A review on Factors Responsible for Biodiversity Loss in Northern Nigeria and the Way Forward

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ABSTRACT

Biodiversity loss is a pressing global issue with profound ecological, economic, and social consequences. This review aims to identify and analyse the factors responsible for biodiversity loss in northern Nigeria, highlighting the causes and proposing strategies for conservation and sustainable management. It synthesizes information from sources, including scientific studies, government reports, and community-based research, to examine the complex interplay of factors affecting biodiversity in northern Nigeria. The identified factors contributing to biodiversity loss in northern Nigeria include land-use change, overexploitation, deforestation and pollution. Rapid population growth, urbanization, and expanding agricultural activities have resulted in extensive land conversion, leading to the loss and fragmentation of natural habitats. Unsustainable agricultural practices, and deforestation have further contributed to habitat degradation and species decline. Pollution from industrial activities, improper waste management, and pesticide use pose significant threats to biodiversity in the region. Additionally, the lack of effective policies and regulations exacerbates the challenges faced by biodiversity conservation efforts. Moreover, cultural factors play a crucial role in biodiversity loss. To address the complex issue of biodiversity loss in northern Nigeria, a holistic approach is necessary which involves implementing integrated conservation strategies that encompass effective land-use planning, sustainable agricultural practices, habitat restoration, and promoting community engagement and awareness are vital components for successful biodiversity conservation in the region.

Keywords: *biodiversity, deforestation, land-use change, pollution,restoration*

INTRODUCTION

The entire heritable variation or variances in traits that exist in all living creatures, both as individuals and as members of their species, in various habitats across the globe are known as biodiversity or biological diversity (Alao, 2009). The rate of biodiversity loss is worrying. It is our duty to safeguard biodiversity as effectively as we can. A lot of focus has been placed in recent years on proving that biodiversity loss is one of the major issues that could endanger even the very existence of the human race on Earth. The diversity of life is most commonly understood by the phrase "biodiversity." According to the Convention on Biological Diversity (CBD 1999), the term "variability among living organisms from all sources," which includes terrestrial, marine, and other aquatic ecosystems and the ecological complexes to which they belong, is accepted internationally. This includes diversity within species and between species of ecosystems, according to (Singh *et al.,* 2021).

Fundamentally, biodiversity should be preserved for two reasons. The first is the moral defense, and the second is the significance of human life. Because of the products and services it offers, biodiversity is crucial for human growth. The world economy is thought to be 40% dependent on biological goods and processes. Globally, however, the rate of biodiversity loss is many times greater than the rate of natural extinction. Uncontrolled land conversion, climate change, pollution, unsustainable resource extraction, and the introduction of alien species are some of the causes of this biodiversity loss (Christ *et al.,* 2003).

Understanding the factors responsible for biodiversity loss contributes to our scientific knowledge and allows researchers to study the complex interactions between human activities and ecosystems. By identifying and studying these factors, scientists can gain insights into ecological processes, the impacts of human activities on biodiversity, and potential mitigation strategies.

2. Factors responsible for biodiversity in northern Nigeria

Kokwaro, (1994) asserts that human activities have played a significant role in the decline of biodiversity over time. These practices include overgrazing, bush burning, logging, fuel wood collecting, inappropriate use of pesticides and fertilizers, urbanization, and water and air pollution (Darkoh,2003). the loss of biodiversity in the northern Nigeria is more of deforestation. The forest exploitation in the north has a serious impact on the nation economy and the natural biodiversity. 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 (Muhammad, 2015). Here are some of the factors responsible for the loss of biodiversity in northern Nigeria;

Deforestation: Deforestation is the process of removing forest trees for domestic and industrial uses, such as the production of firewood, timber, paper, and charcoal (Harper *et al.*, 2022). Other non-forest uses include residential and industrial areas, road and rail construction, agricultural uses, and residential and industrial areas. Deforestation has damaged habitat (Harper *et al.*, 2022), decreased biodiversity (Akintoye *et al.*, 2013), turned agricultural fields desert (Hunter , 2005), degraded soil, lost soil fertility, flooded places, and caused the extinction of important plant and animal species (Strategy, 1980; (Sodimu *et al.*, 2022).

Large-scale cash crop plantation development, reckless bush burning, and excessive grazing all result in habitat damage, which has an effect on insect species (Kehinde *et al.*, 2014). In his study, (Ladan, 2019) noted that the Runka forest in Katsina, which has experienced extensive deforestation for many years, served as an example of how deforestation for the purpose of collecting fuel wood has resulted in the loss of wildlife species. In Nigeria, many trees, shrubs, herbs and assorted animals have been depleted while some are endangered. Mfon *et al.,* (2014) reported that several plant species have been over exploited especially those with edible seeds, nuts and kernels are now endangered. Most primates such as guenons, mangabeys, drills, chimpanzees and gorillas are now endangered (Akachuku, 2006).

Over exploitation: This have also had a significant role and still act as major catalysts for changes in biodiversity. Marine fish and invertebrates, trees, and animals that are sought for their flesh are some of the most often over exploited species or groups of species (Obayelu, 2014). For instance, in northern Nigeria, traders who go by the name YanShinfida (in the local Hausa language) sometimes deal in vultures. They typically do this by putting such goods on show in kiosks or on mats, residents of protected forest regions inherited just the knowledge and tools for hunting from their parents since they did not perceive poaching as a crime against wild animals or

a violation of the law (Ladan, 2014). All migratory species are subject to illegal hunting at all times of the year, and many of the hunters have little concern for the gender, age, or reproductive status of their prey (Ladan, 2014).

Bush burning: In many parts of Nigeria, bush burning is a significant factor contributing to the reduction of wildlife. Fire is frequently required for agricultural purposes. Fire is frequently utilized in Nigeria's rural areas to prepare soil for agricultural use. As a result, this form of fire is frequently managed and intended for a certain region (Izah et al., 2018). According to Songsore (1996) human activities such as the use of bush burning and bad farming practices have also exposed the environment to land degradation, deforestation, loss of biodiversity and a decrease in soil fertility.

Drought and desertification: Parts of northern Nigeria's ecology are recognized to be threatened by drought and desertification (Obioha, 2009). According to estimates, there was significant environmental degradation between 1976/78 and 1993/95, which caused desertification to move from 12°30' North to 10°30' North (Osawaru *et al.*, 2013). Desertification has also been an issue of environmental concern in Nigeria, particularly the northern part of the country. Northern Nigeria has one of the highest rates of deforestation in the world at about 3.5% (UNEP, 1993) which is driven by widespread land degradation, increasing agricultural intensity, over-grazing of livestock, and demand for fuel-wood (Musa and Shaib, 2010).

Expansion of agriculture: In addition to its effects of climate change, the expansion of agriculture has caused massive losses in biodiversity around the world, natural habitats have been converted to farms and pastures, pesticides and fertilizers have polluted the environment, and soils have been degraded. Many plant and animal populations will face extinction in future decades as land clearing and agricultural production increase (Tilman *et al.*, 2017). Work in ecology has demonstrated a strong link between biodiversity and the stability and productivity of ecosystem (Tilman, and Downing, 1994).

Traditional technique is mainly used in Nigerian agriculture. Over 90% of the world's food is still produced by peasant farmers, and shifting cultivation is still one of their main farming techniques which cause habitats being destroyed (Osawaru *et al.*, 2013)

Land use change: The connections between land use and biodiversity are intricate and very context-specific. Planning for the sustainable management of natural resources requires an understanding of how land use affects biodiversity and vice versa. While in certain locations, particular land uses or land management techniques may be crucial in maintaining particular patterns of biodiversity, in other locations, the uses that may be made of a piece of land rely greatly on the biodiversity resources available. Human land use and changes to land use

practices are the single most significant factor causing a decline in biodiversity (Obayelu, 2014). Globally, there have been significant changes in land usage as a result of rapidly growing human populations and rising agricultural operations (Cunningham *et al.,* 2006). Land-use change is considered as a major threat to biodiversity due to the fact that other threats to biodiversity are stimulated by changes in land use (Metemilola *et al.,* 2015). Meyfroidt (2010), referred to the loss and degradation of natural habitats due to change in land use as a war of attrition.

Cultural beliefs: Culture can be understood and described as systems of meaning, the way in which people interpret the world around them (Schein, 1991). It has been suggested that the difference in cultural worldviews and cosmologies of nature between industrialized and resource-dependent (or subsistence-oriented) communities stems from a difference in need and purpose (Pretty, *et al.*, 2008).

Population growth: Nigeria's rapid population growth has resulted in a constant hunt for additional arable land for food production and cattle grazing, as well as for wood for fuel, building materials, and energy. People have a tendency to live in regions with a lot of biodiversity because these locations frequently contain relatively rich soils and other things that make them attractive for human activity. Since many of these places are home to several endemic species, this poses a serious danger to biodiversity (Audu & Ayuba, 2016). The country's forest resources continue to face major risks as a result of the high intensity of logging, poaching, illegal exploitation, agricultural expansion, and collection of fuel-woods as a result of the high population pressure (Perrings *et al.*, 2010).

Pollution: Chemical contamination is intricate and widespread. It manifests itself in a variety of ways, including air pollution with sulfate, nitrogen oxide, and oxidants, direct injury to vegetation, and the contamination of freshwater by the deposition of acid rain (Obayelu, 2014). Through runoff of nitrate and phosphate, excessive use of agricultural chemicals contaminates waterways, disrupts the ecology of wetlands and shallow oceans, and endangers animals through the buildup of persistent pesticides (Obayelu, 2014).

3. The way forward to the factors responsible for biodiversity loss in northern Nigeria

Ecosystem restoration and land use practices: The global concern over deforestation should lead to the development of programs to stop it through afforestation initiatives and initiatives to reduce emissions from deforestation and forest degradation (REDD) through direct financial or other incentives to encourage developing countries to stop or reverse deforestation (Wajim, 2020).

Utilization of biodiversity: According to (Hansen *et al.,* 1991), biodiversity can be prudently utilized through; harvesting wild life and resources sustainably, assessing stock and productive capabilities of exploited populations and ecosystems

and using them within those capacities.

Education and awareness: This section highlights the need for environmental education and awareness campaigns, which includes: Encourage programs that have objective of making more arable lands available through restoration of already degraded and impoverished lands (Obayelu, 2014). Enforcing environment management system (EMS) tools in public and private establishment for effective environmental and cost oriented management e.g. EIS, EU (Amosu *et al.*, 2012).

Involvement of locals: Local people are very key to the success of every biodiversity project. Sadly, many project officers consider them as a distraction and thus, refuse to consult their views on the biodiversity projects undertaken. This results in less success or eventual failure of the biodiversity project as its sustainability lies in the hands of the local people whose participation was excused. As is demonstrated by nature's pattern, every faction of the society is very important to any nature conservation project (Adom, *et al.,* 2020). Local people living in and around communities where biodiversity conservation projects are to be undertaken are crucial to their success. Their active participation in the management, as well as the use of their traditional ecological knowledge, provide tremendous benefits to any biodiversity project (Schultz, 2002).

Nature based solution: Nigeria, like many parts of the world, is experiencing climate change. The combination of frequent natural disasters, large population, poor infrastructure and low resilience to economic shocks, makes Nigeria especially vulnerable to climatic risks. This is in addition to high incidence of poverty, reliance of the poor on agriculture and natural resources (Valentini, 2013).

In Nigeria, nature-based approaches to addressing climate and environmental issues are not entirely new. Things like Afforestation Programme have been implemented, including reforestation of degraded forest reserves/landscapes, land reclamation for flood control. Establishment of Great Green Wall Initiative for the Sahel region with promotion of dryland agricultural technologies have taken place. As NbS becomes popular globally, it is being advocated for in national policies, programmes and projects oriented towards climate adaptation. Revision of Nigeria's NDCs incorporates 'analysis of nature-based solutions for those sectors with significant and mitigation co-benefits' (Abubakar, 2021). In addition, mangrove restoration initiatives are proposed for the Niger Delta Region in Nigeria where coastal communities have continuously suffered erosion-related problems (Whyte, 2021). These initiatives are not only seeking to enhance adaptation and mitigation potentials, but to clean up the coastal environment degraded through oil exploitation, housing development and depleted through uncontrolled consumption of mangrove-based resources. Enforcement of existing laws: forested and

agricultural landscapes are particularly important because they disproportionately provide high values of environmental services and biodiversity. Forest conservation and protection is an important component of adaptation strategies needed to address continuing changes in the natural resource base that sustains our livelihoods. Sustainable forest management is thus a critical component of any policy, action and programme that seeks to address the growing global concern about deforestation, the impact of climate change, green economy and inclusive economic development. Thus, policies gear toward sustaining forest conservation and encouraging afforestation is imperative to sustain economic development. (Ogunwale, 2015).

There is no doubt that Nigeria has over the years spelt out a series of policy statements, law and regulatory measures towards ensuring sustainable forest management (Ogundele *et al.*, 2016).

4. Summary

Biodiversity loss in northern Nigeria is a complex issue influenced by factors such as deforestation, climate change, pollution, over exploitation, and human population growth. Deforestation leads to the destruction of natural habitats, fragmentation, and degradation, while climate change disrupts ecosystems and species' migration patterns. Pollution, over exploitation, and human population growth further exacerbate biodiversity loss. Therefore, this issue can be addressed through education and awareness which will promote sustainable use of biodiversity, land usage and rehabilitating or restoring the ecosystem which is the home for all biodiversity.

5. Conclusion

This study reviewed the factors responsible for biodiversity loss in northern Nigeria and the way forward. Education and awareness, sustainable conservation strategies are possible to safeguard the regions rich biodiversity for future generations and ensure the ecological balance and resilience of its ecosystem and protect the unique natural heritage of northern Nigeria.

6. Recommendation

From the conclusion, there is need for educating the public on the value of biodiversity, sustainable land use practices such as afforestation, sustainable farming practices, diversification of income sources, and afforestation. Other researchers should critically examine the biodiversity of northern Nigeria with emphasis on their IUCN status, area of northern Nigeria with high loss of biodiversity.

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