Impact of environmental degradation on biodiversity conservation in Nigeria

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Abstract

Biodiversity is critical for sustainability but it is being increasingly threatened by anthropogenic activities, such as habitats' degradation through deforestation, unsustainable shifting cultivation and draining of wetlands; as well as industrialisation and overexploitation of flora and fauna-which includes unsustainable fishing, excessive consumption of fuel wood and overharvesting of medicinal plants. Human modification of the ecosystems does not only lead to biodiversity loss but can also cause a continuous shift in earth's ecological equilibrium, resulting in degradation and environmental stress. Notably, the United Nations' Sustainable Development Goal 15 (SDG 15) is aimed at averting this impending crisis. This article examines the impact of environmental degradation and conservation on biodiversity in Nigeria and espouses suggestions towards the attainment of sustainable development goals.

Keywords: Biodiversity, conservation, anthropogenic activities, environmental degradation, sustainable development.

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Introduction

Biodiversity is critical for ecosystem function and services on which humans depend, and is directly linked to the economic, social, and environmental components of sustainability (Heywood 2010). Unfortunately, human modification of the ecosystems has led to alterations of biodiversity worldwide, across marine and freshwater ecosystems, and other portions of the biosphere and thus this diversity is increasingly threatened by human activities. This is largely as a result of actions such as the degradation, simplification, fragmentation or loss of habitats through deforestation, logging, unsustainable shifting cultivation, extensification of agriculture, draining of wetlands, industrialisation, road building, tourist developments; and overexploitation of plant and animal resources such as unsustainable fishing, excessive consumption of fuel wood, overharvesting of medicinal plants (Heywood, 2006; De Vos *et al* 2014). If this rapid environmental change continues unchecked, Sala *et al* (2000) noted that there would be a continuous shift in the earth's ecological equilibrium leading to environmental stress and degradation.

This is further viewed as a crisis because of the recognition that biodiversity loss and associated reduced capacity in the provision of ecosystem services, directly impact the human condition (UN 2012). In order to avert this impending crisis, the United Nations through Sustainable Development Goal Number 15 (UN SDG 15) currently prioritises conservation of biodiversity and emphasises the need to Protect, Restore and Promote the sustainable use of terrestrial ecosystems, sustainably managed forests, combat desertification, halt and reverse land degradation as well as stop biodiversity loss. The relationship between sustainability and the conservation of biodiversity has been slowly evolving. Also, research on integrating them has been accelerating as more efforts are being made to link them all in order to achieve sustainable development which is the fulfilment of several conditions such as: preserving the overall balance, respect for the environment, and preventing the exhaustion of natural resources and as a clean break from other modes of development, which have led and are still leading to worrying social and ecological damage on both worldwide and local scales (UN 2015).

Concepts of biodiversity

Biodiversity is a key measure of the health of any ecosystem, and of our entire planet. Every organism in an ecosystem, or biome, relies on other organisms and the physical environment. Biodiversity is regarded as the wealth of life forms found on earth, that describe nature's variety including both the number and frequency of plant and animal species as well as microorganisms. Wilson and Tisdell (2001), Meduna *et al* (2009), Diaz *et al* (2015), Audu and Ayuba (2016) and *Yager et al* (2018)

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see biodiversity as the wealth of life forms found on earth which describes nature's variety including the totality of number and frequency of plant, animal species and microorganisms on earth comprising components such as composition, abundance, spatial distribution and interactions of species, genotypes, populations, functional types and landscape units in a given ecosystem. Rawat and Agarwal (2015) view biodiversity as a comprehensive umbrella term for the extent of nature's variety or variation within the natural system, both in number and frequency. It is also often understood in terms of the wide variety of plants, animals and microorganisms, the genes they contain and the ecosystem they form. It equally holds ecological and economic significance, provides us with nourishment, housing, fuel, clothing and several other resources and extracts monetary benefits through tourism (Myers *et al* 2000). In the light of this, biodiversity has three essential elements: Genetic diversity (the variation of genetic resources within species and populations (Field *et al* 2009); Eco-system diversity (variation in plant and animal species living together and connected by food chains and food webs, involving a variety of habitats, biotic communities and ecological processes in the biosphere which is not distributed evenly on Earth, (Tittensor *et al* 2010); and Species diversity (which refers to the total count of species in a defined area. It refers to the variety of different types of species found in a particular area and it is the biodiversity at the most basic level as it includes all the species ranging from plants to different microorganisms (McPeeket and Brown 2007).

Distribution of biodiversity

Biodiversity is unevenly distributed across the planet occasioned by the global climatic gradient, the current and historical distribution of landmasses, and geographical barriers, such as mountains (Boenigk *et al* 2015). Consequently, biodiversity gradient is the gradual reduction in biomass and species numbers that occurs with increasing latitude, which is one of the several theories used to explain why life is more abundant in the tropics than the cooler regions (Rickleft *et al* 1995). However, Arroyo *et al* (1995) noted that biodiversity differences among continents and hemispheres can be explained by reference to corresponding differences in such factors as climate and landscape heterogeneity; and that the lowest diversity at the highest latitudes, highest diversity at middle latitudes and intermediate diversity at 15 of the equator, with a sharp discontinuity between the highest and the lowest level at 40° to 42° latitude in the Northern hemisphere and a more smoother, more gradual transition in the southern hemisphere (Figure 1). Biological diversity and balance can be impacted by both natural forces and human activities happening over different time and spatial scales. Changes can occur over millions of years or be rapid and dramatic (United States Environmental Protection Agency 2021).

Environmental degradation and impact on biodiversity

Environmental degradation is the deterioration of the environment through the depletion of resources such as air, water, and soil; the destruction of ecosystems and the extinction of wildlife. When the environment becomes less valuable or damaged, environmental degradation is said to occur. When habitats are destroyed, biodiversity is lost, or natural resources are depleted, the environment is hurt. Environmental degradation can occur naturally or through human processes. The largest areas of concern at

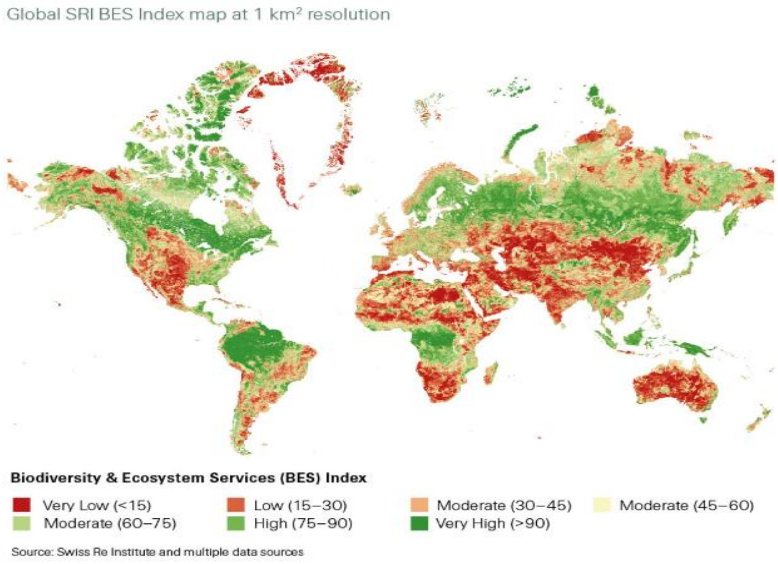

Figure 1. The distribution of biodiversity across the world.

Source: Swiss Re Institute 2021. Biodiversity: better data sharing for effective ecological transitions. https://ideas4development.org/en/biodiversity-toward-better-data-sharing/

present are the loss of rain forests, air pollution and smog, ozone layer depletion, and the destruction of the aquatic environment. Pollution is occurring all over the world and poisoning the oceans. Even in remote areas, the effects of marine degradation are obvious. In some areas, the natural environment has been exposed to hazardous wastes while in other places, major disasters such as oil spills have ruined the local environment (Etuonovbe 2009). For example, the Nigerian Department of Petroleum Resources estimated that 1.89 million barrels of petroleum were spilled into the Niger Delta between 1976 and 1996 out of a total of 2.4 million barrels that spilled in 4,835 incidents (approximately 220 thousand cubic metres) (Vidal 2010), an example is shown in Plate 1. A United Nations Development Programme (UNDP) report states that, in Nigeria, there have been a total of 6,817 oil spills between 1976 and 2001, which account for a loss of three million barrels of oil, of which more than 70% were not recovered equally, 69% of these spills occurred off-shore, a quarter was in swamps and 6% spilled on land (UNDP 2006). Environmental degradation is a very serious problem worldwide, which covers a variety of issues including pollution, biodiversity loss, wildlife extinction, deforestation and desertification, global warming, and a lot more. This interrelationship is shown in the framework below (Figure 2). The framework, developed by the authors, recognises that there are many contextual factors contributing to environmental degradation such as the illegal felling of trees, indiscriminate harvesting of Wildlife **(Plate 2A**), pollution of land, aquatic medium **(Plate 2B**) and the air, fuel wood harvesting **(Plate 2C)** and population growth, which may influence biodiversity loss. It also suggests that the actions of these actors as well as the type and baseline conditions of the ecosystem being exploited play an important role in the loss of biodiversity.

One other major cause of environmental degradation is the destruction caused to the landscape during oil exploration. This has led to the destruction of many wild animals, rendered many people homeless and destroyed their livelihood (Meduna, *et al* 2009). The effect of this economic development process on Biodiversity conservation, and forest resource productivity is enormous and profoundly negative to sustainable development.

Due to oil exploration and other human activities in the Niger Delta region, there is evidence of environmental degradation all over the area (Ugboma 2015). Environmental degradation is occasioned by the consistent flow of industrial waste, oil spills, gas flares, fire disasters, acid rain and flooding erosion, which has led to the pollution of farmlands and fishponds. It has also led to the destruction of property and human lives, including aquatic and other biodiversity resources. The Living Planet Report 2020 underlines how humanity's increasing destruction of nature is having catastrophic

Plate 1. Oil Pollution of aquatic ecosystem

Source: Niger-Delta United Nations Development Report

impacts not only on wildlife populations but also on human health and all aspects of our lives (WWF 2020). These human-induced changes to ecosystems and the extinction of species have been more rapid in recent years than at any time in history. It was reported that population sizes of mammals, birds, reptiles, amphibians and fish, have seen alarming average drop of 68% since 1970; the key driver of the destruction of ecosystems being the demand of growing populations and new consumers for fuels, meat, and grains (Fargione *et al* 2008); a situation Ajayi (2019) described as man's inhumanity to nature. Sodhi and Brooks (2006) estimated the global rate of species extinction as at least tens to hundreds of times higher than the average rate over the past 10 million years, with the resultant land conversion, especially in the tropics, where forests are projected to decline at a faster rate than almost all other biomes globally.

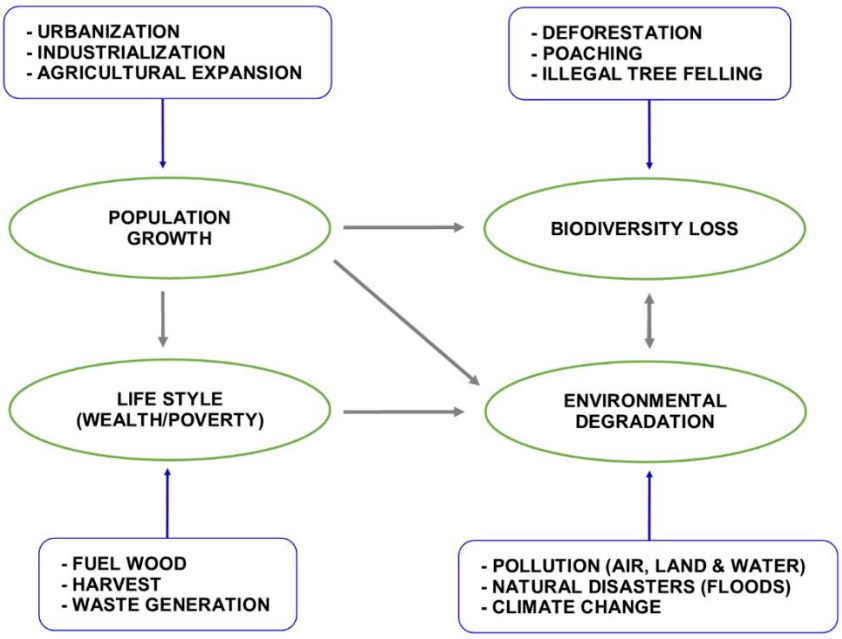

Figure 2. Framework of the interrelationship between environmental degradation, biodiversity and human activities

Although tropical forests are estimated to cover not less than 10% of the earth's surfaces, they are incredibly diverse and support at least two-thirds of the world's biodiversity (Nigeria Environmental Study Team (NEST), 1991). Unfortunately, prospects for tropical forests and the biodiversity therein are becoming increasingly bleak owing to unabated deforestation and forest alteration (Akagu and Adeleke 2012) as a result of already reported human activities such as logging, hunting, agricultural expansion, and human settlement. The UN in its report stated that human activity has altered almost 75% of the earth's surface, squeezing wildlife and nature into an ever-smaller corner of the planet and increasing risks of epidemics such as the recent COVID-19. Equally, about 1.6 billion people depend on forests, which are home to more than 80% of all terrestrial species of animals, plants and insects (UN 2021). It was also stated that 2 billion people depend on forest goods such as fruits, wild game, fibres and fuelwood to meet their basic needs.

In Africa, 58% of the energy supply comes from fuelwood and charcoal. The production and use of fuelwood and charcoal inclusive is an important socio-economic activity in Sub-Saharan Africa as over 70% of the population rely on fuelwood as their primary household energy source (Yager *et al* 2018). Rural households mostly use firewood for cooking and heating and small-scale enterprises for manufacturing and processing such as brickmaking, bread-making, tea and tobacco processing. Charcoal is the dominant energy source in urban centres. Currently in Nigeria, the demand for and use of fuel wood and charcoal has been on the increase and is projected to continue as long as it remains the most readily available source of energy and affordable alternative to kerosene, liquid petroleum gas, and electricity (Nwachukwu 2000 and Emma-Okafor *et al* 2009). Despite its socio-economic significance, fuelwood harvested from forests and woodlands could markedly deplete the natural forest, and its biodiversity resources. Environmental damage from fuelwood harvesting can be significant if too many people depend on the remaining forest thereby significantly hampering the ecosystem services they deliver. The idea of biodiversity is most often associated with species richness, the count of species in an area, and thus biodiversity loss is often viewed as species loss from an ecosystem or even the entire biosphere. However, associating biodiversity loss with species loss alone overlooks other subtle phenomena that threaten long-term ecosystem health (Anwadike 2020). The WWF (2010) states that as the world struggles to meet the ambitions in global accords of stemming biodiversity loss and reducing poverty, these efforts are however marred by the different types of pressures faced by poor households, and their choices of response, which depend fundamentally on many factors beyond their control. It is noteworthy that FAO (2005) had reported that Nigeria, appeared four times in the ranking of countries with the poorest biodiversity conservation, while 60% of its populace had no access to safe water and lived below the poverty line.

Impacts of environmental degradation on biodiversity

Appreciable and significant portion of Nigeria's forest land has been cut down for settlements or urbanisation, road construction, timber harvesting as raw materials for furniture and building construction industries and the use of biomass as a significant source of household energy supply. These inadvertently result in deforestation These

inadvertently result in deforestation, wildlife depletion and sometimes extinction of vulnerable species as well as changes in the micro-climate.

Plate 2. (A) indiscriminate harvesting of wildlife (B) pollution of land and aquatic ecosystem and (C) fuel wood harvesting

Deforestation in the Northern part of Nigeria, especially in the Sahel region, is a major factor in the increasing occurrence of desert encroachment and sandstorms. It has been posited by Zhang *et al* (2001) that climate change, desert encroachment, and deforestation have resulted in blowing away the land surface in Northern Nigeria while heavy rainfalls often flood and wash away a large portion of plain lands, especially in the Southern part of the country. This is usually due to low topography, lack of proper drainage, and deposition of waste in waterways by humans (Sawe 2019), which thence resulted in the loss of cultivable arable land, fertile soils, collapsed buildings and disease outbreaks.

Biodiversity in Nigeria is seriously under threat from climate change, economic development, land-use changes from agriculture, invasive species and pollution, crude oil exploration and exploitation, and channelization that has threatened mainly the mangroves, deforestation, desert encroachment, over hunting, road and residential building construction, etc. Africa and incidentally Nigeria have rich and varied biological resources forming its natural wealth on which its socio-economic system depends.

Human population has been recognised as an indirect driver of biodiversity loss, as human demands for bio-resources, such as food and fuel. They play a key role in driving biodiversity degradation and exacerbate all other factors impacting on the ecosystem (UN 2019). The Nigeria National Population is estimated to average around 200 million people with an annual growth of 2.62%. This high rate of population increase in Nigeria will continue to place more pressure and request on arable land for food production, livestock grazing, and wood for construction and energy. Land hunger has driven humans to settle in areas of high biodiversity, with relatively rich soils and other attractions for human activities. This constitutes a great threat to biodiversity, especially since many of these areas have numerous endemic species (Audu and Ayuba 2016). The consequence of such population pressure has resulted in indiscriminate logging and poaching, unfriendly agricultural expansion and collection of fuel wood. These actions have continued to pose serious threats to the country's forest resources (Pierring *et al* 2010), play a key role in driving biodiversity degradation, exacerbates every other factor having an impact on the ecosystem (UN 2021).

According to Borokini (2014), natural habitats in Africa are being lost through anthropogenic activities of man, such as over-harvesting of resources, most notably wildlife and tree resources, which are being harvested indiscriminately without consideration for its recruitment rate. More than 21 million hectares of forests have been lost to tree felling and forest clearing for agriculture and other uses. Other threats to terrestrial habitat include bush fire especially in the savanna, soil preparation for agriculture, overfishing, deforestation, and roads, residential and commercial centres construction. In Nigeria, there is desert encroachment advancing southwards at an estimated rate of 0.6km a year with Borno, Jigawa, Katsina, Kebbi, Yobe and Sokoto greatly

affected, while Sokoto is losing up to 11.43% of its total land area (UN 1993). The problems of gully erosion in Agulu-Nanka of Anambra State and Imo State are not waning. Zhang *et al* (2001) stated that all the 36 states of Nigeria including the Federal Capital Territory (FCT) are adversely affected by soil erosion, but the intensity and type vary from region to region. While wind erosion is common in the northern part of Nigeria where the soils are sandy, coastal erosion affects all the states bordering the Atlantic Ocean, which include, Ogun, Lagos, Ondo, Delta, Edo, Akwa Ibom, Rivers, Bayelsa and Cross River.

Nigeria has a coastline of about 853km long, with the coastal areas being the most populated zones but is most seriously threatened by coastal and marine erosions, its devastating effects are found in the low-lying belts of the mangrove and freshwater swamps along the coast and plains of large rivers in the coastal southern states of Nigeria (NEST 1991 and Nwachukwu 2000). Nigeria is rated the 6th world's largest producer of crude oil with reserves running into billions of naira and a large deposition of solid minerals and rich biodiversity; yet classified among the poorest countries of the world (Sala *et al* 2000). The quest to survive has driven the populace so much that there seems to be no regards for nature and other species anymore. Every opportunity to convert bio-resources either to cash or food is explored to the fullest regardless of its impact either on the environment, biodiversity loss even future security. Crude oil exploration and exploitation have also created serious problems especially in the Niger Delta, resulting in hazards such as soil degradation, deforestation, and water resources degradation. The destruction of biodiversity has also caused huge losses in terms of human life, natural resources and infrastructural losses (Nwachukwu 2000).

The Nigerian Forest is rich in biodiversity and it covers Ogun, Oyo, Edo, Ondo down to Cross River states and because of the vast resources that can be obtained from them, they have been massively exploited for economic and development purposes. The Savannas, which cover from the middle belt region to the north are the second dominant ecosystem in Nigeria and are equally exploited and depleted for food, fuel wood and other resources. The consequences have been the loss of vegetation cover, fertile topsoil and fauna species. Wildlife, encompassing all living organisms that exist in the wild state, is equally threatened. Population and human pressure are implicated as being responsible for ecological imbalance resulting in habitat and species losses, genetic traits and associated ecological changes in these wildlife populations (NEST 1991).

Biodiversity of Nigeria

Nigeria is blessed with a plethora of biodiversity and biological resources including plants, animals and ecosystems to the extent that some of them are threatened to extinction and degradation resulting from the imbalance between economic development and biodiversity conservation. Unfortunately, High Biodiversity Value Areas (HBVA), which are areas in which there is an abundance of species, are allowed to be destroyed under different guises such as illegal felling of trees, poaching among others. For instance, the forest of Okomu in Edo State was conceded to a company as an oil palm plantation, an activity that has destroyed a very valuable and appreciable quantity of diverse species of plants and displaced a lot of endemic wildlife species. (Adebayo and Uyi 2010). It is worthy of mention that arising from the circumstance above, many countries of the world have set up monitoring agencies and are effectively looking forward to the global observation and science community for guidance and facilitation. No doubt that nature is endowed with a vast array of human, material, and biological resources that constitute life support system required to sustain and meet human needs (Anwadike 2020).

Historically, Nigeria became a signatory to the Convention on Biodiversity (CBD) in 1994 committing her to the three objectives of the convention; conservation of biodiversity, sustainable use of its components and the fair and equitable sharing of resources arising from the effective use of genetic resources. Amakiri (2016) stated that Nigeria has over 7,895 plant species, identified into 338 families and 2215 genera, a significant number of them being endemic species presently threatened with a decline in quality and quantity at an alarming rate due to over-exploitation and misuse.

There are 91 endemic flora species belonging to 44 families with the Rubiaceae family having the highest composition. According to the IUCN Red list 2013, threatened species found in Nigeria are 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).

Nigeria has a total of 7 National Parks (Table 1), covering about 3% of Nigeria's total land area under the control and supervision of the Nigeria National Park Service (NNPS). These categories of biodiversity-related sites are Nigeria National Parks of Old Oyo, Cross River, Gashaka-Gumti, Okomu, Chad Basin, Kainji Lake, and Kamuku; 27 Important Bird Areas including all National Parks and 60% of the Ramsar sites; 11 Ramsar Sites; 2 World Heritage Sites of Sukur Kingdom and Osun Osogbo Grove; 994 Forest Reserves; 32 Game Reserves; 1Biosphere Reserve; and many Sacred groves at varied levels of protection. Though another 10 have been designated with the process of full establishment under way, including a marine park in Bayelsa State, the first of its kind in Nigeria. National parks play a vital role in the conservation of Nigeria's wildlife protecting an abundant diversity of wild faunas as well as flora (NPS 2006).

These animals and plants are found to occur in different numbers within the country's landscape. In

addition to performing conservation activities, the national parks offer local and international visitors the best opportunities to sample Nigeria's natural habitats as well as biodiversity. Also, it has enabled researchers to carryout fieldwork in a natural ecosystem devoid of negative external factors. National Parks have been invaluable in boosting the country's lucrative tourism sector (Sawe 2019).

It is worthy of mention that the Gashaka-Gumpti National Park have habitats across a range of altitude from 450m to 4,000m, chimpanzees are among the threatened species that survive in the forest. Park service in collaboration with the Nigeria Conservation Foundation (NCF) and WWF are working together to develop and promote tourism in the National Park thereby stimulating the economy through conservation efforts. The Drill Rehabilitation and Breeding Centre (DRBC) in Calabar, Nigeria was set up in cooperation with the Cross River State, Ministry of Agriculture, Forestry Department and Cross Rivers National Park. In May 2000, the Afi Mountain Wildlife Sanctuary was gazetted and will protect one of the Nigerian populations of the Cross River gorilla, as well as drills, chimpanzees and other private species (Oates *et al* 2007).

Table 1: Names and Locations of Existing National Parks in Nigeria

Rank	National Park	Geographic Area (km^2)	Year Established	Coordinates	Location [State(s)]
1	Gshaka Gumti	6,731	1991	7.5424°N, 11.6158°E	Taraba, Adamawa
2	Kainji	5,382	1979	10.3683°N, 4.5547°E	Niger, Kwara
3	Cross River	4,000	1991	5.5804°N, 8.7483°E	Cross River
4	Old Oyo	2,512	1991	8.3781°N, 3.8248°E	Oyo, Kwara
5	Chad Basin	2,258	1991	11.7426°N, 14.0349°E	Borno,Yobe
6	Yankari	2,244	1962	9.8543°N, 10.3030°E	Bauchi
7	Kamuku	71,121	1999	10.7500°N, 6.5000°E	Kaduna

Source: National Park Service (NPS; 2006)

Forest reserves are portions of lands, controlled by the state government, where commercial harvesting of wood products is strictly controlled in order to ensure sustainable production and capture elements of biodiversity that may be missing from sustainably harvested sites. Initially, the system was designed in a way that afforestation rate and deforestation are at equilibrium but presently, a significant portion of various forest reserves in Nigeria has been converted to farmlands. Forest reserves in Nigeria are in great danger as an increase in population and economic activities have brought about an indiscriminate encroachment into these protected sites.

Nigeria attended the 1992 Rio de Janeiro Conference on Sustainable Development and was a signatory to the Convention on Biodiversity, following which a National Biodiversity Strategy and Action Plan was prepared. The goal of the plan is to conserve Nigeria's biodiversity and enhance its sustainable use by integrating biodiversity conservations into national planning policy and decision-making process as it was demanded by the United Nations-Sustainable Development Goals. Emphasis was placed on biodiversity conservation within protected areas such as forest reserves and national parks and 37 gazettes and proposed games reserves and sanctuaries that exist in Nigeria.

Some major challenges to conservation practices in Nigeria

There are many government agencies in charge of environmental matters that work at cross-purposes, to the extent that statutory delineation is not adhered to, which in turn may be affected by obvious administrative bottlenecks and connivance between the operators and those flouting the order. Also, conservation projects are threatened by economic development activities that require the areas for exploitation, mining, exploration, and road expansion and highway networks (NEST 1991). Others are lack of sustainability of conservation projects, inadequate finance to fund projects, poverty among the local communities; insufficiently trained manpower on basic information on biodiversity and conservation practices; nonexistence of National Legislation on Biodiversity; the threat of climate change; incomplete knowledge of the species of organisms and their total worth, all form part of the myriads of problems of conservation (Moronne 2015).

Way forward to sustainable biodiversity conservation

The importance of biodiversity as a natural resource cannot be over-emphasized because of the basic needs they satisfy and their role as the vital cultural heritage of the nation, therefore, there must be a concerted effort by the government and citizens to make wise use of these natural resources, to avoid their degradation and depletion. Rapid population growth, over-exploitation of resources, deepening poverty, and weak institutional and legal frameworks need to be seriously addressed by integrating environmental and developmental objectives (De Vos *et al* 2014; Ceballos *et al* 2015; Senior *et al* 2019). The need to consciously address the challenge of ignorance of conservation education on the importance of biodiversity should be given utmost attention. The essence of this is to balance economic development and the environment since the former is the major threat to biodiversity conservation. Due to the linkages between socio-economic systems and ecological systems, issues such as development, poverty eradication, and

biodiversity conservation need to be addressed not as individual phenomena but rather as complex dynamic systems.

There is urgent call for actions towards the ratification of international conventions and treaties and the establishment of regional action plans, to be supported with human and financial resources not just to comply with obligation, but to implement activities and projects at the national and sub-national levels (IUCN 2000). One of the major threats widely overlooked is that there are many governmental agencies on environmental protection and conservation. These agencies work at cross purposes thereby compounding their statutory functions. Consequently, any institution mandated to protect these natural endowments, should be strengthened and supported (Saidu 2017). Institutions such as the Nigeria National Park Service (NPS), National Environmental Standards and Regulatory Enforcement Agency (NESREA) and Federal Department of Forestry (FDF) need to be supported, empowered and mandated by the national government to be up and doing in carrying out their assignment diligently. The Protected Areas like Gashaka-Gumti National parks are meant to promote sustainable harvest, conservation education, and ecotourism and benefit the host community, its management should have this as part of its focus.

The real panacea to some of the country's environmental problems is the adoption of the policy of sustainable development. Sustainable development encompasses the development that meets the needs of the present without compromising the ability of future generations to meet theirs. Odiete (1993), noted that achieving sustainable development involves judicious use of natural resources such that the carrying capacity and the productive capacity are not overexploited. To survive our environmental crisis, we must reduce the massive pollution of the biosphere. Efforts should be made both by the government and individuals towards the reduction of the pollution of the biosphere and the control of air pollution emissions. This can be achieved through concerted efforts of all in the area of surface sink production by tree planting, encouraging smokeless fuels, air pollution reduction from exhaust, incineration and National legislation. Nigeria stands to lose on all fronts if it maintains an unhealthy working environment, especially in the Niger Delta Region and several urban environments of the country.

The Federal Government, therefore, should empower and support all agencies of government whose mandate is to implement environmental protection policies and biodiversity conservations to function optimally and ensure sustainable development. There is the need to prioritise the implementation of the United Nation Sustainable Development Goals (UN SDG) at all levels of governance. This will put the country in good stead to revive the degraded environment and encourage sustainability of both the economy and citizens' welfare. Therefore, the need to harmonise developmental activities in such a way that the impact on biodiversity would be least must be advocated. The primary goal of biodiversity conservation is to maintain all species and population of species for present and future use. Conservation of biodiversity can either be carried out *in-situ*, which implies the on-site conservation or the conservation of genetic resources in natural populations of plant or animal species or *ex-situ*. The effective conservation of biodiversity in Nigeria has been hampered by factors, such as population growth, habitat fragmentation, high poverty index perception, overexploitation and pollution. Also, the lack of biodiversity data has hindered conservation efforts, making it almost impossible to track species extinction rate, which is estimated to be 0.01% to 0.1% annually for developing countries like Nigeria (De Vos *et al* 2014).

Conclusion

There can be little debate that there is in fact a very serious biodiversity crisis, however the World Wildlife Fund believes that nature can thrive again if man can be smarter about the use of our oceans, freshwaters and land; and how we meet our energy needs and exploring new ways of feeding our growing population and manage our water supply. It was further counselled that Governments must commit to halt and start reversing the loss of nature to more sustainable levels (WWF 2020). In the light of this, the world needs ambitious biodiversity conservation plan, in order to stop the catastrophic losses of animal and plant species (Nature 2022).

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