parts of the world. Chemical pollution is complex and pervasive. It is expressed in such different forms as atmospheric pollution with sulphur, and nitrogen oxide and with oxidants, directly damaging vegetation and harming freshwater through the deposition of acid rain. Excessive use of agricultural chemicals results in the contamination of watercourses and causing ecological imbalance in wetlands and shallow seas through run off of nitrate and phosphate and harming wildlife through the accumulation of persistent pesticide (McNelly, 1990)

*4.6 Non-viable Population of Species*

For species that have been severely reduced in numbers, survival might be difficult even if apparently adequate conservation measures are introduced. This is because; the species exists in tiny, fragmented nonviable populations, which may be below the minimum viable population size. Such populations are extremely vulnerable to extinction through random environmental catastrophes such as fire, disease, cyclone, poaching and breakdown of law and order. Even if such populations survive these risks, they can be subjected to severe losses in genetic diversity, vigor and fertility (Ayodele and Lameed, 1999)

*4.7 Over harvesting*

Intense harvesting can result in extremely rapid declines in species population, Kemp and Palmberg (1993) stated that unless carefully planned and controlled, harvesting may severely damage stand structure, site capacity and regeneration of the rainforest. Nnabuife (2003) has warned that people cut trees indiscriminately; they do not know that one day, we are going to run out of these trees and it is already happening in some countries.

Illegal hunting of all species of migrates, takes place at all times of the year, and many of the hunters show no regard for sex, age or reproductive condition of their quarry. According to Happold (1987), illegal hunting is considered to be one of the main reasons for the decline in the populations of all artiodactyls, primates, large rodents, carnivores, rhinoceroses and elephants. The demand for bush meat was increased as human populations have increased and as a consequence intense hunting pressure has caused a decline in the population of many bush meat species in all parts of Nigeria (Agbelusi, 1994; Happold, (1987).

Ayeni (1985) has posited that Nigeria has an extensive inland water mass of about 12.5 million hectares that can produce over 500,000 tones of fish under adequate management. According to Anon (1984) Nigeria needs 1.6 million tonnes of fish protein annually but her national fish output is only 400,000 tones annually. Strategic biodiversity conservation will definitely go along way to arrest these short falls and/or deficits.

*4.8 Commercial Land Use Practices*

Habitat clearance and alteration are the most important single threats to biodiversity. Deforestation for timber trade, mining and oil extraction and cash crop production are examples of activities, which can and do contribute to irreversible habitat destruction. Morakinyo (1994) noted that **RISONPALM** oil palm project in the Delta represents a considerable investment, but will have drastic and irreversible consequences over an extensive area, both for environment and for the people who live there.

Kemp and Palmberg (1993) observed that the most severe impact of logging on genetic diversity results from human intervention after harvesting through agricultural encroachment and fire. Whole population of re-growth may be lost through fire, following the felling of all adult trees of a species in the area concerned.

*4.9 Methods of conservation of Biodiversity*

There are three major methods of conservation. They are the traditional, ex-situ ad in-situ methods (Anon, 2000; Ayodele and Lameed, 1999)

*4.10 Traditional Methods*

There are several traditional methods of conserving biodiversity. During farming activities, some multi purpose trees are spared either for providing shade or for the use of its parts or for religious purposes. The choice of such trees varies from community to community. The protection and management of the trees and sometimes sacred groves are dictated by measures, rules, regulations and taboos, which are stipulated and approved by custom and accepted by the local people. As long as these groves are demarcated for various uses, the plants and animals therein are preserved by the communities.

*4.11 Ex-Situ Conservation*

Ex-situ method involves maintaining organisms out side their original or normal habitats in facilities such as botanical gardens, seed gene banks, in vitro gene banks and field gene banks. This practice is adopted where species are heavily exploited or in which the habitat is being destroyed or neglected. In such circumstances, ex-situ conservation is embarked upon to ensure their perpetration. These centers are used to rear endangered species with the aim of releasing them to their natural habitats when their population and environments are stable.

*4.12 In-Situ Conservation*

The need for biodiversity has long been realized in Nigeria. Back in 1984, a network of Strict Nature Reserve, Forest Reserves and Game Reserves were established by the Forestry Research Institute of Nigeria (FRIN) and various State Forestry Services. Currently, there are 32 gazetted Game Reserves/Sanctuaries, 12 strict Nature Reserves, 1 Biosphere Reserve and 8 National Parks (Table 3).

In all the protected areas biodiversity conservation through in-situ practices are ensured by:

i. Protective measures against poachers,
**ii.** Controlled exploitation of forest reserves,
**iii.** Controlled burning practices, and
**iv.** Reduced intensity of cattle grazing

Table 3: Nigeria sites of In-situ Conservation

| **Conservation Tenure** | **Number** | **Area (million ha)** |
|---|---|---|
| Gazetted Forest Reserves | 445 | 9.7 |
| Gazetted Game Reserves/sanctuaries | 32 | 1.2 |
| National parks | 8 | 1.4 |
| Proposed Game reserves | 11 | 0.372 |
| Ramsar Wetland sites | 3 | 0.472 |
| Proposed Ramsar wetland sites | 1 | 0.207 |
| Strict Nature Reserves | 12 | - |
| Biosphere Reserve | 1 | 0.056 |
| Natural Regeneration Investment Plots | 20 | - |
| Fish Parks | 3 | - |
| Permanent Sample Plots | 200 | - |

Source: Nigeria Tropical Forestry Action Plan: working group on Biodiversity Protection and wildlife Management, 1995.

In conclusion it should be stated that the consumable uses of biodiversity are important reasons for conserving biodiversity on the basis of tangible uses which man make of it. In addition to these, there are ethical values that are the basis of the intrinsic of existence or bequest values accorded to plants and animals. The existence value of biodiversity related to their ecological roles the bequest values and economic values are very cogent and strong reasons for mankind having dominion over all things on earth as indicated in the religious books and should therefore accord respect to all living and non living things. For this reason, priority should be given to conservation of biodiversity as the centerpiece of natural resources management for sustainable development

It is therefore, very necessary that every country including Nigeria and Nasarawa State in particular should take measures, to ensure biodiversity conservation since many species that play major roles in the ecosystems may be lost if they are not conserved.

From the various points highlighted in this paper, the following recommendations are hereby made for the effective conservation of biodiversity in Nasarawa State.

- Exploitation and development of Nasarawa State's ecosystem should be managed on an environmentally sound sustainable principle.

- Conservation action should be implemented at both the local and state levels. At the local level, a kind of participatory management should be initiated, that is giving greater responsibility to the people whose livelihoods require conserving the forest and wildlife resources upon which they depend. This may require giving them forms of ownership or control over their resources, providing them with training and expertise. At the state level, protected areas remain the most important conservation tools for conserving natural ecosystem.
- Effective policing and sound management of protected areas in Nasarawa State should be put in place
- Biodiversity education should be introduced and or intensified at the primary, secondary and tertiary educational institutions throughout the state.
- Awareness campaign conducted through the mass media, organized talks, film shows and seminars should be carried out to enlighten policy makers, cattle rearers, hunters and farmers on the need for biodiversity conservation in Nasarawa State.
- All relevant agencies should ensure the enforcement of existing environmental laws in the State.
- Decrees, edicts and national and state laws bordering on environmental issues should be translated into various local dialects for proper understanding of such policy and legislation and should be widely distributed to all village heads, district heads and emirs.
- Establish a data bank to show the diversity, distribution and status of biological diversities (both flora and fauna) in the state.
- Adequate staffing with requisite training should be put in place to ensure an effective conservation of biodiversity in Nasarawa State.
- The government should exercise sufficient political will to fund biodiversity conservation in Nasarawa State.

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