Nigeria

Fifth National Biodiversity Report

DECEMBER 2015

NIGERIA: FIFTH NATIONAL BIODIVERSITY REPORT

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EXECUTIVE SUMMARY

This report gave information on status of biodiversity and the contribution it has to varied sectors of Nigerian economy including tourism, agriculture, water resources, health, commerce and industrial development. It showed how biodiversity impacts on the lives and livelihoods of the people as well. The value of biodiversity to Nigerians and the linkages it has on various sectors of the Nigerian economy was vividly shown and emphasis was thereafter laid on the need for its integration into national planning and strategies for sustainable development. The threats to biodiversity in Nigeria were outlined and analysed. A current biodiversity species statistics was given. The report identified that the principles for the strategy in the Nigerian NBSAP could be based on the need to manage the biodiversity of Nigeria in the five priority ecological areas of:

(i) Arid zone;
(ii) Guinea Savanna woodlands;
(iii) Coastal and Marine Ecosystems;
(iv) Rainforest belt including montane forests; and
(v) Wetlands and River basins.

Also identified were priority areas for action in Nigeria to be:

(i) National Parks as Nigeria's reservoir of biodiversity;
(ii) The Niger Delta;
(iii) Major inland lakes and wetlands; (creation of a platform for Biodiversity Sensitivity Index to protect major watersheds and important wetlands)
(iv) Gallery forests and wildlife corridors;
(v) Peri-Urban Forests; and
(vi) Marine and coastal estuaries.

Areas (sectors) identified for mainstreaming NBSAP in Nigeria included:

(i) Water resources policy and actions;

(ii) Agriculture policy and actions;

(iii) Science and Technology policy;

(iv) Biosafety and genetic biodiversity protection;

(v) Coastal and marine resource management;

(vi) Arid land management policy and actions;

(vii) Transportation, maritime and aviation; and

(viii) Urban Planning and development

The points of entry in mainstreaming the various sectors were identified as:

AGRICULTURE:

(i) Conversion of protected forest estates to agricultural farms;
(ii) Agricultural expansion (i.e. Continuous clearing of new lands);
(iii) Slash-and-burn farming practice;
(iv) Overgrazing by livestock and overfishing by artisanal fishermen;
(v) Unsustainable use of pesticides and chemical fertilizers;
(vi) Agricultural policy, which although highlighted the need to promote enabling environment for agricultural production and processing, did not provide principles for promoting such enabling environment (i.e. issues as land use, soil conservation and principles for management of agricultural inputs for environmental management purposes). The Policy recognized and adapted some sections of the Nigerian Environmental policy as an element of the policy document and agreed totally that the integration of environmental management to agricultural production and development in Nigeria was very weak.

WATER RESOURCES POLICY AND ACTIONS:

(i) The design, development and management of Dams (Proper Environmental Impact Assessment to address major biodiversity issues such as location of protected areas, Important Bird Areas, endangered species, heritage sites etc.);

(ii) In inland lakes management (to address degradation especially in Lake Chad and arrest loss of bio-resources and agricultural potentials);

COASTAL AND MARINE RESOURCE MANAGEMENT:

(i) The outcomes of the Gulf of Guinea Large Marine Ecosystem Project and the Niger Delta Environmental Survey;

(ii) The Gulf of Guinea Large Marine Ecosystem carried out ecosystem assessment and developed strategic action plan that were aimed at assisting countries in the Gulf of Guinea marine ecosystem to manage coastal resources in a more sustainable manner;

(iii) The Niger Delta Environmental Survey documented the biodiversity and habitat characteristics of the Niger Delta and also touched on wetland values in relation to socio-economic development;

(iv) After over ten years, the Niger Delta is considered inappropriate to provide up-to-date information on the current status of biodiversity and its challenges in the Niger Delta, thus the urgent need for a follow up survey on the current realities and challenges of biodiversity conservation;

(v) The huge Coastal and Marine resources of Nigeria and the need to establish a Marine National Park as part of her network of National Parks under category 11 of the IUCN;

(vi) The need to establish a Marine Park is paramount in order to ensure that the ecosystems in Nigeria are fully represented in the network of nationally protected areas in Nigeria.

TRANSPORTATION, MARITIME AND AVIATION:

(i) Management of bird species and populations in and around the Airports, where aircrafts take-off and land is crucial for security of air transport users. Aircrafts may suffer bird strikes. Understanding the role of biodiversity in the aviation industry therefore is an essential aspect that should be noted in National Policy on safety in aviation.

URBAN PLANNING AND DEVELOPMENT:

(i) Pollution through the production of toxic chemicals and liquid and solid wastes;

(ii) Pollution through emissions from vehicles and industrial processes;

(i) Urban development is carried out with little or no consideration for biodiversity and habitat protection or management.

ARID LAND MANAGEMENT POLICY AND ACTIONS:

(i) The Desertification which is spreading fast in the northwest and north eastern parts of Nigeria;

(ii) The Biodiversity in arid land which is crucial for food, fibre and livelihoods is being degraded;

(iii) The Arid Land Management Policy should support Biodiversity principles and policies to address the threats to natural resources in the arid areas.

It addressed synergies with NBSAP of the various Multilateral Environmental Agreements (MEAs) e.g. Convention on the Conservation of Migratory Species of Wild Animals (CMS), Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), Ramsar Convention on Wetlands of International Importance and Agreement on the conservation of Africa-Eurasian Migratory Waterbirds (AEWA) to ensure that the priorities of MEAs are reflected in the NBSAP.

Nigeria's National targets, actions and their indicators and also programmes in the revised NBSAP were outlined. The revised NBSAP has **14 SMART National Targets with 21 Impact Indicators and 67 Actions with 123 Performance Indicators and 20 Programmes**. The targets were shown to be closely aligned to both the CBD Strategic Plan for biodiversity 2011-2020 and its Aichi biodiversity Targets and Nigeria's unique Priorities and features. Table

Although the implementation of the previous NBSAP was inadequate, measures were put in place in the revised NBSAP to ensure improvement. It was stated that the revised NBSAP had well developed monitoring, evaluation and reporting plans and a national coordination structure for effective implementation.

CHAPTER ONE

1 INTRODUCTION

1.1 Location: Nigeria is situated in the West African region and lies between longitudes 3^0E and 15^0E and latitudes 4^0N and 14^0N. It has a land mass of 923,768 sq.km. It is bordered to the north by the Republics of Niger and Chad. It shares borders to the west with the Republic of Benin, while the Republic of Cameroun shares the eastern borders right down to the shores of the Atlantic Ocean which forms the southern limits of Nigerian Territory. The about 853km of coastline confers on the country the potentials of a maritime power.

1.2 Climate: Temperature across the country is relatively high with a very narrow variation in seasonal and diurnal ranges (22 - 36^0C). There are two basic seasons: wet season which lasts from April to October; and the dry season which lasts from November till March. The dry season commences with Harmattan, a dry chilly spell that lasts till February and is associated with lower temperatures, a dusty and hazy atmosphere brought about by the North-Easterly winds blowing from the Arabian Peninsula across the Sahara; the second half of the dry season, February – March, is the hottest period of the year when temperatures range from 33-40^0C. The extremes of the wet season are felt on the south-eastern coast where annual rainfall might reach a height of 330cm; while the extremes of the dry season, in aridity and high temperatures, are felt in the north third of the country.

1.3 Population: The population of Nigeria is estimated at 183, 523, 434 people with an annual growth rate of 2.8% as at July 2015, which is equivalent to 2.51% of the total world population and makes Nigeria number 7 in the list of the total world population (Source: Worldometers).

1.4 Ethnic Groups: Nigeria, Africa's most populous country, is composed of more than 250 ethnic groups. The following are the most populous and politically influential: Hausa and Fulani 29%, Yoruba 21%, Igbo (Ibo) 18%, Ijaw 10%, Kanuri 4%, Ibibio 3.5%, and Tiv 2.5%.

CHATPTER TWO

2. THE VALUE OF BIODIVERSITY TO NIGERIANS

Biodiversity is appreciated and valued by Nigerians in different ways. The nation's biodiversity constitutes the source of food, raw materials, wide range of goods and services and genetic materials for agriculture, medicines and health-care support, domestic and commercial products, aesthetics and cultural values. It provides ecosystem services that improve the value and knowledge about life. The value of biodiversity to Nigerians is closely linked to the wide range of the various ecosystems found. Some of the areas in which biodiversity is valued and appreciated by Nigerians are presented below.

2.1 Food, Food Products and Agriculture

Biodiversity in forests, savannah woodlands and coastal mangroves make significant direct contribution to the nutrition of the rural poor in Nigeria. As an agrarian society, Nigerians depend largely on biodiversity resources for food supplies and supplements. Biodiversity therefore supports 70-80% of food requirements of 70% of rural Nigerians, while about 30-50% of urban and peri-urban communities depend on biodiversity for their nutritional support.

Various types of food sourced from the wild include bush meat, snails, periwinkles, fish, as well as wild fruits such as bush mango, edible kola, nuts, vegetables of various types and also condiments and health-related foods such as hot leaves, varied species of spices, honey from bee hives, mushrooms and scent leaves. Biodiversity and human food in Nigeria are inseparable. The uniqueness of nutritional support from biodiversity in Nigeria lies in the broad-based ecosystem diversity across the length and breadth of Nigeria: from the south to the north and from the east to the west of the country.

The biodiversity of the coastal area of the Niger Delta provides a characteristic spectrum of sea-food sources, a huge collection of fish from the highly productive mangrove ecosystem, which Nigeria has the largest of its type in Africa, some collection of swamp forest vegetables and fruits, and a collection of wild nuts, food supplements.

The tropical rainforest belt that cuts across southern Nigeria provides a huge base for food resources. These include a large collection of fruit trees both for commercial and domestic use, food for domestic use as well as for trade by hundreds of thousands of Nigerians. A study of the Okwangwo sector of Cross River National Park in northern Cross River State alone, revealed the presence of 15 types of seeds, 3 oil seeds, 44 fruit types, 13 species and 25 different species of mushrooms. Trade in bush mango (*Irvingia*

gabonensis) alone has a large network of collectors and processing traders in southern Nigeria and connected to a trade network in other countries in West Africa. The bush meat trade, although decreasing in size and volume due to declining bush meat supplies, has supported many Nigerian families in rural areas and continue to provide employment for many men and women in rural areas. Until recently when demand surpassed supply, "afang" – *Gnetum africanum*, from Cross River and Akwa-Ibom States have supported food needs for millions of Nigerians.

Fig. 1 A Sample of some bio-resources of Nigeria: Source: NCF

The Guinea Savannah woodlands of Nigeria are still rich in wildlife, even after over three post-independence decades. Apart from bush meat, the savannah woodlands provide a variety of its unique fruit trees and vegetables of various types.

The Sudan savannah, apart from providing food and fodder for grazing livestock, also has a huge supply of wildlife, until recently when these resources were depleted. The richness in biodiversity in its broad based nature can be appreciated in the variety of mono-specific plants and trees for food. An example is the contribution of a large variety of Palms and fire resistant trees that provide food and food supplements.
From the coast to the Sahel, Nigeria has a wide range of palm species that are of significance to food and drink needs of millions of Nigerians. Raffia palm, coconut and oil palm dominate the coastal swamps, the freshwater swamps and the rainforest zone in the south while others such as the Doum palm, date palm, the Phoenix and Borrassus palm dominate the northern savannah and woodlands.

Fig.2 Forest with understory, herbs and shrubs (Source: NCF)

Nigeria's vast inland water systems including rivers, lakes, floodplains and streams support both natural and agricultural biodiversity for food production and wild resource exploitation. Fish species of various types and in large quantities form a major protein source for millions of Nigerians. Fisheries, especially the artisanal sector, provide employment for more than one million Nigerians in the urban, peri-urban and rural communities.

Of special importance in Nigeria are the many crop species that originate from Nigeria. Land races of some of the important crops that are now being grown worldwide that originated from Nigeria include sorghum (*Sorghum bicolor*), cowpeas (*Vigna unguiculata*), West African rice (*Oryza sativa*), Yams (*Dioscorea spp.*), Bambara groundnuts (*Vigna subterranea*), Kersting's groundnut (*Macrotylomageocarpum*), African yam bean (*Sphenostylis stenocarpa*), and winged bean (*Psophocarpus tetragonobus*) (Ng 2002). Although a number of these crops still exist, some are being lost due to the lack of a conservation plan for them and the preference to the improved hybrid species.

2.2 Domestic and Commercial products

A majority of rural dwellers in many parts of Nigeria derive a higher percentage of their income from wild bio-resources. Accordingly, biodiversity forms a solid base for rural livelihoods and economy. Unprocessed wild resources are collected mainly by men and youths while majority of women are involved in the processing of these wild resources to add value for distribution and marketing. Biodiversity therefore forms an integral link between poverty reduction, provision of employment, and sustainable livelihood. The value of biodiversity to the life of rural Nigerians is demonstrated in the trade and accession of food resources as well as the community relationships with biodiversity. Wild bio-resources (leaves, vegetables, ropes, seeds, fruits, nuts, gum Arabic, firewood, bamboo, rattan, chewing sticks, cattle sticks, logs, snails, bush meat and fish) and their products such as: medicines, oils, fats, wines, thatches, sponges, dyes, baskets, mats, furniture, sawn wood, charcoal, smoked fish and meat, are used for domestic purposes while the excess is sold. Fish, periwinkles, snails, shrimps and prawns are harvested in large quantities and traded between rural and urban settlements in Nigeria, creating a huge network of market interactions and providing sources of employment for almost 20% of the Nigerian population both in rural and urban settlements.

Other trade and traditional occupations associated with biodiversity in Nigeria include wood carving, canoe building, furniture making, basket weaving, local dye industry, bee farming and honey processing, fish smoking, bush meat hunting/processing, oil palm processing, fruit processing and local medicine marketing. The wild also provide sources of genetic support to domestication of both plants and animal species. Biodiversity has been a major source of livelihoods support for the rural Nigerians especially in the area of snail farming, bee farming, grass-cutter/other small mammal farming, wild bird and reptile rearing, and aquaculture; while to some extent, also supports commercial activities in rabbit, goat farming.

2.3 Ecosystem Functioning and Ecological services

Changes in the structure and function of given ecosystems, usually from biodiversity degradation and loss can reduce the availability of these vital services and affect aesthetic, ethical and cultural values of human societies. Natural resource scarcity for livelihood support is evident in many local communities in Nigeria that once possessed abundant products and services for life support systems. Biodiversity reflects the

Fig. 3 Mixed flocks of wintering migratory birds in Hadeja-Nguru

abundance of life and life support systems and in Nigeria where human population is on the increase at high rates, the role of biodiversity in sustaining ecosystem functioning is of high importance for sustainable development.

2.4 Watershed protection and resource recycling

Biodiversity has a direct and major impact on watershed protection. The extensive network of river systems and their associated wetlands and floodplains depend on the sustainability of the functioning of these watersheds that supports a variety of flora and fauna. Two major Rivers – the Niger and the Benue, occupy a very major position in the ecology and economy of Nigeria. The tributaries of the Niger and the extensive Delta that it forms at its entry to the Atlantic Ocean are a repository of Biodiversity in varied forms. Headwaters of many rivers are protected by luxuriant vegetation of tropical and rocky outcrops of savannah woodlands.

Gallery forests form a fringe of cover for protecting and purifying water sources which supports human, wildlife and livestock. When forests and their associated biodiversity are destroyed, this results in siltation and the degradation of water resources, causing untold hardships on human populations, wildlife and livestock. Watersheds and their associated biodiversity therefore play major roles in providing the much needed freshwater for domestic and agricultural purposes, providing habitats for a large variety of wildlife and providing platform for nutrient circulation and the recycling of much needed resources for the complex ecosystem and species interaction, generic renewal and ecosystem productivity.

2.5 Public Health and Traditional medicine

Biodiversity has supported the health needs of millions of Nigerians for centuries. It is however in the past two decades that the traditional medicine was given formal recognition and attention. Virtually all local communities have huge collections of plants and animals for healing different kinds of diseases and performing other health related services such as antenatal care, childbirth, anti-infection treatments and sexual drive improvements. Ethno-botanical studies have revealed the importance of hundreds of different kinds of herbs used for curing different kinds of diseases in different parts of Nigeria. Accordingly, trade in medicinal plants and animal parts have grown and now form a major category of merchandise in village markets in rural and peri-urban settlements. The number of people who rely on herbs, wildlife parts and other agricultural and wild resources is increasing. Consequently, maintaining health standards for millions of Nigerians depends on the protection and sustainable management of biodiversity.

Research findings and field reports indicate that a lot of time, energy and resources are required to harvest the much needed herbs and other plant and animal materials needed for traditional medicine. Efforts are now being made in different parts of the country to domesticate some of these medicinal plants. Accordingly, one of the mandates of the National Agency for Genetic Resources and Biotechnology (NAGRAB) is to document and keep essential genetic biodiversity resources. The National Institute for Pharmaceutical Research and Development (NIPRD) also has reliable data on the medicinal and patent value of plant resources in Nigeria.

Apart from direct use of biodiversity for traditional medicine, the maintenance of environmental health and sanitation is also an ecosystem service performed by biodiversity, through biological scavengers and decomposers. The role of decomposers and waste removers is important in the area of waste decomposition and public hygiene. This ecosystem service is likely to be lost, following the crash of populations of vultures and other species of scavengers around slaughter slabs, abattoirs and dumpsites, where they provide useful services of eating up waste.

2.6 Culture, Heritage, Arts and Crafts

Culturally, many ethnic groups in Nigeria have unique and distinct traditions and knowledge which they use in relating with nature. The survival of natural habitats and species are therefore important to Nigerian cultures. Biodiversity represents an indispensable resource endowment to Nigerians. There exists a strong integration between cultural heritage and biodiversity. Lifestyles, customs and norms as well as the associated arts, crafts, songs and folklores, reflect type of biodiversity and natural resources in different communities and societies in Nigeria. The social fabric of life

including food, shelter type, skills and traditional knowledge are all enshrined in biodiversity represented in these areas. For example, Ijaws, Itsekiris and the Ilajes of the Niger Delta region are coastal people and are used to and familiar with coastal environment. They are skilled in swimming, canoe building, fishing, water regatta and sea-food processing.
Similarly, inland Lake People around Lake Kainji, Hadejia-Nguru, Lake Chad, Oguta Lake and the Benue floodplains, are familiar with freshwater fishing, fresh water fish processing and water resources utilisation and management. In prehistoric times, special attention was placed on areas of high biodiversity protection in support of worship, provision of important herbs and consultation with deities in many parts of Nigeria. Some communities still maintain fetish or sacred forests where spiritual consultations and collection of traditional medicines and herbs for community benefits take place.

The recognition of the interaction between biodiversity, culture and natural heritage in Nigeria has earned the country some level of international recognition, leading to the listing of Osun-Osogbo grove in Osun State as a World Heritage site. The interaction between culture and biodiversity has also assisted in the protection of certain endangered species of wildlife such as the Sclaters guenon (***Cercopithecus sclateri)***, which is not only available in the wild in Taylor Creek and Stubbs Creek forest reserves, but also in abundance in sacred forests in Akpugoeze community in Anambra State and Langwa community in Imo State.

2.7 Tourism and Aesthetic values

Nigeria's natural resource endowment includes tourism and aesthetic resources, including but not limited to coastal sandy beaches, barrier islands, scintillating landscapes, biodiversity hotspots, amazing cultural diversity and friendly climate. The wide range of ecosystems in Nigeria makes it a potentially high tourism destination. The appreciation of the value of biodiversity for tourism has received some positive attention in recent years. The world recognised Mountain race established some years ago and being hosted in Obudu Plaateau in Nigeria is in appreciation of the unique, terrain and the semi-temperate characteristics of the Obudu Plateau. Argungu Fishing festival remain very popular as a tourist event in Nigeria while the Hadejia Nguru Wetlands in northern Nigeria and some other notable sites in Nigeria have great potentials for receiving millions of migratory birds, that could provide huge resource for seasonal bird watching if well developed.

These unique characteristics have however not been able to earn Nigeria much tourism attention due to social insecurity, decaying infrastructure, corruption and the lack of national recognition of the social and environmental values of these resources.

Nigeria's iconic large mammals *include*: the Cross River gorilla (***Gorilla gorilla diehli)***, the African elephant (***Loxadonta africana*****),** the lion (*Panthera leo*) and Nigerian-Cameroon chimpanzee (*Pan troglodytes ellioti*). The country is also a centre for primate diversity and its bird diversity, a record 940 species is among the highest in Africa. Interestingly, Nigeria's amazing biodiversity is not well known and even hotspots such as the Niger Delta, are not well studied and are therefore not well understood.

2.8 Research and scientific knowledge development

Apart from serving as a source of inspiration, information, tourism and recreation, Nigeria's biodiversity also satisfies scientific and educational pursuits. Much of the Nigeria's important biodiversity hotspots such as the Niger Delta which has some of the most highly endangered species of primates in the world, are not yet well studied.
Biodiversity provides an outdoor laboratory for researchers and unlimited opportunity for research in medicine, biotechnology, pest control and management and anthropology. Nigeria's biodiversity is grossly under-researched and under documented; hence its contribution to scientific knowledge and sustainable national development falls short of its inherent potentials.

2.9 Job creation and occupation

More than 65% of Nigerians are engaged in biodiversity related jobs and occupation, such as farming, fishing, logging, livestock rearing, agricultural and forest resources marketing, sawmilling and wood processing, manufacturing (paper making, perfume blending, food processing, brewery, distilling, garment and footwear making). Hunting and gathering still remain a major occupation in rural areas and the wood based industry engages hundreds of thousands directly and indirectly. Biodiversity allied activities offer employment to Nigerians through commercial and industrial investments such as oil palm and rubber estates, gum Arabic, kola nut, cocoa and forest plantations, tobacco production companies, horticulture and commercial fruit trees investments.

2.10 Climate Change Mitigation and Adaptation

In Nigeria, the value of Biodiversity in climate Change is recognised but not holistically addressed. Policy actions on Climate Change mitigation and adaptation in Nigeria need

to be improved. Policies and actions on Climate Change should decisively seek to increase the adaptive capacity of species and ecosystems. The strategy of ecosystem-based adaptation activities for Climate Change mitigation and adaptation in Nigeria will ensure ecosystem health and optimal contribution to sustainable development.

CHAPTER THREE

3 THE MAIN THREATS TO BIODIVERSITY IN NIGERIA

3.1 THE UNDERLYING FACTORS

World Rainforest Movement (1999) records show that 70-80% of Nigeria's original forest has disappeared and presently the area occupied by forests is reduced to 12%. In the period between 2000 and 2005, Nigeria lost about 2, 048ha of forest (FAO 2005). Although Nigerian government established several forest reserves for conservation of forest resources, these forest reserves have been seriously neglected and received little or no improvement in terms of investment and management (Pelemo et.al 2011). The implication of these loses is that many plants and animals, including many potentially valuable species are on the fast track to extinction. The USAID Report on Biodiversity and Tropical Forestry Assessment (2002) recorded that there are many – too many environmental threats in Nigeria affecting Biodiversity. A National Assessment (NCF2012) confirmed the reality of high rise and fast tracked increase in biodiversity loss in Nigeria. An analysis of the major underlying factors responsible for the continuous degradation of biodiversity in Nigeria, were categorized as follows:

3.1.1 High Population Growth rate

Biodiversity loss is a problem in many other countries in the world and most particularly developing countries where poverty is still pervasive. Nigeria is the most populous African country and has one of the highest growth rates in the world. The population of Nigeria is estimated at 183, 523, 434 people as at July 2015, which is equivalent to 2.51% of the total world population and makes Nigeria number 7 in the list of the total world population (Source: Worldometers). More than 70 percent of Nigerians live in rural areas where they depend on agriculture and other natural resources for their survival (FEPA 1992). Biodiversity supports the growing populations in rural and urban areas but the pressure is becoming increasingly higher due to over-exploitation occasioned by high demand.

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 these resources faster than their reproductive or replenishment rates. However, Nigeria's large population is characterized by high percentages of illiteracy, unemployment and poverty, which act as powerful drivers of increasingly severe demands on the remaining biodiversity in Nigeria.

Evidence based field studies have confirmed that natural processes of regeneration are not able to cope with the over-exploitation in high 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.

In addition, several socio-economic factors can be reported to be mediating the relationship between population and natural resource depletion or degradation in Nigeria. The role population pressure plays in biodiversity loss in Nigeria could be seen in a larger context that goes beyond the absolute number of people, and their density or rate of increase. Other critical factors such as access to and patterns of production, distribution, and consumption have had significant influence on Nigeria's biodiversity loss, particularly with the realization that people's perception, attitudes, and values may be more important than sheer numbers of people.

3.1.2 Poverty

According to the Human Development Index Report (UNDP 2008-2009), the number of poor people in Nigeria remains high and the level of poverty rose from 27.2 per cent in 1980 to 65.6 per cent in 1996, an annual average increase of 8.83 per cent over a 16-year period. However, between 1996 and 2004, the level of poverty declined by an annual average of 2.1% to 54.4%.

To a large extent, Poverty contributes a major threat to biodiversity and in other ways continues to further deepen the level of poverty in most rural areas. As an underlying factor for biodiversity degradation, poverty causes threats to biodiversity in two ways. First, the poor are pushed by the affluent and influential majority to destroy their own source of livelihoods for meagre financial returns and the poor, due to deprivation find it difficult to secure any other alternative than to erode the very foundation of their own long term survival. Biodiversity is always at the receiving end being the readily available option for food, fibre and minimal commercial gain by the rural poor.
The need for protection of biodiversity is therefore seen as elitist by the rural poor whose deprivation in terms of food and domestic needs have been pushed to the wall.

3.1.3 Policy and Legislation Constraints

The environment and by implication, biodiversity, lags behind other sectors in policy and legislative reforms. The underpinning value elements of biodiversity as a life support system for millions of Nigerians is yet to receive recognition and serious consideration in national policy and legislative action. The existing laws relating to biodiversity are obsolete, with the exception of the new laws establishing the National Environmental Standards and Regulations Enforcement Agency (NESREA); that on Climate Change; the new law establishing the National Biosafety Management Agency (NBMA) and possibly the Grazing Commission. The process of policy review on biodiversity related issues is very slow and given little or no consideration in major policy and strategic national discourse. Biodiversity issues have been relegated into the background and have only been the concern of conservationists, scientists and environmentalists despite its significant contribution to the livelihood and commerce of rural and peri-urban communities.

International conventions and treaties are entered into and signed by the Federal Government of Nigeria, but implementation has been slow, with huge backlogs of annual contributions to the respective trust funds of these conventions. Low budgetary allocations to implement decisions of the various conferences and meetings of the Parties to these conventions and agreements, coupled with low capacity have resulted in poor implementation. Poor legislative enforcement has been and still is a glaring setback for biodiversity conservation in Nigeria. The National Parks that are repository of much of Nigeria's biodiversity have faced serious threats of poaching in recent years, losing not only wildlife but also Rangers to poachers. Everywhere in Nigeria, Biodiversity related laws are broken openly in the face of low public awareness on biodiversity and lack of capacity for law enforcement agents to deal with issues of concern. Poor law enforcement on biodiversity has occasionally caused embarrassment for the Government and people of Nigeria.

Implementing the domestic enforcement of laws is as important as laying emphasis on international conventions. Nigeria Biodiversity laws, if well enforced, can assist the action of Nigeria on the national obligations to the international treaties signed.

Poor institutional cohesion, low capacity of States to manage varied biodiversity related portfolios, the lack of commitment to and investments in the Departments responsible for biodiversity matters characterize the biodiversity conservation policy of most States

of Nigeria. Wildlife conservation Departments/Units have either been marginalized or are inactive in many States.
In most States of Nigeria, the Biodiversity related legislations such as the wildlife and forestry laws are obsolete, non-implementable and are totally ignored (or not regarded) by the customary, sharia and other courts.

As a major element of best practice, Nigeria should set up a National Committee on Biodiversity. This Committee should have inter-ministerial composition and cut across gender, civil society, resource use groups and the private sector. The institutional weakness associated with the values attached and the emphasis placed on biodiversity conservation will receive a much more articulate attention as a major focus of the National Biodiversity Committee.

3.1.4 Poor land use planning

USAID (2002) observed that no land use policy exists in Nigeria, despite the existence of a land use Act. Instead, states are encouraged to derive their legislation from the Federal legislative framework. While some states have taken steps to develop legislation to improve (from an environmental perspective) resources management through laws against bush burning and agricultural expansion into forest lands, major impediments to sustainable environmental management still exist.

Two key land tenure and land use issues that require future consideration include how to mediate/resolve problems that arise between tenure systems; and how, within the various tenure systems, to support policy/institutional frameworks that are capable of promoting the sustainable use of natural resources.

Land use and land cover change have emerged as a global phenomenon and perhaps the most significant regional anthropogenic disturbance to the environment. As is the case in Nigeria, rapid urbanization/industrialization, large scale agriculture and major changes in human activities have been identified as the major causes of the dramatic changes in land cover and land use patterns globally. Dramatic land cover and land use changes that would have once taken centuries now take place within a few decades.
Africa is said to have the fastest rate of deforestation in the world due mainly to overdependence on primary resources with direct effect on the biodiversity.

For Nigeria, the rate of deforestation due to poor land use planning has been alarming. Bisong (2012) reported that “Nigeria’s forests are threatened as the forest cover declined from approximately 24 million hectares in 1976 to 15 million hectares in 1995 and down to 9.6 million hectares in 2011.” This alarming rate of deforestation was

caused by poor land use planning and has made habitat loss one of the most significant threats to biodiversity in Nigeria today.

Competing land uses such as agriculture and human settlements are contributing to the decline of forests and woodlands together with the rising demand for fuel wood and charcoal. Over harvesting, agricultural encroachment and unregulated burning are believed to be contributing to the decline of many species in the wild. The depletion and degradation of the natural resource base has extended to less stressed areas in the different ecological zones of Nigeria.

Changes in land use policy have resulted in transferring control of land and other natural resources management from the local authorities to the States. This control involves ancestral rights and authority of caring, protecting and managing forest resources, land, water and other such natural resources. Poor land use planning and unclear tenure rights have been identified as a major catalyst to biodiversity degradation and loss in Nigeria.

Poor Land Use Planning has not only affected biodiversity but has also resulted in conflicts which has claimed human lives and further impoverished the Nigerian rural community. Major conflicts such as the Jos crisis, the Tiv/Jukun crisis of Benue and Taraba States, the Fulani Herdsmen/Tiv crises of Benue and the Aguleri/Umuleri crisis in Eastern Nigeria are in one way or the other associated with biodiversity and natural resource access and use.

3.1.5 Governance and Transparency

Biodiversity in Nigeria, as is the case in many countries, is largely considered a common 'good'. It is therefore largely affected with the principle of the tragedy of the common which places exploitation with the range of the survival of the fittest. It has been observed that most of the domestic, commercial and industrial activities carried out in the country impacts heavily on the Biodiversity resources. The issue of biodiversity is multi-faceted and control of its exploitation equally complex. The degree of pressure on natural resources has outgrown the current straight-jacketed approach to its management by most States and local authorities. The issue of a National Biodiversity Committee has been mentioned earlier. Extension services on forestry and biodiversity related matters have collapsed, thereby leaving the governance of natural resources in an open loop. There are however exceptional situations, as is the case in Cross River State, where communities have taken the lead in forest protection, royalty and benefit sharing, forest management, NTFP exploitation control and ecotourism planning.

Corruption is another major factor to blame for creating a threatened future for Nigeria's Biodiversity. The collapse of logging controls in Nigeria is traced to corruption of forestry officials and this indirectly affects all other natural resource based products. Corrupt politicians have aided the de-reservation of many biodiversity rich areas for non-productive reasons, thereby jeopardizing all past efforts at saving and protecting biodiversity.

3.1.6 Socio-cultural characteristics, food and trade connections

As a set of practices or ways of doing things, cultures shape biodiversity through the direct selection of plants and animals and the reworking of whole landscapes (Sauer, 1965). Such landscapes have been described as anthropogenic nature, their composition, whether introduced species, agricultural monocultures or genetically modified crops, being a reflection of local cultures and a product of human history including the context in which individuals and groups live their lives (Milton, 1999).

Some cultural practices that existed in Nigeria encouraged the use of specific species for festivals and they often limit the population of species occurring in a narrow ecological range. While it is important to remark that in some Nigerian societies, cultural taboos and their sanctions have helped to check abuse of the environment at least among the local people, the abandonment of these traditional cultural practices have done more harm and posed serious threat to natural environmental structures.

Many Nigerians, especially in the southern parts view the consumption of wildlife resources as normal and in some cases a delicacy. Bush meat consumption is high and has only reduced in the past few years due to scarcity occasioned by pressure on wildlife resources. The situation is a bit better in some parts of northern Nigeria that is dominated by Islam, where consumption of some types of wildlife is prohibited. However, field reports on bush meat trade have confirmed that apart from primate species, other large games and a large variety of flora are used as food and traditional medicines in northern Nigeria. The 'juju' market or traditional medicine market is also responsible for a larger percentage of biodiversity in-take from the wild in Nigeria. The current report on the global scarcity of vultures by Birdlife International is a special case for concern.

In Nigeria, field reports continue to support the fact that vultures are mostly harvested and used in traditional medicine. A study of the national status of vulture species in Nigeria (which is on-going at the time of compilation of this report), revealed that there is large scale utilization of vulture body parts for traditional medicine. Until recently, when the activities of the National Environmental Standard Enforcement Agency

(NESREA) began to have appreciable impact on control of trade in endangered species, trade in endangered species was not properly controlled. Despite these efforts, parrot species, most particularly the African Grey Parrot – *Psittacus eritharcus* are still being harvested in large numbers in the country for sale to Asian and Mediterranean markets.

3.1.7 Effect of Climate change

The National Adaptation Strategy and Plan of Action for Climate Change in Nigeria (NASPA-CCN 2011) revealed that climate change is already having significant impacts on Nigeria. According to the report, recent estimates suggest that in the absence of adaptation, climate change could result in the loss of between 2% and 11% of Nigeria's GDP by 2020, rising to between 6%-30% by the year 2050. The impacts of climate change are expected to exacerbate the impacts of human pressure on biodiversity. This will further diminish the ability of natural ecosystems to continue to provide ecosystem services and may cause invasion of strange species that are favoured by climate change.

3.2 THE THREATS TO BIODIVERSITY

The underlying factors stated above are responsible for threats on Biodiversity which are categorized into three major areas:

3.2.0 Habitat Degradation

3.2.1 Unsustainable Agricultural practices

Conversion to agriculture is also occurring in many protected areas, in community-owned land, and in state-managed forests without control. Rainforests and savannah woodlands are under the greatest threat from agricultural conversion. Communities in and around protected areas continue to encroach on these protected areas in total disregard to their protection status. Until more sustainable agricultural practices are put in place, the process of slash-and burn agriculture continues, since tropical soils under cultivation can only support crops for a few years before becoming depleted, thereby requiring the clearing of new lands for continued harvests. Mangroves are also heavily harvested for fuel-wood and for construction materials. **USAID (2008)** also reported that degradation of habitats and loss of species is not always as visible as out-and-out conversion, but it occurs in other more insidious ways with equally damaging results.
In areas where particular species, such as hardwood trees, rattans, medicinal and food plants, and other non-timber forest products, are harvested unsustainably, not only are these species lost but also a myriad of associated plants, such as insects and fungi, that require these specific hosts to meet their own ecological requirements for survival.

Furthermore, Nigeria's wildlife is rapidly declining due to habitat loss and increased pressure from hunters, poachers, and bush burning. Animals that have disappeared from Nigeria include the Giant Eland (***Taurotragus derbianus***), the Giraffe (***Giraffa camelopardalis***), Black Rhino (***Diceros bicornis***), Cheetah (***Acinonyx jubatus***) and the Pygmy hippopotamus (***Choeropsis liberiensis***. About 10-12 species of primates, including the white throated guenon and *sclater's guenon*, are under serious threat of extinction.

3.2.2 Unsustainable harvesting of bio resources

Intense harvesting can result in extremely rapid declines in species populations (***Kemp and Palmberg, 1993***), stated that unless carefully planned and controlled, harvesting may severely damage stand structure, site capacity and regeneration of rainforests. Nnabuife (2003) stated that people cut trees indiscriminately; they do not know that one day, they are going to run out of these trees and it is already happening in some countries. In Nigeria, the Iroko, Ebony, Mahogany and Obeche, are already running out of stock.

Illegal hunting of all species of ungulates, takes place at all times of the year, and many of the hunters show no regard to 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 has increased as human populations have also 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)*** posited that Nigeria has an extensive inland water mass of about 12.5 million hectares that can produce over 500,000 tons 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** tons annually, due to unsustainable harvesting practices and incidences of pollution.

3.2.3 Extractive Industries and their activities

Extractive industries in Nigeria are those companies that search for, and exploit resources which are naturally stocked in the earth’s crust. Some of the non-renewable resources of Nigeria that are regularly exploited include crude oil and gas; the nation’s major source of energy and foreign earning, solid minerals, and salts. The petroleum industry accounts for over 90 percent of Nigeria’s national income. The Niger Delta is the seat bench of oil and gas production in Nigeria. Virtually all aspects of oil and gas

exploration and exploitation have deleterious effects on the ecosystem and local biodiversity.

Nenibarini (2004) reported that seismic activities through massive dynamiting for geological excavation have had serious effects on the nation's aquatic environment. The use of dynamites produces narcotic effect and mortality of fish and other fauna.
The destabilization of sedimentary materials associated with dynamite shooting also causes increment in turbidity, blockage of filter feeding apparatuses in benthic fauna and reduction of photosynthetic activity due to reduced light penetration.

The process of burying of oil and gas pipelines in the Niger Delta is equally known to fragment biodiversity rich ecosystems such as rainforest and mangroves. Apart from the reduction in habitat area, clearing of pipeline track reduces natural populations, which might in turn distort breeding.

Oil spillages occur routinely in the Niger Delta. Sources of oil spill are varied, including, pipeline leakage and rupturing, accidental discharges (tank accident) discharges from refineries and urban centres. There are also biogenic sources of hydrocarbons. Detailed statistics of oil spillage as reported by UNEP in 2011, in Ogoni land of the Niger Delta (2006-2011)**.** The recent UN Report on Shell Petroleum Development Company (SPDC) and Ogoni land released in August 2011 revealed that the occurrence of oil spills on land brings about fire outbreak that leads to the killing of vegetation and creation of crust over the land, making remediation and re-vegetation very difficult (UNEP,2011).
It was further reported that areas directly impacted by oil spills will be damaged, and root crops, such as cassava, will become unusable. When farming recommences, plants generally show signs of stress and yields are reportedly lower than in non-impacted areas.

Oil exploration in the Niger Delta and in coastal areas, gas emissions and other pollutants from the petroleum industry have therefore caused considerable environmental pollution and forest degradation, thus biodiversity of Nigeria. The overall effects of oil on ecosystem health and biota are many. Oil interferes with the functioning of various organs and systems of plants and animals. It creates environmental conditions unfavourable for life.

3.2.4 Unsustainable Natural Resource Harvesting

3.2.4.1 Poaching

Poaching is the main threat to large mammals but habitat loss (mainly due to farming) is probably the main threat to biodiversity. The demand for ivory is increasing and Nigeria's elephants are declining rapidly. Poaching and /or illegal hunting of all species of ungulates, 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).

3.2.4.2 Fuelwood consumption

About 70% of Nigerian households mainly in rural and semi-urban areas depend largely on fuel wood consumption for their domestic and to a large extent commercial energy needs. The demand for fuel-wood is higher in the less vegetated north and in urban cities where most poor who cannot afford other cost of other sources of energy supply use fuel wood for food production.

Charcoal production is also in high demand from the highly populated cities and is the most critical cause of forest degradation in some parts of the country. With growing population, increasing poverty and relatively low industrialisation rate, Nigeria should develop mechanism to expand the scope of energy requirements in rural and semi-urban areas as part of the strategies to save biodiversity and increase the size of the national vegetation cover.

3.2.4.3 Illegal Logging

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.

Fig. 4 Logs of wood extracted from the forest. Source: NCF

Illegal logging and the international trade in illegally logged timber is a major problem for many timber-producing countries in the developing world, particularly in West Africa. It causes environmental damage, costs governments billions of dollars in lost revenue, promotes corruption, and undermines the rule of law and good governance and in some instances, provides funding for specialized crimes such as terrorism. Illegal logging also retards sustainable development in some of the poorest countries of the world. Consumer countries contribute to these problems by importing timber and wood products without ensuring that they are legally sourced. In recent years, however, producer and consumer countries are collaborating to address illegal logging.

The Nigerian Government is currently concerned about rising deforestation and environmental degradation, which is estimated to cost the country over $6 billion a year. However, government has failed to put in place effective measures to curb illegal logging and only 6% of the land area is protected. Timber concessions have been granted in some of its forest areas and oil-palm plantations have replaced forest areas. Previous governments have tried to prevent further forest loss through the on log exports, so as to promote agro-forestry and communities based conservation schemes and also encourage the establishment of plantations and reforestation of logged areas. The successes of these initiatives have however been limited.

Large areas of natural forests are being exploited for species such as ***Khaya spp.***, ***Nauclea diderrichii (opepe), Terminalia ivorensis (Odigbo), Terminalia superba (Afara)***

and Triplochiton sceleroxylon (Obeche). High intensity of logging and illegal exploitation of these and other species have continued to pose serious threats to the country's forest resources. The tree-fall gaps in logged areas has also led to the establishment of secondary growth that often cannot fully replicate the lost trees and the demand for commercial timber does not allow for natural regeneration. There is also the case of genetic erosion, when the largest and most vigorous trees are selectively logged, leaving the genetically poor trees behind to reproduce.

The on-site conversion of logs into lumber using chainsaws (Chainsaw milling), is supplying a large proportion of local timber markets with cheap lumber. While it offers socio-economic opportunities to local people, it is often associated with poor timber quality and it also encourages corruption and other illegalities. Regulating and controlling the practice has therefore become a great challenge in the country due to the mobility of these chainsaw milling operations.

The Wildlife Conservation Society (WCS) brokered an agreement between Nigeria and Cameroon, in September 2008, to protect the habitat of the endangered Cross River gorilla by cracking down on illegal logging and the bush meat trade, by strengthening and improving law enforcement and monitoring in the Cross River National Park (Nigeria) and Takamanda National Park (Cameroon). In addition, the two countries agreed to increase community involvement in conservation activities as well as strengthening conservation education and public awareness on conservation. Nigeria is also a signatory to the Accra Declaration which resulted from a FAO/ITTO workshop held in Accra, Ghana in July 2008, which explored the problems and possible solutions to the illegal extraction of forest resources in tropical West Africa (ETRN, 2011).

3.2.4.4 Uncontrolled, Illegal and Bad Mining Practices

The history of mining activities in Nigeria dates back to the tin mines on the Jos Plateau, for tin and bauxite and the coal mines of Enugu. The tin deposits on the Jos plateau had been extracted through open cast mining, until when surface deposits were depleted. Today, deeper underground ores cannot be extracted economically as world market prices of tin have fallen. This has left the coast clear for artisanal and illegal miners to flourish. The mining of coal on the other hand, was stopped in favour of cleaner energy sources such as oil and gas. Since the withdrawal of foreign investment in the 1970's, the contribution of the mining sector to the GDP dropped to less than 1% (*Seven Year Plan, 2002).* The emphasis on mining also changed from big foreign companies, to small local companies and artisan miners who provided raw materials for the local market.

The local mining and processing of these raw materials have had major socio-economic, infrastructural development of these areas, associated with major negative physical, biological, hydrological as well as environmental impacts on these areas.

Small-scale, largely illegal mining have had similar widespread negative impacts in most other *areas in Nigeria.* Sumaila (1989) reported that tin mining activities which have caused considerable erosion damages to lands arising from active gully equal to 7, 240km in length. The influx of mining operators without adequate monitoring of production and documentation does not augur well for conservation of the vegetation cover, minerals and land use systems. The erosion problem created in the mining sites is on a steady increase, leading to development valleys. Solid mineral mining in Nigeria has left behind, abandoned and un-reclaimed mine sites, to the detriment of the surrounding communities, the environment and biodiversity.

3.2.4.5 Unsustainable Harvesting of Non Timber Forest Products

Nigeria's population is largely rural and agriculture plays an important role in the national economy. Nigerian agriculture affects biodiversity in a number of ways.
Almost all other forest exploitation processes affect the non-timber forest products. These products – nuts, fruits, seeds, ropes, dye, lianes, gum, wax, honey, wild animals etc constitute a huge resource of food, medicine and commerce but unplanned and uncontrolled harvesting due to human pressure has degraded the resource to a less productive level. Most of the expanding local trade in traditional medicine, fibres and domestic material needs are not domesticating the much needed raw materials; they are however continuously being sourced from the wild, thereby reducing population density of the species and causing near extinction of many species.

3.2.4.6 Pollution

The production and use of toxic chemicals pose a major and relatively new threat to humankind and the environment. Emissions from vehicles, industrial processes, liquid and solid waste, pesticides and chemical fertilizers for agricultural and domestic purposes release toxic substances into the air, soil or water thereby affecting aquatic and other organisms in the environment. Heavy metals and persistent organic pollutants such as polychlorinated biphenyls, dioxins and DDT are of particular concern since they do not degrade easily in the environment. They accumulate and are lethal to plants, animals, fishes and human beings resulting disruption in the ecosystem loss of species.

Fig.5.A Polluted water body. Source: NCF

Pollution has become one of the most serious problems of our time and water pollution is one of the prime reasons for the loss of aquatic genetic diversity. This view is further confirmed by the UNEP (2011) report that concludes that pollution of soil by petroleum hydrocarbons in Ogoni-land is extensive in land areas, sediments and swampland. Most of the contamination is from crude oil although contamination by refined product was also found at three locations. Oil pollution in many intertidal creeks has therefore left mangroves denuded of leaves and stems, leaving roots coated in a bitumen-like substance sometimes 1 cm or more thick. Mangroves are spawning areas for fish and nurseries for juvenile fish and the extensive pollution of these areas is impacting on the fish life-cycle. With oil spill on land, fires often break out, killing vegetation and creating a crust over the land, making remediation or re-vegetation difficult.

The report also observed that if the noticed increase in artisanal refining in parts of the Niger Delta region is left unchecked, it may lead to irreversible loss of mangrove habitats in this area. It was reported that between 2007 and 2011, artisanal refining has been accompanied by a 10% loss of healthy mangrove cover, or about 307, 381 m2. The UNEP investigation also found that the surface water throughout the creeks contains hydrocarbons, with floating layers of oil varying from thick black oil to thin sheets.

3.2.4.7 Gas Flaring

Due to the lack of gas utilization infrastructure, Nigeria flares approximately 75% of the gas it produces and re-injects only about 12% for enhanced oil recovery. Gas flaring contributes to both the production of the acid in acid rain and increased carbon emissions into the atmosphere.

One local study (Pollutec 1996) estimated that 12 million tons of methane gas is released into the atmosphere in Rivers and Delta States. It also subjects flowering plants to heat radiation, high temperatures and excessive light and gas deposits (dry and wet depending on the season). In the Niger Delta, Pollutec (1996) also noted that affected plants show signs of chlorosis (leaf discoloration), scorching, browning and desiccation, stunting and death after prolonged exposure. The same study also noted that gas flares attracted yam beetles and grasshoppers that destroy crops.

3.2.4.8 Invasive Species

Invasive species inhibits ecological processes and reduces the value of the environment, thereby limiting livelihood options available to people living and dependent on such ecosystems. They are also termed as plant invaders, as alien plants that invade and replace native vegetation. Some of the common invasive species in Nigeria are Nypa palm (***Nypa fruticans***), Water hyacinth (***Eichhornia crassipes)*** *and* Typha grass *(**Typha latifolia**).* Invasive weeds have however impacted negatively on their new area of invasion exerting untold hardship on the people, particularly poor farmers, the biodiversity, including entomofauna and phyto-flora. Most of these weed species smother out the native species into extinction while others produce allellopathic substances that eliminate other species around them (**Adebayo & Uyi, 2010**).

Nypa palm was introduced into Nigeria in 1906 from Singapore Botanic Gardens, to control coastal erosion. It grows up to 10 m tall and produces large buoyant propagates that are dispersed by ocean currents. This invasive species has invaded the Nigerian coastal environment and has displaced the native mangroves of the Niger Delta, causing loss of biodiversity and hardship to coastal communities who depend on the biodiversity and the dynamics of the mangrove ecosystem for their livelihood. The species invades deforested and exposed mudflats and forms dense mono-specific stands that out-compete native mangrove species. The lack of stilt roots, absence of leaf litter and dense structure reduces estuarine habitat and has negatively affected native biodiversity.

Water hyacinth (***Eichhornia crassipes),*****(Mart.) Solms-Lamb** (Family ***Pontederiaceae***), is a floating aquatic plant with inflated petioles and native to tropical America (**Hutchinson**

and Dalziel 1968). It is believed that the weed originated from Brazil, but is widely spread all over Southern and Central American countries, having been introduced as an ornamental in the 1890's (**Penfound and Earle 1948**). It is a major weed in several regions of the world having climatic regions similar to its native habitat. In many countries where it is a pernicious weed, it has been found to interfere with river transportation, irrigation channels, pumps and access to water by riverine communities and recreational activities.

Water hyacinth has become a major weed in Nigeria having successfully invaded and established itself on the entire Badagry Creek, the Yewa Lagoon, Ologe Lagoon, the Lagos Lagoon and the waterways of the riverine areas of Okitipupa. It was reported in 1982 in the local newspapers as a weed that is spreading fast and paralyzing the fishing industry. Since this initial report, the surge in growth has become phenomenal leading to complete coverage of some of these creeks and lagoons. As a result of this invasion, **Akinyemiju (1987)** gave a rough estimate that more than one third of Nigeria's local fish supply has become threatened by the mats of water hyacinth. It is known in Nigeria for example that the salinity of the Lagos Lagoon usually drops drastically during the raining season thereby enhancing a build-up of the weeds during this season. The conducive temperatures and high rate of reproduction coupled with the seasonally low salinity of the Lagos lagoon made the water hyacinth an especially dangerous threat to the continued use of the affected Nigerian waters as a resource, unless appropriate and effective control is adopted and implemented forthwith.

The Federal Government of Nigeria has made attempts to maintain focus on the control of invasive species, most particularly water hyacynth in recent times and Nypa Palm in the recent past. Apart from data and information sharing, there is need for much more investments in research, stakeholder participation in the control of invasive species and seeking opportunities for converting waste to wealth approach to management.

Typha grass (***Typha latifolia****)* is a native plant species of North and South America, Europe, Eurasia, and Africa. *T. Latifolia* generally grows in flooded areas where the water depth does not exceed 0.8m. However, it has also been reported growing in floating mats in slightly deeper waters. Typha is often among the first wetland plants to colonize areas of newly exposed wet mud, with its abundant wind dispersed seeds. The buried seeds can also survive in the soil for long periods. It germinates best with sunlight and fluctuating temperatures, which is typical of many wetland plants that regenerate on mud flats. It also spreads by rhizomes, forming large interconnected stands. Hence, it has three interlocking reproductive strategies: dominance of local habitats by clone growth, survival of long inhospitable periods with buried seeds, and dispersal to new sites with wind-dispersed seeds.

Kasaga Community Clearing
Typha on Nguru Channel.

Fig. 6

This may explain in part why the species is so widespread. It is considered to be a dominant competitor in wetlands, and often excludes other plants with its dense canopy. Although this is a natural species of wetlands, there is growing concern about the degree to which it is replacing other native species.

Today, it is a native invasive plant species devastating the watersheds of the Chad Basin and Hadejia-Nguru wetlands, causing flooding, loss of farmlands and conflict among farmers, herdsmen and fishermen. NCF/WOW (2011) reported that Typha weed has colonized areas of the wetland, blocking channels and open water, and preventing water reaching some seasonal pools, so that farming has ceased in these areas, while flooding has displaced many communities.

In an effort to reduce the extent of typha in the area, NCF/WOW and other supporting organizations, assisted the communities of DabarMagini, Kasaga and Matafari/MataraUku, to physically clear typha that blocked and hindered free movement of water in the Marma channel, a key freshwater channel that serves as the lifeblood to the people living in these locations.

3.2.4.9 Overgrazing

Overgrazing occurs when plant material is grazed faster than it can naturally regenerate, often leading to the permanent loss of plant cover. It is a common effect of too many

animals grazing on limited range land and also occurs when plants are exposed to livestock grazing for extended periods of time without sufficient recovery periods. It reduces the usefulness of the land and is one of the causes of soil erosion and desertification. Overgrazing can occur under continuous or rotational grazing. It can be caused by having too many animals on the pasture land or by not properly controlling their grazing cycle. Overgrazing reduces plant leaf areas, which prevents sunlight from reaching the plant and affects the plant growth. Plants become weakened and have reduced root length.

The area devoted to grazing in Nigeria rose from 166, 326 km2 in 1978, to 187, 236km2 in 1995. Because most of the cattle are concentrated in the semi-arid zones that support 90% of cattle, the area is subjected to overgrazing and shortage of fodder.

EPI (2011) reported that one indicator that helps in the assessment of grassland health is changes in the goat population relative to those of sheep and cattle. As grasslands deteriorate, grass is replaced by desert shrubs. In such a degraded environment, cattle and sheep do not fare well but goats, being particularly hardy ruminants, are able to forage on these desert shrubs.

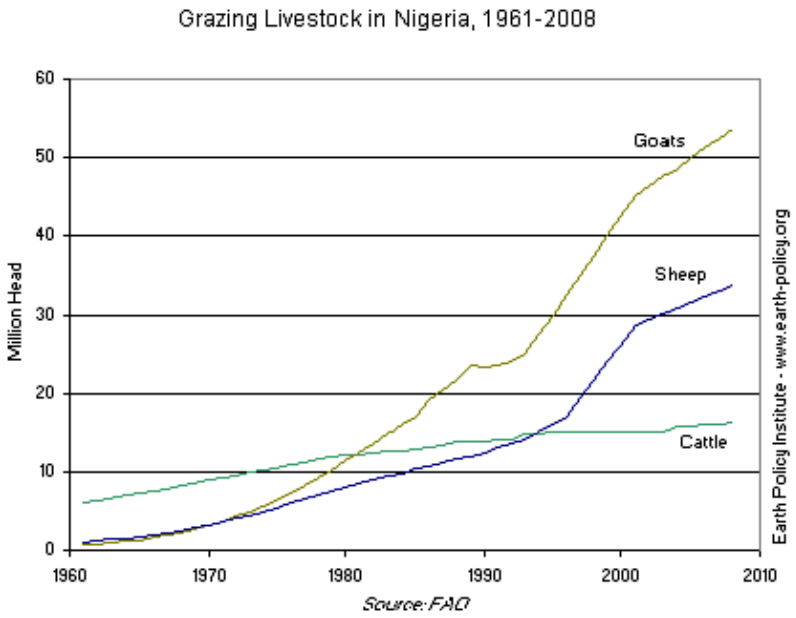


Figure 7: Number of grazing livestock in Nigeria between 1981 and 2008

Nigeria, Africa's most populous country, reports losing 867, 000 Ha of range land and crop land to desertification each year (EPI, 2011). As human and livestock populations increase, herders and farmers compete for the limited land for farming and grazing. The goat population in particular has skyrocketed as the soil has eroded. If Nigeria's human

and livestock population continues to grow as they are today, the associated land degradation will eventually undermine the nation's capacity for farming and livestock production.

The Federal Government's concern over this threat has resulted in the introduction of a draft bill to the National Assembly for an Act establishing a National Grazing Reserves Commission; with powers to acquire and develop land for grazing and livestock routes in any part of the country. This bill, which is highly controversial, is yet to be passed by the National Assembly.

3.2.4.10 Bush fires

Bushfires occur widely and extensively and have become common occurrence in the Nigerian environment. Fire is widely accepted throughout the country as a valuable tool for the management of natural vegetation, agriculture, including livestock production, hunting and in other land use systems. Bush fires occur when they are ignited by farmers during the dry season in the process of land clearance/preparation for farming. If not contained, they may spread and cause damage to vegetation, other farmlands, gardens and even residential areas.

Others may be deliberately set by hunters to flush game, or by livestock herdsmen to stimulate fresh grass. Accidental bushfires are also known to have started by improperly discarded cigarettes by smokers. Although fire can be deployed as a management tool to suppress the development of thickets and control ticks and other parasites in protected area, their devastating effect, if not properly controlled and suppressed, can cause the loss of native flora and fauna that may take several years to regenerate.

Fire also creates negative impacts on the composition and density of vegetation and delays the attainment of sustainable development targets and also accelerates desertification and general environmental degradation. Small mammals, ground-nesting birds, soil-dwelling organisms and numerous invertebrate species are often victims of wildfires. In forest ecosystems, wildfires repress seedling establishment in some species and create wounds on some big plants through which they become infected by disease agents. Fire destroys large areas of forest ecosystems annually with the elimination of sensitive species such as ***Afromosia laxiflora*****)**, Silk Cotton tree (***Ceiba pentandra****),* ***Entanda abyssinica*** *and* ***Hildegardia barteri***

CHAPTER FOUR

4 Status of Biodiversity in Nigeria

Nigeria is rich in biodiversity and among the regions of the world, houses comparable levels of endemism and species richness due to a complex topography and wide variety of habitats. These include but are not limited to coastal creeks of the Niger Delta, the rainforests of the Cross River basin and the mountains along the Cameroun border with Nigeria (WCS, 2015). Along with the Atlantic Ocean which forms the southern border part of Nigeria, and with its highly diverse marine and freshwater ecosystems, there exists an inland layout of an array of other forest and woodland ecosystems which end up in Sudan Savannah and Sahel/semi-desert belt in the northern part of Nigeria. With very extensive and broad based river systems that emerge out of the two largest Rivers – Niger and Benue, Nigeria has a huge watershed resource which supports agriculture, navigation and commerce. The three major plateaux landscapes in the central part – Jos, the south eastern end – Obudu and the north east – Adamawa and Mambilla contains the topmost peaks of Nigeria where altitude approaches about 1800 m asl. Each of these ecosystems has its own unique characteristics of wild fauna, higher and lower floral species and a huge collection of marine and freshwater aquatic species. In species diversity and endemism, Nigeria is highly endowed. Borokini (2014) reports that Nigerian endemic flora amount to 91 species belonging to 44 families with Rubiaceae accounting for the highest numbers. A breakdown of faunal species is presented in the Table 1.

Table 1: List of Endemic Vertebrate species in Nigeria

Mammals	**Birds**	**Fishes (Freshwater)**	**Fish (Marine)**	**Reptiles**
Cercopithecus sclateri (Primates - Cercopithecidae) **Sclater's Guenon** *Crocidura*	*Malimbus ibadanensis* (Ploceidae) **Ibadan Malimbe** *Estrilda poliopareia*	*Alestopetersius smykalai* (Alestiidae) **Blue Diamond Tetra** *Arnoldichthys spilopterus* (Alestiidae) **Niger**	*Grammonus longhursti* (Bythitidae) *Meganthias carpenteri* (Serranidae) **Yellowtop**	*Cynisca gansi* (Squamata Amphisbaenia - Amphisbaenidae) *Cynisca kigomensis*

Mammals	Birds	Fishes (Freshwater)	Fish (Marine)	Reptiles
longipes (Soricomorpha - Soricidae) **Savanna Swamp Shrew** *Dasymys foxi* (Rodentia - Muridae) **Fox's Shaggy Rat** *Praomys obscurus* (Rodentia - Muridae) **Gotel Mountain Soft-furred Mouse**	(Estrildidae) **Anambra Waxbill** *Lagonosticta sanguinodorsalis* (Estrildidae) **Rock Firefinch** *Vidua maryae* (Viduidae) **Jos Plateau Indigobird**	**Tetra** *Ctenopoma argentoventer* (Anabantidae) **Silver-bellied Climbing Perch** *Ctenopoma nebulosum* (Anabantidae) **Fog Bushfish** *Aphyosemion deltaense* (Aplocheilidae) **Delta Killifish** *Epiplatys biafranus* (Aplocheilidae) **Biafra Panchax** *Epiplatys longiventralis OC* (Aplocheilidae) **Banded Panchax** *Fundulopanchax arnoldi* (Aplocheilidae) **Arnold's Lyretail** *Fundulopanchax powelli* (Aplocheilidae) **Black**	**Jewelfish**	(Squamata Amphisbaenia - Amphisbaenidae) *Cynisca nigeriensis* (Squamata Amphisbaenia - Amphisbaenidae) *Mehelya egbensis* (Squamata Ophidia - Colubridae) **Dunger's File Snake** *Rhinotyphlops crossii* (Squamata Ophidia - Typhlopidae) **Cross' Beaked Snake** *Cnemaspis gigas* (Squamata Sauria - Gekkonidae) **Perret's Nigeria Gecko** *Cnemaspis petrodroma*

Mammals	Birds	Fishes (Freshwater)	Fish (Marine)	Reptiles
		Aphyosemion *Nothobranchius kiyawensis* (Aplocheilidae) **Kiyawa Nothobranch** *Parauchenoglanis akiri* (Bagridae) *Parauchenoglanis buettikoferi* (Bagridae) *Thysochromis annectens* (Cichlidae) *Neolebias axelrodi* (Citharinidae) *Neolebias powelli* (Citharinidae) **Domino Neolebias** *Barbus aboinensis OC* (Cyprinidae) **Aboina Barb** *Barbus clauseni OC* (Cyprinidae) *Garra trewavasai*		(Squamata Sauria - Gekkonidae) **Nigeria Crag Gecko**

Mammals	Birds	Fishes (Freshwater)	Fish (Marine)	Reptiles
		(Cyprinidae) *Dormitator pleurops* (Eleotridae) *Synodontis guttatus OC* (Mochokidae) *Synodontis robbianus OC* (Mochokidae) **Russet Synodontis**		

Source: Wilson & Reeder (2005) for mammals, Dickinson (2003) for birds, the EMBL Reptile Database (2005) for reptiles, Frost (2004) for amphibians, and FishBase 2004 (2004) for fishes

However, overall, biodiversity in Nigeria is highly threatened due to land use changes from agriculture and overgrazing, over exploitation of natural resources through extractive actors, invasive species and environmental pollution. According to the IUCN Red list 2013, Nigeria has a total of 309 threatened species in the following taxonomic categories: Mammals (26), Birds (19), Reptiles (8), Amphibians (13), Fishes (60), Molluscs (1), other Invertebrates (14) and Plants (168) (Sedghi, 2013).

Conservation scientists observe that immediate attention should be focused on saving what remain of the priority areas for biodiversity in the country. There is also general consensus on where the remaining nexus of biodiversity lies in Nigeria and the first level action is expected to be focused on those areas as shown in Table 2.2.

Table 2: Categories of Biodiversity sites in Nigeria

Category of Biodiversity related sites	Number	Comments
National Parks	7	The National Parks are high priority

Category of Biodiversity related sites	Number	Comments
		conservation areas and are found in seven locations, namely Old Oyo National park in Oyo State, Cross River National Park in Cross River state, Gashaka-Gumti in Taraba/Adamawa states, Okomu National Park in Edo state, Chad Basin National Park in Borno/Yobe States, Kainji Lake National Park in Niger/Kwara States and Kamuku National Park in Kaduna state. However, these reservoirs of Nigeria's biodiversity suffer from low funding and several management and technical challenges
Important Bird Areas	27	These are identified as important biodiversity areas too. All National Parks have IBAS within them and 60% of Nigeria Ramsar sites are also IBAs
Ramsar Sites	11	Management plans have been developed for four of these sites (Apoi Creek, Lower Kaduna, Oguta Lake and Baturiya) but are yet to be implemented due to lack of funding. The national wetland policy is at draft stage and there are plans to designate four more sites (Chingurme, Ibom/Cross River estuary, Wawan Rafi Wetlands and Akassa coastal wetland.
World Heritage Sites	2	The Sukur Kingdom in Mandara Mountains in Madagali LGA of Adamawa State in north-eastern Nigeria is the first Nigerian landmark to be listed on the World Heritage Sites, while Osun Osogbo Grove made the list later in 2005.
Forest Reserves	994	50% still maintain their FR status, while the remaining 50% have either been de-reserved or have been encroached upon and converted to either farmlands or residential areas

Category of Biodiversity related sites	Number	Comments
Game Reserves (State Governments and a few managed by communities)	32	60% under various levels of management
Biosphere Reserve	1	The only named Biosphere Reserve according to UNESCO is in Omo Forest Reserve, Ogun State, Nigeria
Sacred groves	N/A	Many in number and at varied level of protection

Nigerian Conservation Foundation (2012)

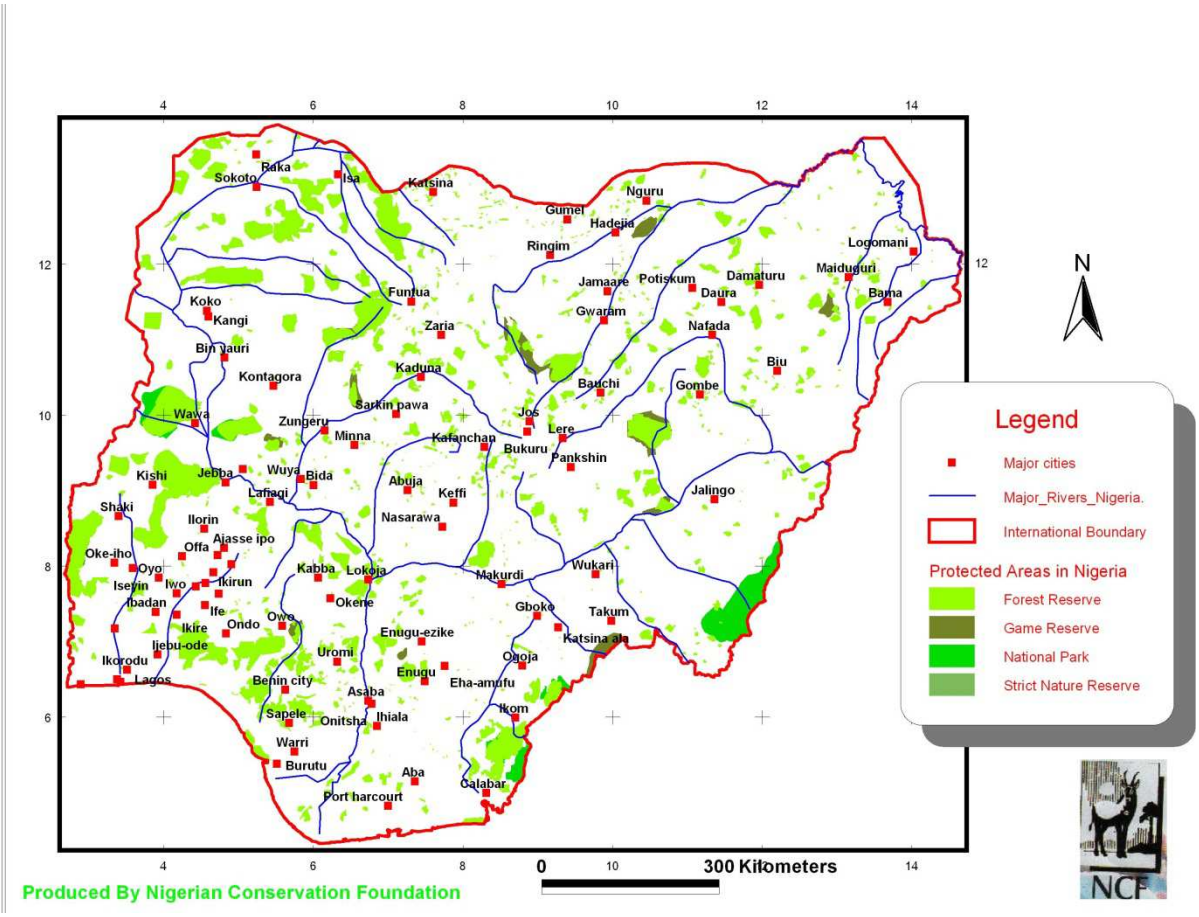


Fig 8: Map of Nigeria showing Protected Areas for Biodiversity

Table 3: Biodiversity in Nigeria: Species Statistics

Mammals	274
Birds	941
Amphibians	109
Reptiles	135
Fish	338 Inland Fisheries(314 species for Niger Delta alone)
Orchids	145
Flowering plants	5209

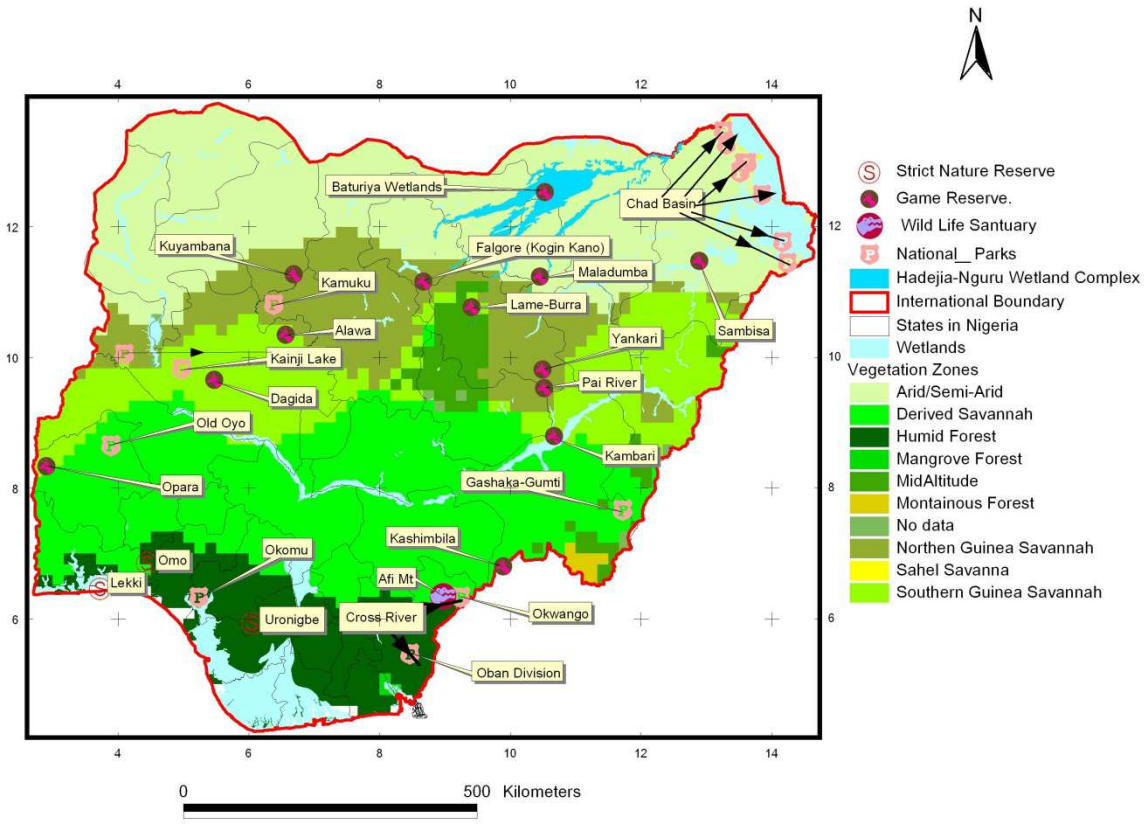
Nigerian Conservation Foundation (2012)

4.1 Nigeria's Endemic Species

Nigeria is rich in endemics. This is partly attributable to the country's ecosystem diversity. From the marine to the semi-desert, varied species of mammals, reptiles, birds, marine and freshwater fishes etc are solely recorded by science to exist in Nigeria. The endemism associated with Nigeria in Biodiversity underscores the significant role that biodiversity management plays in maintaining the world's natural heritage, apart from the implication that biodiversity has on livelihoods, health and food of generations of people.

This assessment study lacks the capacity to recommend actions and priorities at this level but analysis of the current trends on biodiversity will help provide elements for priority and action planning on biodiversity issues, conservation and management.
Stakeholder's consultation revealed that efforts should be concentrated on some specific approaches to rescue Nigeria's biodiversity from total collapse and to commence gradual rehabilitation of her genetic, species and ecosystem biodiversity.
Stakeholders observed that immediate attention should be focused on saving what remains of the critical hotspots of biodiversity in the country. There is also general consensus on where the remaining nexus of biodiversity lies in Nigeria and the first level action is expected to be focused on those areas categorized as Nigeria's Biodiversity Hotspots

Fig 9: Map of Nigeria showing vegetation zones and some important sites for Biodiversity



Fig

CHAPTER FIVE

5. CHALLENGES TO BIODIVERSITY CONSERVATION

The goal of the Federal Government's policy on the conservation of biodiversity is to ensure sustainable use of forest resources and preservation of the many benefits accruing from the soil, water, and wildlife for economic development. The Government's mission is that Nigeria's rich biological endowment together with the diverse ecosystems will be secured, and its conservation and management assured through appreciation and sustainable utilization by the Year 2010. This ultimate goal and mission has however been constrained by a multitude of challenges which include:

5.1 Financial Resources

USAID (2002) sponsored an environmental assessment in Nigeria and the analysis conducted by the EA Team identified two problems with the resource allocation system that heavily impact on the capacity of the country to attain environmental management and protection. These problems include:

5.2 Limited allocations to local governments

The limited revenue allocated to local governments is a constraint to the integration of environmental management and protection into local government economic planning and development activities;

5.3 Use of the Ecological Funds

The Ecological Funds, which is 2% of the annual Federal budget, was established as a financing mechanism to support a wide range of environmental activities throughout Nigeria. In its current state, the GFRN allocates money from the fund to state governments, through the state governors. While these monies are intended to exclusively support environmental activities at the state level, this is rarely the case as monies received by the state from the Ecological Funds office are diverted for other uses (Adapted from: ARD, 2001).

Major challenges militating against sustainable management of forest resources in the country include lack of political commitment and poor funding of the forestry sub-sector. The States usually regard the forest reserves as opportunities for generating

revenue without reinvestment for sustained production. In addition adequate manpower, equipment and funds are not provided for proper implementation of sustainable forest management.

5.4 Weak coordination and monitoring among relevant institutions

USAID (2002) reported that overuse and poor management of existing resources have created enormous problems and substantial holes in Nigeria's natural resources base. Public records at the Federal and State levels are poor, and too often out of date. They are non-existent at the local and community levels, except for the indigenous knowledge of the local land stewards. There is a definite need for more information, better science and solid monitoring of the status of biodiversity and the rate of change over time.

5.5 Political will

Nigeria's environmental problems are extensive. Reversing these trends will require significant political and popular will. Any credible change in Nigeria's enforcement of environmental regulations will therefore require more than simple capacity building. It would require building the political support or the political will to see the regulations enforced. Unfortunately, this is presently not the case.

These types of changes are long term and require raising the awareness of a wide range of stakeholders, such as resource users, politicians, legislators, judges and the general public, on the interrelated nature of environment, economics and health. Legal and political frameworks for environmental management require further work; considerable gains in improved environmental management could be made by effectively enforcing existing regulations, both in regards to pollution control and biodiversity conservation.

5.6 Weakness in basic and applied research

The general lack in systematic environmental data collection and management in Nigeria, impacts negatively on biodiversity data and their application. Although University faculties and other specialised institutions have conducted a number of research works, the results are widely disseminated and often not accessible. In addition, faulty and incomplete information is gathered and cited in various documents, leading to unrealistic assessment of biodiversity related problems and solutions to address them.

5.7 Biodiversity, Poverty Reduction and Livelihoods

The majority of Nigerians still live below the poverty line and poverty is pervasive. The National Bureau of Statistics (2012) reports that 112. 519 million (about 70.3%) Nigerians live in relative poverty conditions. This was further confirmed by the Governor of Central Bank, who said that unless there is a deliberate effort to create other sources of revenue apart from crude oil, the level of poverty in Nigeria will continue to rise. (Vanguard Newspapers, February 2012).

Livelihood in the rural areas is intrinsically tied to the natural environment and biodiversity. Rural people depend largely on natural resources for their livelihood and unsustainable extraction of these resources is directly linked to biodiversity loss. This is because of the relationship between poverty and environmental degradation. While environmental degradation is the cause of accentuated poverty among the rural poor, poverty itself can be the cause of environmental degradation because of the reverse causality whereby a number of environmental resources are complementary in production and consumption to other goods and services, and a number of environmental resources supplement income, most especially in times of acute economic stress (**Dgupta &Maler, 1997**).

Nathaniel & Nathaniel (2001) reported that large populations reside and work in rural areas. Agriculture which is dominant in these areas has the greatest concentration of poor, landless workers, small tenant farmers, small farm owners, rural unemployed, and the poorest of the poor in the nation. They observe that as a result of the poverty level in these areas, biodiversity provides for over 75% of their needs, which plays a major role in the destruction and depletion of the flora and fauna. About 90% of these rural dwellers were reported to use fuel wood as the major source of household energy because they cannot afford fossil fuels.

Agricultural practices of these peasant farmers have brought further destruction to the nation's biodiversity. Slash-and-burn or shifting cultivation provides a basis for subsistent agriculture, responsible for the burning of forests and woodlands and the depletion of nutrients and organic matter in the soil.

The exploitation of the forest resources to generate income survival has resulted in the large-scale hunting of wildlife. Hunting, trapping and burning of the bush to smoke out rodents from burrows bring about further devastation to the forest, and to the

ecosystem's biological web. Compounding the problem is that although these communities need income, they do not see the direct economic return them through the protection of these areas and therefore do not appreciate the value of these protected areas.

Small-scale forest-based enterprises such as bamboo basket making and cane furniture all contribute to the destruction of Nigeria's biodiversity due to lack of -sustainable harvesting. The traditional knowledge of the uses of flora and fauna that is usually passed down from generation to generation, that is based on sustainable use principles, is being lost and this further aggravates biodiversity loss as the upcoming generations will not practice sustainable exploitation of these natural resources.

In the rural economy, almost all small farms presume stable rainfall patterns in their choice of seeds and planting times. Government strategies for poverty reduction in both arid and arable regions are therefore at risk of the vagaries of climate change in addition to more familiar social and economic pressures.

The interim poverty Reduction Strategy and Green Agenda 2010 of the Federal Government of Nigeria developed under the Office of the Vice President with broad Stakeholder inputs are today two of the Government policies that have ensured cross sector coordination in policy development. The Climate Change debate and the emergence of the National Adaptation Strategy is also another landmark in policy development as it links biodiversity, livelihoods and policy action in Nigeria.

5.8 BIODIVERSITY IN THE SCHEME OF DEVELOPMENT: Policy and Sectoral Linkages

The report has highlighted the direct and indirect impacts on Biodiversity and also how Biodiversity impacted in some major sectors of the Nigerian economy. Specific considerations will be given to analyse the status of interaction between Biodiversity and some sectors of the economy. The report also highlights some essential areas of intervention needed by NBSAP in achieving medium to long term integration of Biodiversity into the policy and practical principles and applications in such sectors

5.8.1 AGRICULTURE

An assessment of the new Nigerian Agricultural Policy identified the following objectives of the policy

(i) The achievement of self-sufficiency in basic food supply and the attainment of food security;
(ii) Increased production of agricultural raw materials for industries;
(iii) Increased production and processing of export crops, using improved production and processing technologies;
(iv) Generating gainful employment;
(v) Rational utilization of agricultural resources, improved protection of agricultural land resources from drought, desert encroachment, soil erosion and flood, and the general preservation of the environment for the sustainability of agricultural production;
(vi) Promotion of the increased application of modern technology to agricultural production; and,
(vii) Improvement in the quality of life of rural dwellers. These objectives are very similar to that of the old policy. Although the policy thrust highlighted the need to promote enabling environment for agricultural production and processing, it did not provide principles for promoting such enabling environment including issues as land use, soil conservation and principles for management of agricultural inputs for environmental management purposes

The Policy recognized and adapted some sections of the Nigerian Environmental policy as an element of the policy document; however, the Policy agreed totally that the integration of environmental management to agricultural production and development in Nigeria is very weak.

The NBSAP sees agriculture and environment, and with particular attention biodiversity as very closely linked in the Nigerian context. The integration of Biodiversity into the elements of agricultural policy and principles on agricultural production should be given special attention by both sectors. This becomes critical due to the following reasons: the increasing rate of habitat degradation and fragmentation in the rainforests and guinea savanna woodlands; the net negative impacts of poor agricultural land use planning in wetlands and gallery forest zones; the need for development of guidelines and principles for managing biodiversity in agriculture production and agro-allied industrial investments and the need to promote conservation agriculture awareness and education among small scale farmers; the continuous low yield in the artisanal fisheries sector and the need to provide more financial resources to monitor effectively the population dynamics of fish species that are available in Nigeria coastal and inland

waters as part of the efforts to promoting food security; the need for improved agricultural practices in the primary production sector involving subsistence producers/farmers to enhance soil conservation, rational labour use on farms and increase yield and productivity; The need to ensure appropriate use of herbicides and pesticides on farms for the purpose of supporting natural ecosystems for agriculture and consideration for public health; the need for attention and focus on conflict mitigation (including those involved in wildlife hazards) and management among land users – farmers, fishermen and pastoralists on land use as an integral part peace and security for Nigerians and as a way of supporting biodiversity considerations in agricultural planning and development; and the need for agricultural institutions to promote sensitivity index for large scale agricultural programmes as a check to biodiversity loss and protection of critical species and habitats.

The NBSAP will need to review and develop target actions that address the above and some other activities where agriculture and biodiversity linkages are of high significance in national development planning.

5.8.2 WATER RESOURCES AND WETLANDS

Nigeria as a whole is well endowed with water resources. The country is well drained with a reasonably close network of rivers and streams. With this huge surface water resource, it will be envisaged that Nigeria will not have too much challenges of water resource needs and that water availability will support both human and wildlife resource needs. Nigeria's water problems are however associated with inadequate planning and management of water resources to support timely distribution of water in time and space for human needs. Inadequate water planning and management affects biodiversity and only in few cases have Biodiversity issues been considered in planning and managing water resource needs

Water resources started to appear in the Nigerian National Development Plans more prominently since the third National Development Plan (1970 -1975) when the Federal Government of Nigeria established development authorities for Sokoto-Rima River basin in the north-west and the Chad basin in the north east. Five more **River Basins** were established in the fourth Development Plan (1975- 1980). They include the Ogun-Osun, the Hadejia-Nguru, the Cross, the Benue and the Niger River basin authority. The Benin-Owena River basin was later added.

Apart from failures observed in developing the agricultural sector, consideration for natural resource heritage and biodiversity is found insignificant or negligible in the framework and design of projects by River Basin authorities. As they (river basin authorities) covers Nigeria's major watersheds, river systems and gallery forests where huge biodiversity resource abounds, much is needed to integrate River Basins fully into developmental planning including harnessing their role for biodiversity protection and management of lands and watersheds for agriculture, water resource utilisation and landscape management in their areas of operation.

Dams are constructed for agricultural development through irrigation and for water supply for human consumption and needs. However, the design, construction and management require biodiversity consideration. In the past, Environmental Impact Assessments are either rushed or do not significantly address major biodiversity issues such as location of protected areas, Important Bird Areas, endangered species, heritage sites etc.

Nigeria NBSAP should consider strategies and actions to ensure full integration of biodiversity considerations in the design, development and management of Dams in Nigeria.

Inland Lakes supports food production and nutrition of Nigerians to a large extent. Fishery resource of Nigeria inland Lakes (both natural and manmade) - Kainji, Oguta and Chad is significant. Keeping the fishery biodiversity and other aquatic resources of these Lakes are essential as part of natural resource planning for Nigeria. Lake Chad is reported to be receding at a very fast rate in recent years. The loss of Lake Chad in term of space and resource is not only important for agriculture and food security, it has great implications on biodiversity. Mitigations to avert the total loss of much of Lake Chad should be among the priority actions of Nigeria's Federal Government most particularly on Climate Change negotiations and the need to arrest loss of bio-resources and agricultural potentials of Lake Chad.

5.8.3 AVIATION

Nigeria established the Wildlife Hazard Management Unit in the Federal Airports Authority of the Nigerian Federal Ministry of Aviation about five years ago. Bird strike has been recorded as one of the major hazards for air travelling in Nigeria as has been recorded in many other countries in the world.

Managing birds species and populations in and around airspace and most particularly in areas around air ports where aircraft take-off and landing may suffer bird strike attacks is a crucial step for security of life of Nigerians, resident s and visitors. Understanding the role of biodiversity in the aviation industry therefore is essential aspect that should be noted in National Policy on safety.

5.8.4 MARINE AND COASTAL RESOURCES

Nigeria is highly endowed with coastal and marine resources. The country entire southern border is with the Atlantic Ocean covering about 857 km from west at the border with the Republic of Benin to the eats at the border with Republic of Cameroon.

Two major field surveys have contributed to coastal biodiversity and marine database. The first is the Gulf of Guinea Large Marine Ecosystem Project and the Niger Delta Environmental Survey which was carried out in the 1990s. The Gulf of Guinea Large Marine Ecosystem carried out ecosystem assessment and develop strategic action plan that are aimed at assisting countries in the Gulf of Guinea marine ecosystem to manage coastal resources in a more sustainable manner. The 16 country Project, which was largely supported by Global Environmental Facility (GEF) has reliable data on marine wildlife, fisheries. The GGLME has the following major components: Finalize Strategic Action Plan and develop sustainable financing mechanisms for its implementation; Recovery and sustainability of depleted fisheries and living marine resources including mariculture; Planning for biodiversity conservation, restoration of degraded habitats and developing strategies for reducing coastal erosion; Reduce land and seas based pollution and improve water quality; and Regional Coordination and Institution Sustainability.

The Niger Delta Environmental Survey documented the biodiversity and habitat characteristics of the Niger Delta and also touches on wetland values in relation to socio-economic development. After over ten years, the Niger Delta is considered inappropriate to provide up to date information on the current status of biodiversity and its challenges in the Niger Delta, thus the need for a follow up survey on the current reality and challenges of biodiversity conservation is highly essential

With its huge coastal and marine resource, Nigeria is expected to have established a Marine National Park as part of her network of National Parks under category 11 of the

IUCN. The need to establish a Marine Park is paramount in order to ensure that the ecosystems in Nigeria are fully represented in the network of nationally protected areas in Nigeria.

The Nigerian Institute of Oceanography and Marine Research leads on field research in the marine biology sector, however much more research is needed on marine wildlife including marine ornithology.

5.8.5 ARID LAND MANAGEMENT AND BIODIVERSITY

Nigeria's semi-desert and dry-land areas deserve special attention both on Biodiversity support and natural resource use and management. Desertification is spreading already faster in the northwest and the north eastern corner of Nigeria. Biodiversity in arid land is crucial mainly for human resource needs for food, fibre and occupation in already dry and highly deprived environment. The Arid Land Management Policy should support Biodiversity principles and policies to harness rather than strengthen the threats to natural resources in arid areas.

5.8.6 HOUSING AND URBAN DEVELOPMENT

The rate of urbanisation in Nigeria has grown in the past two decades. Urbanisation rather than rural development continued to top political agenda and demand for urban infrastructural growth has increased tremendously. Urban development planning has been carried out with little or no consideration for biodiversity and habitat protection or management. Apart from the benefits of saving species from extinction and keeping the common species common, urban planning with focus and attention on biodiversity can influence greater opportunity for recreation and healthy living in urban areas. Green areas, parks and gardens, greenbelts are afterthoughts and are not always included in housing and urban development planning.

It is pertinent to integrate consideration for biodiversity in future Housing and urban planning both as a policy position for the Federal Ministry of Housing and Urban Development and for State authorities charged with similar responsibility.

5.8.7 BIODIVERSITY, BIOSAFETY, ACCESS TO GENETIC RESOURCES

Nigeria signed the Cartagena Protocol in the Year 2000 and ratified it in 2003 as part of her commitment to global biosafety management. The country has also participated in all meetings of the Conference of Parties to the Convention on Biological Diversity, most

particularly as related to the Cartagena Protocol on Biosafety. Nigeria has equally signed the Supplementary protocol on Liability and Redress to the Cartagena Protocol on Biosafety in 2012. Framework and Legislative instruments in support of Biosafety has been prepared and integration of Biosafety principles in Biodiversity management is a major aspect of the NBSAP review. Finally, the Cartagena Protocol on Biosafety to the Convention on Biological Diversity has been domesticated by the establishment of the National Biosafety Management Agency (NBMA).

The issue of access to biological resources and protection of the integrity of genetic resources of Nigeria demands very serious attention in the face of global economy and emerging trends in international trade. Efforts are being made to provide policy and legislative instruments on, access to genetic resources and the protection of indigenous knowledge. However, Nigeria has not yet ratified or acceded to the Nagoya Protocol on Access to genetic resources and the fair and equitable sharing of the benefits resulting from their utilization to the Convention on Biological Diversity (ABS). All the protocols have been integrated in the revised NBSAP.

5.8.8 BIODIVERSITY, TOURISM AND SOCIAL DEVELOPMENT

Closely linked to human economy and welfare is the need for appreciation of nature for its economic and socio-cultural gains. Nigeria has not benefited much from the huge opportunities that ecotorusim provides in form of direct revenue and the associated values in rural development and social integration.

Biodiversity should be integrated fully into the mainstream of Nigerian Tourism Development and values of biodiversity have a great role to play in environmental education and design of major tourism plan for Nigeria.

CHAPTER SIX

6 NATIONAL BIODIVERSITY STRATEGY AND ACTION PLAN (NBSAP)

6.1 NATIONAL BIODIVERSITY TARGETS

Nigeria adopted 14 SMART national targets in line with the strategic plan for biodiversity 2011-2020 and its Aichi biodiversity targets. The 14 national targets are related to the Aichi targets and are spread across the 5 global strategic goals. Table 4 below is the mapping of the national targets, the related Aichi targets and the global strategic goals.

Table 4: National Targets and Related Global Strategic Goals

SN	National Targets	Related Aichi Target	Related Global Strategic Goals
Target 1	By 2020, 30% of **Nigeria's population is aware of the importance of biodiversity** to the ecology and economy of the country.	**Related Aichi Target – 1**	**Relevant Strategic Goal – 1**
Target 2	By 2020, a comprehensive **programme for the valuation of biodiversity** is developed and implemented, and **payments for ecosystem services (PES)** and goods are mainstreamed into the national budget.	**Related Aichi Target- 1**	**Relevant Strategic Goal – 1**
Target 3	By 2020, adoption of a **national ecosystem-based spatial planning process** and plans, promoting the values of biodiversity and ecosystem services to sustain development.	**Related Aichi Targets- 5, 6, 7**	**Relevant Strategic Goals – 1, 2, 3**
Target 4	By 2020, up to 15% of the areas of degraded ecosystems in Nigeria are **under programmes for restoration and sustainable**	**Related Aichi Targets- 5,14,15**	**Relevant Strategic Goals – 2, 3, 4**

SN	National Targets	Related Aichi Target	Related Global Strategic Goals
	management.		
Target 5	By 2020, six (6) **management plans are implemented for habitats of endemic and threatened plants and animals**, including sites for migratory species.	**Related Aichi Targets- 4,6,9,12**	**Relevant Strategic Goals – 1, 2, 3**
Target 6	By 2020, at least 10% of Nigeria's national territory is sustainably managed in **conservation areas** at varied levels of authority, with representation of all ecosystem types.	**Related Aichi Targets- 5 & 11**	**Relevant Strategic Goals – 2 & 3**
Target 7	By 2020, the **genetic diversity** of cultivated plants, domesticated animals and their threatened wild relatives, including culturally valuable species, are documented, maintained and valorised in two key institutions in Nigeria.	**Related Aichi Target- 13**	**Relevant Strategic Goal – 3**
Target 8	By 2020, at least 60% of identified **pollution** sources, including those from extractive industries and agricultural inputs, are **brought under control** and guidelines are put in place to mitigate their effects on ecosystems.	**Related Aichi Target- 8**	**Relevant Strategic Goal – 2**
Target 9	By 2020, **invasive alien species** and pathways are identified and prioritized and priority species controlled or eradicated, and measures are in place to manage	**Related Aichi Target- 9**	**Relevant Strategic Goal – 2**

SN	National Targets	Related Aichi Target	Related Global Strategic Goals
	pathways in the six ecological zones.		
Target 10	By 2015, the Nigerian **NBSAP** has been fully revised and adopted by government as a policy instrument, and its implementation commenced in a participatory manner.	**Related Aichi Targets- 2 & 17**	**Relevant Strategic Goals – 1 & 5**
Target 11	By 2015, the **Nagoya Protocol** on Access to Genetic Resources and the fair and equitable sharing of Benefits Arising from their utilization is acceded to and its implementation through a national regime on ABS commenced.	**Related Aichi Target- 16**	**Relevant Strategic Goal – 4**
Target 12	By 2020, **community participation in project design and management of key ecosystems** is enhanced in one (1) each of the six (6) ecological zones.	**Related Aichi Targets- 1,7,11**	**Relevant Strategic Goals – 1, 2, 3**
Target 13	By 2020, national-based **funding for biodiversity** is increased by 25%, with effective international partnership support.	**Related Aichi Target- 20**	**Relevant Strategic Goal – 5**
Target 14	By 2020, the **capacity** of key actors is built and gender mainstreaming carried out for the achievement of Nigeria's biodiversity targets.	**Related Aichi Targets- 2,14,19**	**Relevant Strategic Goals – 1, 4, 5**

6.2 THE REVISED NBSAP AS AN IMPROVEMENT ON THE NBSAP-1

In the planning and preparation of the revised, current NBSAP the lessons learned from the previous one were put into consideration. Unlike the previous NBSAP, the revised NBSAP has a well defined implementation plan which consists of a: capacity development plan; technology needs assessment; plan for resource mobilization; and a communication and outreach plan. The current NBSAP has a national coordination structure put in place for its implementation. There is a national Clearing House Mechanism (CHM): www.chm-cbd.com.ng. Each target or action has an indicator for tracking its progress. Monitoring and Evaluation (M&E) framework and reporting plan are put in place. A high level of awareness was created at Federal, State and Local governments and stakeholders during its preparation through consultations, involvement and participation. Since the targets were SMART, identified in view of the national biodiversity status and trends, national priorities and circumstances, it is believed that the participatory implementation of these measures will help in restoring the integrity and sustainability of biodiversity and therefore the achievement of the Strategic Plan for biodiversity 2011-2020.

6.3 MAINSTREAMING BIODIVERSITY INTO RELEVANT SECTORAL AND CROSS-SECTORAL STRATEGIES, PLANS AND PROGRAMMES

In order to integrate biodiversity issues into national development policies relevant to poverty reduction and climate change mitigation and adaptation in the forestry, food and agriculture, commerce & industry, environment, health, and education sectors of the economy, the implementation of the following measures were identified:

- Review of policies, plans and budgets in the key sectors of the economy that need to change to support improved biodiversity management;
- Awareness Creation for policy and decision makers on the economic implications of improved biodiversity management;
- Influencing Lawmakers to make/review laws relevant to biodiversity management for sustainable economic development;
- Enhancing the understanding of key personnel of sectoral stakeholders with capacity to influence budgets to support projects that would improve biodiversity

management and create climate resilient ecosystems to reduce poverty and climate change impacts;

- Influencing the creation of a network of stakeholders to enhance integrated biodiversity management through participatory planning, knowledge sharing and capacity building across all levels of government;
- Establishment of an Inter-Agency Committee to develop sustainable financing mechanism to generate revenues for biodiversity programmes; and
- Integration of biodiversity education into national curricula at all levels

6.4 IMPLEMENTATION OF NBSAP

The first NBSAP lacked clear cut implementation plans and therefore was inadequately implemented, hence the poor management of biodiversity in the country. The lack of a coordination structure and other elements of such plan stated earlier made it difficult to identify the actions taken by Nigeria to implement the CBD in relation to its NBSAP. However, relevant institutions and economic sectors carried out uncoordinated actions relevant to the conservation and sustainable use of biodiversity linked to poverty reduction and human well-being. A case in point is the Mangrove restoration and nypa palm utilization project carried out in Cross River State of Nigeria. It was successful: the riparian communities' capacity were built in the utilization of the alien invasive nypa palm that depletes the mangrove in the production of sap for possible production of ethanol and vinegar and IN making craft, and thereby generating income; and mangrove was planted as a programme to restore the mangrove ecosystem and biodiversity. This project was supported by UNIDO. Unfortunately, it was not sustained and not replicated because of lack of ownership and a resource mobilization.

6.5 ACHIEVEMENT OF SYNERGIES IN THE IMPLEMENTATION OF THE RIO CONVENTIONS

There is inadequate synergy between the various Rio conventions: the United Nations Framework Convention on Climate Change (UNFCC); the United Nations Convention to Combat Desertification (UNCCD); and the CBD which cover the most serious global environmental problems of human-induced climate change, desertification and loss of biodiversity. Realizing that there is need to tackle them hand in hand rather than in

isolation, the revised NBSAP is not a stand-alone document but has integrated climate change and issues of desertification.

6.6 NATIONAL BIODIVERSITY MANAGEMENT IN INTERNATIONAL AND TRANSBOUNDARY COOPERATION

Nigeria is committed to the sustainable management of its enormous biodiversity, hence it is signatory to all Conventions and Multi-lateral Environment Agreements on biodiversity and endeavours to meet their obligations. For example, Nigeria is signatory to the three Rio conventions and also the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES). Apart from the international cooperation, there is South-South cooperation in biodiversity management. Transboundary programmes like the Great Green Wall Sahara (GGW) for addressing desertification and biodiversity loss in the Sudan/Sahel region and the Guinea Current Large Marine Ecosystem (GCLME) that involves 16 countries in the coastal region exist.

6.7 IMPLEMENTATION OF THE REVISED NBSAP

The revised NBSAP will be implemented between 2016 and 2020. During this period progress of implementation and achievement of set objectives will be determined. There are 14 targets with 21 impact indicators and 67 actions with 123 performance indicators as shown in Table 5 below. Equally, well developed monitoring, evaluation and reporting plans and a national coordination structure for effective implementation were put in place.

TABLE 5: NATIONAL TARGETS AND ACTIONS

BIODIVERSITY TARGET	Impact Indicators	National Programmes	Actions	Implementing Agency		Implementation / Performance Indicators
				Lead[1]	Collaborators[2]	
Target **1.** By 2020, 30% of **Nigeria's population is aware of the importance of biodiversity** to the ecology and economy of the country. Lead Institution: Federal Department of Forestry (FDF) **Related Aichi Target - 1** **Relevant National BD Goals – 1**	% of the population aware of the importance of biodiversity	Promote Environmental Awareness and Good Environmental Governance. Support and Promote Community Based Institutions on sustainable biodiversity resource use efforts. Support and promote the activities of civil society organisations, corporate media groups; and the National and State Information management institutions on informal environmental education programmes and activities. Promote the values of ecosystem services in the context of awareness creation on environment and biodiversity.	1.1 Conduct outreach and awareness campaigns (radio, jingles etc), information sharing and public discussions on Nigeria's biodiversity and its significance to ecology, economy, life and services, with specific emphasis on indigenous and local communities.	NOA	Media organizations, Traditional Institutions, NAN, NGOs, CBOs, CSOs, NOA	1.1.1 No. outreach & awareness campaigns.
						1.1.2 No. public discussions.
						1.1.3No. regions of Nigeria with outreach activities.
						1.1.4. No. of radio jingle aired
						1.1.5. No. of advert in television and newspapers
			1.2 Produce and distribute publications in appropriate local languages and dialects on biodiversity and ecosystem services for the public, especially women and youth.	NOA	Media organizations, Traditional Institutions, NAN, NGOs, CBOs, CSOs, NOA, FDF	1.2.1 No. of publications produced and no. of copies distributed.
						1.2.2 No. of local languages and dialects covered by outreach publications.

			1.3 Inclusion of the subjects and texts on biodiversity conservation into the national primary and secondary education and the General Studies (GS) of tertiary institution curricula.	FME	States ME, Secondary and Tertiary Education Boards, NUC, FME	1.3.1 No. of biodiversity subjects and texts included in each level of the education system. 1.3.2. No of primary, secondary and tertiary institution in which biodiversity conservation subjects are taught.
			1.4 Host an annual National Forum on Biodiversity for legislators and other sectors of the economy	FDF	FDF, State governments, Relevant MDAs, Private sector, Media organizations	1.4.1 No. Fora hosted.
			1.5 Host an annual National Biodiversity dialogue, and Press Conference.	FDF	FDF , State governments, Relevant MDAs, Private sector, Media organizations, NGOs, CBOs, CSOs, NOA	1.5.1 No. of years (frequency) when a dialogue & press conference are held.
			1.6 Promote environmental social media networking among the Nigerian youth.	FDF	FDF, NAN, Bloggers, NBC, You tube, BBM Channels, Media organizations	1.6.1 No. of social media sites linked to the National CHM 1.6.2. No of youths that visits social media sites linked to the National CHM

BIODIVERSITY TARGET	Impact Indicators	National Programmes	Actions	Implementing Agency		Implementation / Performance Indicators
				Lead	Collaborators	
Target **2**. By 2020, a comprehensive **programme for the valuation of biodiversity** is developed and implemented, and **payments for ecosystem services (PES)** and goods are mainstreamed into the national budget. Lead Institution: FDF **Related Aichi Target- 1** **Relevant National BD Goals – 1**	No. of payments for ecosystem services per year.	Integrate biodiversity conservation considerations into national development plans. Strengthening the processes on Access and Benefit Sharing to ensure that biodiversity conservation is considered in the granting of access to Nigeria's genetic resources. Enhancing National Biodiversity assessment capabilities	2.1 Conduct Economic Valuation of Biodiversity and national studies on 'The Economics of Ecosystems and Biodiversity' (TEEB).	NCF	BDCP, NCF, other NGOs, CSOs and CBOs	2.1.1 No. Published Reports on TEEB studies and values of biodiversity resources
	Amount of payments for ecosystem services per year.		2.2 Integrate valuation of biodiversity into national accounts, strategies and planning process.	Budget and NPC	NPC, FMF, FDF	2.2.1 Published national accounts that include payments for biodiversity activities.
	No. of beneficiaries of payments for ecosystem services per year.					2.2.2 No. of published development strategies and plans that promote biodiversity values.
	Contribution of biodiversity to the national GDP		2.3 Establish and implement a national procedure for Payment for Ecosystem Services (PES), to enhance private sector investment and corporate social support to Nigeria's biodiversity protection.	FDF	FDF, BDCP, FRIN, NCF, FMF, Private Sector, CSOs, NGOs	2.3.1 National procedure for PES established.
						2.3.2 National procedure for PES implemented
			2.4 Strengthen and implement the provisions of Environmental Impact Assessments (EIA).	EA	EA, FDF,	2.4.1 Provisions for EIA that promote biodiversity and ecosystem services values published.

						2.4.2 % of EIAs that include biodiversity and ecosystem service values

BIODIVERSITY TARGET	**Impact Indicators**	**National Programmes**	**Actions**	**Implementing Agency**		**Implementation / Performance Indicators**
				Lead	**Collaborators**	
Target **3**. By 2020, adoption of a **national ecosystem-based spatial planning process** and plans, promoting the values of biodiversity and ecosystem services to sustain development. Lead Institution: FDF **Related Aichi Target- 5, 6, 7** **Relevant National BD Goals – 1, 2, 3**	% of the country with published and adopted spatial plans that promote the values of biodiversity and ecosystem services.		3.1 Conduct a National Biodiversity survey, to identify habitats of high biodiversity and ecosystem services value and priorities for ecosystem restoration and new conservation areas.	NPS	NPS, FMA&RD, State governments, FDF, NCF, NGOs	3.1.1 National Biodiversity survey report published which identifies habitats of high biodiversity and ecosystem services value and priorities for ecosystem restoration and new conservation areas.
			3.2 Establish a government process for ecosystem-based spatial planning.	Office of the Surveyor General of Federation(OSGF)	FML&S, FMA&RD, FDF, NPS, State governments, FMJ	3.2.1 Ecosystem-based spatial planning guideline established
						3.2.2 Ecosystem-based spatial planning guideline adopted
						3.2.3 Ecosystem-based spatial planning guideline implemented

			3.3 Establish Grazing Reserves and Pastoral Routes as an important element of local, National and Sub-regional land use planning.	NLDA (KADUNA)	FML&S, FMA&RD, FDF, NPS, State governments	3.3.1 No. of Grazing Reserves established. 3.3.2 No. of Pastoral routes established.
			3.4 Safeguarding of wildlife corridors as part of spatial development/habitat connectivity axes/Green Infrastructure.	NPS	FML&S, FMA&RD, FDF, NPS, State governments	3.4.1 No. of wildlife corridors identified and safeguarded

BIODIVERSITY TARGET	**Impact Indicators**	**National Programmes**	**Actions**	**Implementing Agency**		**Implementation / Performance Indicators**
				Lead	**Collaborators**	
Target **4**. By 2020, up to 15% of the areas of degraded ecosystems in Nigeria are **under programmes for restoration and sustainable management.** Lead Institution: FDF **Related Aichi Target-5,14,15**	% of the total area of degraded ecosystems in 2015 under programmes for restoration and sustainable management.	Support the implementation of the Great Green Wall Sahara Programme Establishment of a National terrestrial, river and wetlands Rehabilitation Programmes.	4.1 Establish a National Forest and Vegetation Recovery Programme, including mangroves and other coastal areas.	FDF	FDF, NPS, NCF, FRIN, NGOs, DDA, EC/CZM, Ministry of Niger Delta	4.1.1 No. Published reports on National Forest and Vegetation Recovery Programme 4.1.2 No of Published report on Mangrove and coastal area recovery programme
			4.2 Review and strengthen the National Forest Policy, to improve production efficiency	FDF	FDF, NPS, NCF, NGOs, DDA, Ministry of	4.2.1 Revised National Forest Policy published

Relevant National BD Goals – 2, 3, 4			whilst promoting conservation of high-biodiversity habitats and restoration of degraded areas.		Niger Delta	4.2.2 Act for the revised National Forest Policy published
			4.3 Resuscitate the National Forest Development Committee and Forest Utilization Centres, as part of the strengthened National Forest Policy.	FDF	FDF, NPS, NCF, NGOs, DDA, FRIN	4.3.1 No. of times the National Forest Development Committee has meetings
						4.3.2 No. Of Resolutions adopted at each meeting of the National Forest Development Committee
						4.3.3. No of Resolutions implemented at each meeting of the National Forest Development Committee
						4.3.4. No of Forest Utilization Centres rehabilitated
			4.4 Develop a national strategy for the conservation of agricultural biodiversity and promotion of agro-forestry.	FDF	FMA&RD, FDF, State Ministry of Agriculture, State Dept of Forestry,	4.4.1 National Strategy for the conservation of agricultural biodiversity and promotion of agro-forestry developed

					Farmers	4.4.2 National Strategy for the conservation of agricultural biodiversity and promotion of agro-forestry adopted
						4.4.3 National Strategy for the conservation of agricultural biodiversity and promotion of agro-forestry developed)
			4.5 Establish a National Rivers and Wetlands Rehabilitation Programme, linked to reduction of pollutants in Target 8.	FDF	FDF, NPS, NCF, NGOs, DDA, FRIN, PC&EH, FMA&RD	4.5.1 No. of Dedicated National rehabilitation Programmes to reduce pollution in Rivers and Wetlands
						4.5.2. No of Dedicated National rehabilitation activities to reduce pollution in Rivers and Wetlands
			4.6 Support the implementation of the Great Green Wall Sahara Programme.	DDA	DDA, FDF, NAGGW	4.6.1. No. of technical personnel posted
			4.7 Promote alternative livelihoods for communities in protected areas and ecosystem restoration areas.	FDF	FRIN, FDF, NPS, NGOs	4.7.1 No. of alternative livelihoods introduced
						4.7.2 No. of people engaged in alternative livelihoods
						4.7.3 No. of people engaged in alternative livelihoods 2 years after starting the practice

			4.8 Develop pilot community-based sustainable energy-efficient production facilities e.g. bio-gas, solar energy etc. around protected areas and ecosystem restoration areas.	Renewable Energy Unit	Renewable Energy Unit, NPS, DDA, FDF, NGOs, CBOs	4.8.1 No. of people around protected areas using community-based energy efficient production facilities
						4.8.2. No. of people around protected areas using community-based energy efficient production facilities

BIODIVERSITY TARGET	**Impact Indicators**	**National Programmes**	**Actions**	**Implementing Agency**		**Implementation / Performance Indicators**
				Lead	**Collaborators**	
Target **5**. By 2020, six (6) **management plans are implemented for habitats of endemic and threatened plants and animals**, including sites for migratory species. Lead Institution: FDF **Related Aichi Target-4,6,9,12** **Relevant National BD Goals – 1, 2, 3**	No. of management plans implemented for habitats of endemic, threatened and migratory species	Stock assessment and prepare a National Action Plan for Nigeria's endemic species Conservation of High Altitude Habitats Conservation of Important Wildlife corridors and Migratory Sites	5.1 Conduct and publish an assessment of the conservation status of Nigeria's endemic and threatened species.	NPS	NPS, NCF, FRIN, FDF, NGOs	5.1.1 Reports on the conservation priorities of endemic species published
						5.1.2 Reports on the conservation priorities of threatened species published
						5.1.3 No. of Ramsar sites and the species conserved
			5.2 Identify priority sites requiring management actions for Nigeria's endemic and threatened species.	NPS	NPS, NCF, FRIN, FDF, NGOs, CBOs	5.2.1 Published report of priority sites requiring management actions for Nigeria's endemic and threatened species
			5.3 Identify important sites for migratory species and their conservation needs.	NCF	NCF, NPS, FRIN, FDF, NGOs,	5.3.1. Published report that identifies important sites for migratory species

						and their conservation needs for management action
			5. 4 Produce a Strategy for Conservation of High Altitude Habitats, linked to Targets 2, 3, 4	NCF	NPS, FML&S, FDF, FRIN, NGOs, NCF	5.4.1 Published Strategy for conservation of high altitude habitats

BIODIVERSITY TARGET	Impact Indicators	National Programmes	Actions	Implementing Agency		Implementation / Performance Indicators
				Lead	Collaborators	
Target **6**. By 2020, at least 10% of Nigeria's national territory is sustainably managed in **conservation areas** at varied levels of authority, with representation of all ecosystem types. Lead Institution: FDF **Related Aichi Target-5,11** **Relevant National BD Goals – 2, 3**	% of Nigeria's national territory with some form of conservation area status.	Strengthening the capacity of the National Parks in Nigeria Development of Biodiversity Conservation Strategy for the Niger Delta	6.1 Identify sites for new or expanded conservation areas from the relevant surveys and strategies under Targets 3, 4 and 5.	NPS	NPS, FDF, NCF, NGOs, FRIN	6.1.1 No. of new sites for Conservation areas identified
			6.2 Upgrade the status of ten forest reserves/game reserves and sanctuaries to National Park status, including marine ecosystems.	NPS	FDF, NPS, FRIN, FMJ	6.2.1 No. of new National Parks established since 2015
						6.2.2 representation of each ecosystem type in the National Park system
	% of conservation areas assessed to be sustainably and effectively managed.					6.2.3 No of new marine ecosystem identified and upgraded to National Parks since 2015
			6.3 Implement the Conservation Strategy for Biodiversity in the Niger Delta.	Ministry of Niger Delta	FDF, NPS, NCF, FRIN, Ministry of Niger Delta, NGOs	6.3.1 No. of actions in the Conservation Strategy for Biodiversity in the Niger Delta implemented
			6.4 Assess the status of biodiversity resources in the designated new National Parks.	NPS	FDF, NPS, NCF, FRIN, Ministry of Niger Delta, NGOs	6.4.1 No. of the new National Parks with baseline data especially status of biodiversity resources

			6.5 Prepare and implement management plans for the Designated New National Parks.	NPS	FDF, NPS, NCF, FRIN, Ministry of Niger Delta, NGOs	6.5.1 No. of new National Parks with management plan prepared 6.5.2 No. of new National Parks with management plan implemented
			6.6 Document and map the indigenous and local communities' conservation areas and strengthen their management plans.	FDF	FDF, NPS, NCF, FRIN, NGOs, CBOs, Traditional Institutions, CSOs	6.6.1 No. of Indigenous and Local Communities Conservation areas
						6.6.2 Distribution of Indigenous and Local Communities Conservation areas
						6.6.3 No. of Indigenous and Local Communities Conservation areas with a supported management plan
			6.7 Implement the full plan for the paramilitary status of the Nigerian National Parks to enhance the level of biodiversity protection in protected areas.	NPS	FDF, NPS, NCF, FRIN, CBOs, CSOs	6.7.1 % of actions in the plan for the paramilitary status in National Parks implemented

BIODIVERSITY TARGET	Impact Indicators	National Programmes	Actions	Implementing Agency		Implementation / Performance Indicators
				Lead	Collaborators	
Target **7**. By 2020, the **genetic diversity** of cultivated plants, domesticated animals and their threatened wild relatives, including culturally valuable species, are documented, maintained and valorised in two key institutions in Nigeria. Lead Institution: NABDA **Related Aichi Target-13** **Relevant National BD Goals – 3**	No. of key plants and animals with their genetic diversity documented, maintained and valorised.	Stock assessment and Preparation of a National Action Plan for Nigeria's endemic species	7.1 Establishment of a national centre / institute for knowledge and sustainable Use of Biodiversity.	BDCP	FDF, FRIN, NPS, NCF, NGOs	7.1.1 Existence of a functional Center/institute
			7.2 In-situ conservation of wild relatives of cultivated plants and domesticated animals.	FRIN	FDF, FRIN, NPS, NGOs, NIPRD, NIOMR, NIFFR, NCGRAB, , NCF, FMA&RD,	7.2.1 No. of wild relatives of both Cultivated plants and Domesticated animals present in protected areas
			7.3 Establishment of Nigerian National gene bank for cultivated plants and domesticated animals.	NABDA	FDF, FRIN, NPS, NGOs, NIPRD, NIOMR, NCF, FMA&RD, NCGRAB, NBMA, NABDA, NIFFR	7.3.1 No. of gene bank accession) 7.3.2 No. of cultivated/domesticated/ wild plant and animal relatives with genes stored
			7.4 Establishment/Rehabilitation of Community Herbal Heritage Centres.	FDF	FDF, DDA, NCF, NGOs, CBOs, NIPRD, FRIN, FMH	7.4.1 No. of Community Herbal Heritage centres established 7.4.2 No. of Community Herbal Heritage centres rehabilitated

BIODIVERSITY TARGET	Impact Indicators	National Programmes	Actions	Implementing Agency		Implementation / Performance Indicators
				Lead	Collaborators	
Target **8**. By 2020, at least 60% of identified **pollution** sources, including those from extractive industries and agricultural inputs, are **brought under control** and guidelines are put in place to mitigate their effects on ecosystems. Lead Institution: PC&EH **Related Aichi Target- 8** **Relevant National BD Goals – 2**	**% increase in the number of restored wetlands, rivers, coastal and other sites damaged by pollution.**	Pollution reduction programme in Nigeria.	8.1 Promote measures to reduce agricultural wastes, fertilisers and agro-chemicals entering rivers and wetlands.	PC&EH	PC&EH, FMA&RD, FDF, NPS, NCF, NGOs	8.1.1 Ratio of agricultural extension workers to farmers
						8.1.2 Quantity of Nitrogen and other pollutants deposition and water quality in fresh water and terrestrial ecosystems
			8.2 Identify the pollutant sources and purification capacity of Nigeria's wetlands, rivers and coasts, for restoration measures in Action 4.5.	PC&EH	FDF, PC&EH, NPS, NCF, NGOs FMA&RD,	8.2.1 No. of Companies that discharge untreated effluent into Nigeria's wetlands, rivers and coasts and terrestrial sites
						8.2.2 Level of Nutrient loading in freshwater and terrestrial environment
						8. 2.3 Level of Nutrient loading in marine environment
						8.2.4 Number of Reported incidence of water-borne disease and illness in communities around wetlands and uplands
			8.3 Strengthen national water quality guidelines	FMWR	FMWR, FDF, PC&EH, NPS, NCF, NGOs	8.3.1 Amount of Resources mobilised to support National water quality guidelines

						8.3.2 Level of implementation of National water quality guidelines
			8.4 End gas flaring and manage oil spillage.	NOSDRA	NOSDRA, NGOs, CC, NNPC, DPR, Oil Companies, FDF, Media organizations, CBOs, NIFFS, Fed. Dept. of Fisheries	8.4.1 Deadline for end of gas flaring announced
						8.4.2 No. of reported infractions of laws on gas flares
						8.4.3 No. of prosecutions for infractions of laws on gas flares
						8.4.4 No. and extent of oil spillage and their remediation
						8.4.5 No. of reported pipelines vandalized and repaired
						8.4.6 No. of outreach activities to reduce oil spillage
BIODIVERSITY TARGET	**Impact Indicators**	**National Programmes**	**Actions**	**Implementing Agency**		**Implementation / Performance Indicators**
				Lead	**Collaborators**	
Target **9**. By 2020, **invasive alien species** and pathways are identified and	No. IAS with significant negative	Control and Management of Invasive Alien species in Nigeria	9.1: Strengthen the capacity of the Plant Quarantine Services Department for effective border	PQD	Nigerian Custom Service, Nigerian Immigration Service, PQD,	9.1.1Budgetary support to the Nigerian Agricultural Quarantine Service (Plant/Animal

prioritized and priority species controlled or eradicated, and measures are in place to manage pathways in the six ecological zones. Lead Institution: FDF **Related Aichi Target- 9** **Relevant National BD Goals – 2**	impacts		control.		Inland Water Ways Management Agency, FDF	Department) for effective border control of IAS
			9.2: Establish a national framework for the control and management of Invasive Alien Species (IAS).	FDF	Nigerian Custom Service, Nigerian Immigration Service, PQD, Inland Water Ways Management Agency, FDF	9.2.1 Published Adopted National Framework for the control and management of Invasive Alien Species
			9.3: Promote the utilization of IAS in Nigeria.	FDF	FDF, CBOs, NGOs	9.3.1 Level of IAS-based products in the market and systems
			9.4: Strengthen research on the impacts of IAS and update the existing baseline on IAS status.	FRIN	FRIN, FDF, Inland Water Ways Management Agency,	9.4.1 Level of budgetary support for IAS research
						9.4.2 Published current baseline on IAS status
			9.5: Establish an early warning and rapid response mechanism for IAS at the ports and border crossings.	PQD	Nigerian Custom Service, Nigerian Immigration Service, PQD, Inland Water Ways Management Agency, FDF	9.5.1 Operational early warning and response mechanism for IAS 9.5.2 No. of ports and border crossing with IAS rapid response team

BIODIVERSITY TARGET	**Impact Indicators**	**National Programmes**	**Actions**	**Implementing Agency**		**Implementation / Performance Indicators**
				Lead	**Collaborators**	
Target **10**. By 2015, the Nigerian **NBSAP** has been fully revised and adopted	NBSAP Adopted. Sub-national		10.1: Revise the NBSAP and adopt it as a policy instrument.	FDF	FDF, Multi-Stakeholders, NPC, FMF, FMEnv,	10.1.1 Published adopted NBSAP

by government as a policy instrument, and its implementation commenced in a participatory manner. Lead Institution: FDF **Related Aichi Target- 2,17** **Relevant National BD Goals – 1 & 5**	(State and Local Governments) BSAPs initiated.		10.2 Establish and strengthen a Biodiversity Steering Committee.	FDF	FDF, Multi-Stakeholders, FMEnv,	10.2.1 N0. of approved Report of Meetings of the Biodiversity Steering Committee
						10.2.2 Proportion of Budget and Project implementation achieved
			10.3 Establish and implement Sub-national (State and Local Government) levels of the Biodiversity Strategy and Action Plan, promoting stakeholder participation.	State Governments	FDF, State and Local Governments, NGOs, CBOs, Multi-Stakeholders	10.3.1 N0. Of Sub-national (State and Local Government) with Published and adopted BSAP
						10.3.2 No. of stakeholders that participated in the NBSAP Revision process
			10.4: Strengthen Multi Stakeholders Committees on biodiversity-related conventions and protocols.	FMEnv (Planning Research and Statistics Department)	FMEnv (Planning), FDF, Rio Conventions and Protocols, Multi-Stakeholders	10.4.1 Proportion of Budget and Project implementation achieved
			10.5 Establish synergy among focal areas in the environment sector.	FMEnv (Planning Research and Statistics Department)	FMEnv (Planning), FDF, Rio Conventions and Protocols, Multi-Stakeholders	10.5.1 No. of activities between Ministry of Environment and other Stakeholders on NBSAP implementation
BIODIVERSITY TARGET	**Impact Indicators**	**National Programmes**	**Actions**	**Implementing Agency**		**Implementation / Performance Indicators**
				Lead	**Collaborators**	
Target **11**. By 2015, the **Nagoya**	Nagoya Protocol		11.1 Accede to the ABS	FDF	FDF, MFA, FMJ,	11.1.1 Deposition of Instrument of ratification

Protocol on Access to Genetic Resources and the fair and equitable sharing of Benefits Arising from their utilization is acceded to and its implementation through a national regime on ABS commenced. Lead Institution: FDF **Related Aichi Target-16** **Relevant National BD Goals – 4**	acceded to. National ABS framework or legislation adopted.		Protocol.			with CBD Secretariat
			11.2 Develop a National ABS framework or legislation.	FDF	FDF, IMCABS, FMJ	11.2.1 Published ABS National framework
						11.2.2 ABS legal instrument enacted into law
			11.3 Designate appropriate structures of protected areas for sustainable harvesting of non-timber products by local people, to ensure benefits to them and guarantee protection of resources	NPS	FDF, NPS, State and Local Governments, CBOs, Traditional Institutions, NGOs, CSOs	11.3.1 No. and size of Protected areas with structures for sustainable harvesting of NTFPs
						11.3.2 No. of permits granted for sustainable harvesting of NTFPs
						11.3.3 Revenue generated from NTFP permits
			11.4 Develop and implement policy guidelines for bio-prospecting, access and benefit sharing, and associated traditional knowledge (intellectual property rights).	FDF	FDF, NPS, State and Local Governments, CBOs, Traditional Institutions, NGOs, CSOs	11.4.1 Adopted guidelines for bio-prospecting, access and benefit sharing, and associated traditional knowledge
						11.4.2 N0. Of applications granted for bio-prospecting
						11.4.3 No. of permits issued for bio-prospecting and access to genetic resources
			11.5 Develop and implement a Sub-national (State and Local	State Governments	IMCABS, FDF, NPS, State	11.5.1 Adopted sub-national regime on ABS

			Government levels) regime on ABS.		and Local Governments, CBOs , NGOs	11.5.2 % of implementation of sub-national ABS regime

BIODIVERSITY TARGET	**Impact Indicators**	**National Programmes**	**Actions**	**Implementing Agency**		**Implementation / Performance Indicators**
				Lead	**Collaborators**	
Target **12**. By 2020, **community participation in project design and management of key ecosystems** is enhanced in one (1) each of the six (6) ecological zones. Lead Institution: FDF **Related Aichi Target- 1,7,11** **Relevant National BD Goals – 1, 2, 3**	No. NBSAP projects with community participation in design and management.	Promotion of Gender and Community participation in biodiversity management	12.1 Strengthen the capacities of local Communities to participate in natural regeneration of wetlands, arid zone vegetation, forests, mangroves & other priorities identified in Targets 3, 4, 5 & 6.	Local Communities	Local Communities, FDF, CBOs, NGOs, DDA, LCBDA, Ministry of Niger Delta	12.1.1 No. of projects replicated with Community participation in the Design and management of key Ecosystems
			12.2 Survey the flora and fauna outside protected areas, including sacred groves, community lands, abandoned farmlands and homesteads, and assist local communities in the sustainable management of these sites.	FDF	FDF, NPS, NCF, Local Communities, Farmers, NGOs, CBOs	12.2.1 Published report of survey of flora and fauna outside protected areas 12.2.2 No of Communities assisted
			12.3 Strengthen the implementation of guidelines for Community-based sustainable forest management, including conservation and sustainable use of biodiversity.	FDF	FDF, CBOs, NGOs, Local Communities,	12.3.1 Proportion of Budgetary Resources directed to support the implementation of guidelines for Community-based sustainable forest management

			12.4 Develop a national framework and mechanism for community participation in ecotourism planning and development.	NPS	NPS, FDF, Local Communities, CBOs, NGOs	12.4.1 N0. Of Adopted framework and mechanism for Community participation in ecotourism planning and development

BIODIVERSITY TARGET	**Impact Indicators**	**National Programmes**	**Actions**	**Implementing Agency**		**Implementation / Performance Indicators**
				Lead	**Collaborators**	
Target **13**. By 2020, national-based **funding for biodiversity** is increased by 25%, with effective international partnership support. Lead Institution: FDF **Related Aichi Target- 20** **Relevant National BD Goals – 5**	% increase since 2014 of national and international funding for biodiversity.	Establishment of Nigeria Biodiversity Trust Fund	13.1 Conduct an NBSAP resource needs assessment.	BDCP	NGO, FDF, Multi-Stakeholders	13.1.1 Published report of NBSAP resource needs assessment
			13.2 Establish a national funding mechanism for biodiversity.	FMEnv (Planning)	FDF, FMEnv, Multi-stakeholders, NPC, FMF, Development Partners, Private Sector	13.2.1 Published and adopted national funding mechanism for biodiversity
			13.3 Integrate biodiversity conservation into national appropriation.	FMF	FMF, NPC, FDF,	13.3.1 Proportion of appropriated budget released for Biodiversity
			13.4 Strengthen the government partnership with development partners (e.g. GEF, UNDP and UNEP.)	FDF	FMEnv, FDF, Development Partners,	13.4.1 No. of Government projects and activities on Biodiversity supported by Development partners
						13.4.2 Amount of investment on Biodiversity by partners

BIODIVERSITY TARGET	Impact Indicators	National Programmes	Actions	Implementing Agency		Implementation / Performance Indicators
				Lead	Collaborators	
Target **14**. By 2020, the **capacity** of key actors is built and gender mainstreaming carried out for the achievement of Nigeria's biodiversity targets. Lead Institution: FDF **Related Aichi Target- 2,14,19** **Relevant National BD Goals – 1, 4, 5**	No. of beneficiary institutions with strengthened capacity to implement the NBSAP.	Capacity Building of key actors in Biodiversity	14.1 Determine prioritised capacity building needs for government agencies, NGOs and local communities to implement the NBSAP.	BDCP	NGO, FDF, Multi-Stakeholders	14.1.1NBSAP implementation Capacity Needs Assessment Report
			14.2 Develop training guides and modules for prioritised capacity building needs.	NGO	NGO, FDF, Multi-Stakeholders	14.2.1 No. of training guides and modules for NBSAP implementation
			14.3 Build capacity of government officials and individuals for prioritised NBSAP implementation capacity development needs in relevant organizations including NGO's through meetings, seminars and conferences both locally and internationally.	Development Partners	Development Partners, FDF, NGOs, Multi-Stakeholders	14.3. 1 No. of proposals and training for individuals for prioritised NBSAP implementation capacity development needs
						14. 3. 2 No. of beneficiaries trained in prioritised NBSAP implementation capacity development needs

[1]**Lead agency**: The institution mandated to carry out action stated under the respective targets of this NBSAP. It is the institution that takes major responsibility to execute the actions and coordinate others.

[2]**Collaborating agencies:** The institutions that work in close coordination with the lead agency to execute the specified actions, under mutually agreed terms. [a]Definitions of the acronyms are as follows:

NOA (National Orientation Agency); **NAN** (News Agency of Nigeria); **NGO** (Non-governmental Organization); **CBO** (Community-Based Organization) **CSO** (Civil Society Organization); **FME** (Federal Ministry of Education); **FDF** (Federal Department of Forestry); **NUC** (National University Commission); **NCC** (Nigerian Communication Commission); **NBC** (Nigerian Broadcasting Commission); **MDA** (Ministries, Departments and Agencies); **CHM** (Clearing House Mechanism); **BDCP** (Bio-resources Development and Conservation Programme); **FRIN** (Forestry Research

Institute of Nigeria); **NCF** (Nigerian Conservation Foundation); **FMF** (Federal Ministry of Finance); **NPC** (National Planning Commission); **EA** (Environmental Assessment Department); **NPS** (National Parks Service); **FMA&RD** (Federal Ministry of Agriculture and Rural Development); **FMJ** (Federal Ministry of Justice); **DDA** (Drought and Desertification Amelioration Department); **NAGGW** (National Agency for Great Green Wall); **FML&S** (Federal Ministry of Lands and Survey); **PC&EH** (Pollution Control and Environmental Health); **NIPRD** (National Institute for Pharmaceutical Research and Development); **FMH** (Federal Ministry of Health); **NESREA** (National Environmental Standards Regulation and Enforcement Agency); **NOSDRA** (National Oil Spill Detection and Response Agency); **DPR** (Department of Petroleum Resources); **NNPC** (Nigerian National Petroleum Corporation); **PQD** (Plant Quarantine Department); **FMEnv** (Federal Ministry of Environment); **IMCABS** (Inter-Ministerial Committee on Access and Benefit Sharing); **NCGRAB** (National Centre for Genetic Resources and Biotechnology); **NABDA** (National Biotechnology Development Agency); **NBMA** (National Biosafety Management Agency); **NIOMR** (Nigerian Institute for Oceanography and Marine Research); **NIFFR** (Nigerian Institute for Freshwater Fisheries Research); **BD** (Biodiversity); **CC** (Climate Change Department); **LCBDA** (Lake Chad Basin Development Authority)

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