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Biodiversity: Management and Control as a Catalyst for Environmental Sustainability in Katsina State, Nigeria

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Abstract: *The variety of ecosystems, species and genes that surround us, is our life insurance, giving us food, fresh water and clean air, shelter and medicine, mitigating natural disasters, pests and diseases and contributes in mitigating effects of climate change. Biodiversity is also our natural capital, delivering ecosystem services that underpin our economy. In this research work the researcher was able to identify some devastating effects due to loss of the natural biodiversity. Research also identifies some measures or strategies used in combating such menace of biodiversity loss. The research work was able to identify some of the significant issues of maintaining the natural biodiversity. Moreover, findings show that; loss of biodiversity may leads to rainfalls shortageand lower the volume of water table, general extinction of forest and animals. It may also cause soil degradation, loss of soil fertility, soil erosion, and desertification as well as food shortage. Finally, the researcher suggested some measures for minimizing the negative impact of biodiversity loss. Such measures can be done through controlling grazing, afforestation program and through use of alternative source of fuel.*
Keywords*: Biodiversity, Management and Environmental sustainability*

I. Introduction

Biodiversity: the term used to indicate the distribution of the variety of ecosystems, species and genes that surround our natural environment. This ecosystem is our life insurance thatgives us food, fresh water and clean air, shelter and medicine, mitigating natural disasters, pests and diseases and contributes in regulating the climate and minimizes the serious effect of climate change in the natural environment (FGN/CCD, 1999).Biodiversity is also our natural capital, delivering ecosystem services that underpin oureconomy. Its deterioration and loss may jeopardize the provision of these services: we losespecies and habitats and the wealth and employment we derive from nature, and endanger ourown wellbeing (FAO, 1992). This makes biodiversity loss the most critical global environmental threatalongside climate change, and the two are inextricably linked. While biodiversity makes akey contribution to climate change mitigation and adaptation, achieving the two-degree targetcoupled with adequate adaptation measures to reduce the impacts of unavoidable effects ofclimate change are also essential to avert biodiversity loss.

In Nigeria, the loss of biodiversity in the northern Nigeria is more of deforestation, while in thesouth is more of gas pillaring which cause greater environmental degradation due loss of life of the aquatic animals and natural land quality. The forest exploitation in the north has a serious impact on the nation economy and the natural biodiversity. In most areas major losses have been recorded in vegetation, forest complexity (diversity). The deforestation rate in the country is about 3.5% per year, translating to a loss of 350,000–400,000 ha of forest land per year. Recent studies show that forests now occupy about 923,767 km2 or about 10 million ha. This is about 10% of Nigeria's forest land area and well below FAO's recommended national minimum of 25%. Between 1990 and 2005 alone, the world lost 3.3% of its forests while Nigeria lost 21%.

II. Reviews of the previous literatures

This research was designed to review the previous research conducted base on biodiversity and compare it with the happening in Nigeria and Katsina state in particular. As such the paper tries to digest from the global issue which indicated that there is serious problem related to the natural environment, biodiversity per se. The rate of menace is increasing for example FAO, (2010) identified that 60% of the world's ecosystems are degraded or used unsustainably; 75% of fish stocks are over-exploited or significantly depleted and 75% of the genetic diversity of agricultural crops has been lost worldwide since 1990. An estimated 13 million hectares of tropical forests are cleared each year1 and 20% of the world's tropical coral reefs have already disappeared, while 95% is at risk of destruction or extreme damage by 2050 if climate change continues unabated. In the EU, only 17 % of habitats and species and 11 % of key ecosystems protected under EU legislation are in a favorable state. This is in spite of action taken to combat biodiversity loss, particularly since the EU, 2010 biodiversity target was set in 2001. The benefits of these actions have been outweighed by continued and growing pressures on Europe's biodiversity: land-use change, over-exploitation of biodiversity and its components, the spread of invasive alien species, pollution and climate change have either remained constant or are increasing.

One of the policy problems was that the indirect drivers/causes of biodiversity, such as population growth, agricultural intensification and uncontrolled animals grazing make the problem to accelerate to a large scale, covering a wider range of land globally. More over the current issue of technological advancement stand as one of the driving force to this problem. This strategy is aimed at reversing biodiversity loss and speeding up the EU's transition towards a resource efficient and green economy. It is an integral part of the Europe, 2020 Strategy, and in particular the resource efficient Europe flagship initiative. In line to this Rosina, (2012) opined that; one of the main challenges of managing naturalecosystems is to find a balance between economic andecological sustainability (Jose 2009). For example, theintegration of native forests within livestock grazingareas is an advantageous management alternative interms of both biodiversity and productivity, comparedto traditional grazing systems in open grasslands(Sa´nchez-Jardo´n et al. 2010). Although livestock andforests have long co-existed in the rural areas ofsouthern Patagonia, traditional practices in the past(e.g., fires) have led to the replacement several of theoriginal old-growth forest by rangelands or secondary vegetation (Roig 1998).

Currently, forest managementsystems are being promoted in the region as anovel strategy for a sustainable use and conservationof the natural environment (Peri et al. 2009a).This proposal involves livestock feeding on naturalpastures that grow in the understory of thinned forests,where forest regeneration occurs naturally (e.g., seedsor sprouts), not through planting. Since there arepositive and negative interactions among trees, pasturesand livestock, some scholars opined that forest management systems aim to encourage thepositive interactions to ensure tree regeneration andlong-term viability (Peri et al. 2009a; Adler et al. 2001 and Romanya et al. 2005).Forest regeneration is a dynamic process whichincludes multiple transitions among different reproductivestages (flowers, seeds, seedlings, and saplings).

In respect to Nigeria,different research was conducted in the country and results indicated that; there was serious loss of biodiversity in both northern and southern part of the country. Northern Nigeria is more devastatingas a result of deforestation, while the southern part is suffering due to gas pillaring which causes greater environmental degradation due loss of life of the aquatic animals and natural land quality. The forest exploitation in the north has a serious impact on the nation economy and the natural biodiversity. In most areas major losses have been recorded in vegetation, forest complexity or diversity. The deforestation rate in the country is about 3.5% per year, translating to a loss of 350,000–400,000 ha of forest land per year. Recent studies show that forests now occupy about 923,767 km2 or about 10 million ha. This is about 10% of Nigeria's forest land area and well below FAO's recommended national minimum of 25%. Between 1990 and 2005 alone, the world lost 3.3% of its forests while Nigeria lost 21%.

While in Katsina state my study area Adediji, (2010) discovered that, theestimatedpotential mean annual soil loss is 17.35 ton/ac/yr based on the refined RUSLEinstrument obtained in the study area.Also, the potential erosion rates from the erosion classes identified ranged from 0.0 to 4185.12 ton/ac/yr. About65.47% of the study area was classified under the first class with erosion rate between 0.0 and 10 ton/ac/yr. Themost severely eroded area with rates of erosion between 104.80 and 4,185.12 ton/ac/yr accounted for about1.86% of the study area. On the whole, of this study demonstrated that, the significance of Satellite (RS) and GIStechnologies in modeling erosion in Katsina state.Soil degradation is one of the contributing factors of biodiversity.Another reviewed literature of Abbas, et al. (2010) indicated that; A paired t-test analysis was used to see if there was significant change inthe land use/land cover between 1995 and 2008 in Katsina state.The results of the findings shown that open space covered 13.56 squarekilometers of the land area and constituted 34.00% in 1995 which constituted the most extensive type of landuse/land cover in the study area. The increasing population and economic activities were noted to be puttingpressure on the available land resources. Therefore, population growth and human activities is another factor needs to be address under biodiversity: management and control for environmental sustainability.

Kankara, (2010) opined that the sudden decline of forests in Katsina State was occur due to human interference and the roaming of animals in the processes of grazing in the range land, and this cause the extinction of primary vegetation and replaced by secondary types (Nelson, 2003) The establishment of forest reserves in Katsina state started in 1919 in the old Katsina province (Kabiru 1998). Within a decade, a number of reserves with varying sizes were established at Jibiya 92 sq miles); Kankara-Tsaskiya-Ruma area (284 sq miles), the Birninn Katsina Area 9193 acres); Karaduwa (6.8 sq miles) Garunmashi district (66.6 acres) and Makoda-Marusa district (62 miles); Sabuwa- Marusa district (15 acres); Masibiingawa (68 acres); Musawa South (30 sq miles); Kogo reserves (30 sq miles) Babsal and Co, 1998). By the mid of 1940s the number of reserves increased and additional areas included Rogogo hill, Sandamu, Kaya, Hamis, GulbinBaure, bringing the total area to 9,466 sq miles (KTSG, 2005). The state has about 50 forest reserves scattered all over the state. They vary in size and area extent forms few hundred square Kilometers to thousands of square kilometer. There are also shelterbelts in the northern part of the state around Mashi, Mani, Daura, Shargalle and Baure areas. Other forest reserves of great potential include Guru Gingia, Kandawa, Kabbi, Yashi, Dutsinbali, Mawashi,

Karfi,Dayi, Badauri, Dayingoro, Barawa, Tsanmi and Katsina with Other areas Dankabbi, Madarai, Nasssarawa and so on (KTAPU,1997).

From the previous literature reviewed by the author of this study, the researcher designed some objectives need to achieve,among the objectives include:

Research objectives

- To identify the devastating effects due to altering the natural biodiversity of an environment.
- To identify measures or strategies used in combating such menace in the natural environment.
- To identify the significance of biodiversity in the environment.

III. Methodology

The researcher has systematically adopted the method of review papers and supportedit with preliminary survey of the study area, Katsina state. In line to this, the researcher consulted different write-up from the global perspective, Nigeria and finally pin it down to Katsina state.

Significant of the study

- This ecosystem is our life insurance, that give us food, fresh water and clean air, shelter and medicine, mitigating natural disasters like flooding, soil erosion and desertification.
- Economically, biodiversity is our natural capital, because help soil to regain it fertility, improve the water table, improve the climatic condition and improve the amount of rainfall which consequently affect the agriculture and food security.
- Biodiversity sustainability can help the industries with enough raw materials to progress and sustained as well increase the nation economy.
- Social, political, economic and environmentally biodiversity play strong roots the global success for sustainable future.
- Meanwhile, all the resources such as atmospheric, land, water, animals and human are benefiting under the umbrella of good biodiversity.

Problems associated with the destruction of biodiversity

Among the problems of biodiversity destruction may leads to the occurrences of the following:

- Shortage of rainfall
- It can affects the underground water table
- Loss of natural vegetation canopy
- Loss of wild animals
- Soil degradation
- Extinction of natural forest
- Loss of soil fertility
- Soil erosion and other environmental deterioration
- Desert encroachment
- Air pollution and climate change
- Shortage of food, political, social and religious crises
- Economic hardship and lack of employment opportunity
- Earth dams, rivers and streamssedimentationand so on.

National Policy on Biodiversity, Management and Control

The Nigerian government has taken cognizance of the multi problems of biodiversity. Inthis regard, government developed a number of policies and plans ranging from agricultural toenergy. Some of the policies relevant to biodiversity control include:

- NationalPolicy on the Environment
- National Agricultural Policy
- National Forestry Policy
- National Document on Biodiversity and Conservation

Acton Plans and Strategies

Thesestrategies and action plans contain elements that address the issue of desertification.Some of these include:

- Nigerian National Environmental Action Plan (NEAP).
- State Environmental Action Plans (SEAPs). The SEAPs were prepared for each of the36 States of the Federation and the Federal Capital Territory through participatoryprocesses of planning and action, which seeks to integrate socio- economic andecological perspectives in to all the States' policies, plans

and programmes as well asthose of all stakeholders and interests groups within the State. For those States in thedesert-prone region, their SEAP Reports prioritized their environmental problems withdesertification ranking as the most important problem.

- National Forestry Action Plan and the National Conservation Strategy
- TheNatural Resources Conservation Action Plan
- The National Water Resources Master Plan
- The National Biodiversity Strategy and Action Plan
- The Green Agenda of the VISION, 2010 Report and the Nigeria's National Agenda 21.

Laws and Regulations

Nigerian government initiated some laws that addressed issues like desertification which means deforestation, over exploitation of natural resources, inappropriate agricultural practices, bush burning, etc. Such Laws include:

- The Federal Environmental Protection Agency (FEPA) Decree.
- The National Parks Decree 101 of 1991.
- The Environmental Impact Assessment (EIA) Decree No 86 of 1992.
- The Endangered Species (Control of International Trade and Traffic in Fauna and Flora) Decree, 1985.
- The National Water Resources Decree No. 101 of 1993.

State Policy on Biodiversity, Management and Control

At state level, in most cases is the extension of what the national body has initiated, all the states in the country have forestry, agricultural and wildlife laws bush burning and grazing reserve regulations. These categories of laws are directed in controlling the notable causes of biodiversitydestruction. The most significant of these laws relevant to biodiversity control are the Forestry Laws, which required expertupdate.This is one of the possible reasons that cause the continuous decline of natural biodiversity in Katsina state and Nigeria in general.

Institutional Framework

Some institutions are being use in the country to check in the destruction of the natural biodiversity, such institutions or ministries includes:

- Federal Ministry of Agriculture and Natural Resources
- Department of Forestry in the Federal Ministry of Agriculture and Natural Resources
- Forestry Management Co-ordinating Committee (FORMECU) established to coordinate and monitor the implementation of Forestry II Programme,
- National Parks Service established to manage all the National Parks inNigeria.

Federal Ministry of Water Resources and Rural Development is responsible,inter-alia, for management of water resourcesWater Resources and Rural Development is responsible, inter-alia, for management of water resources generally in the country including River Basin Development Authorities in the Country established to capture, store and distribute water resources for irrigation, fishing and other agricultural purposes.

IV. Conclusions and Recommendations

Conclusively this study highlighted the importance of maintaining the natural biodiversity in Nigeria and the world at large. The study also has try to list down some of the natural and artificial causes that increase the rate of forest extinction and other natural ecosystem in Nigeria and the world at large. Finally the study shows the policy and other mitigating factors employed by Nigerian government and state in the process of making sustainable and habitable environment.

Recommendations

This study wanted to offer additional measures in minimizing the rate of biodiversity destruction in Katsina state, the following strategies can be employed:

- Through controlling grazing.
- Providing alternative source of fuel to minimized the over usage of fuel wood.
- Providing job opportunity, in order to minimized unemployment rate among the people of Katsina state.
- Improving the farming system through use of manure and cover crops to maintain the soil quality.
- More afforestation programs should be initiated to minimize the rate of desert encroachment.

- More earth dams and water reservoirs needs to be constructed to improve the ground water table.

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