

MEDICINAL HERBS AND BIODIVERSITY RESOURCES IN NIGERIA: AN ETHNOGRAPHIC ANALYSIS OF THEIR GOVERNANCE MECHANISMS AND IMPLICATIONS FOR SUSTAINABLE AND ECONOMIC DEVELOPMENT

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Abstract:

This article examines the present systems for regulating biodiversity resource use, with a specific focus on Osun State, Nigeria. The study undertakes an exploratory research design due to the novelty of the subject matter. For data collection, qualitative research methodologies, specifically in-depth interviews (IDIs) and key informant interviews (KIIs), were purposefully adopted. Herbal medicine sellers were key participants in the in-depth interviews, while key informant interviewees included a diverse group of leaders of herb sellers' associations, traditional healthcare providers, government officials responsible for Forestry Resources Management, practicing ethnobotanists, and knowledgeable academics with expertise relevant to the subject matter. The study further unfolds a comprehensive analysis of the threats to biodiversity, delving into the underlying causes and far-reaching consequences of biodiversity depletion in Nigeria. The study's

findings further shed a discerning light on the regulatory mechanisms governing biodiversity utilisation in Nigeria. Despite the existence of these mechanisms, they have struggled to realise the anticipated positive outcomes. This predicament is largely attributable to a lack of strong political will on the part of the government to ensure compliance among users of Nigeria's rich biodiversity. A critical observation is that the legal and policy frameworks that oversee biodiversity in Nigeria have not undergone periodic reviews, rendering them out of touch with current societal dynamics. Consequently, traditional medicine practitioners and vendors of medicinal herbs, among other biodiversity users, have exploited this policy vacuum to exploit plant, tree, and other biodiversity resources unabated. Of notable concern is the unregulated exploitation of plants for medicinal purposes, particularly the trade in herbs, which has emerged as a significant threat to public health and well-being. This unchecked practice undermines the prospects of Sustainable Development Goal 3 (SDG-3), which prioritises health and well-being. In light of these findings, the study strongly advocates for a two-fold approach to address this pressing issue. First, it underscores the critical importance of fostering robust political will to enforce existing regulations and institute much-needed reforms. Secondly, constant monitoring and oversight of medicinal herb utilisation and other biodiversity resources in Nigeria by government agencies are deemed imperative to safeguard the nation's natural wealth and the health of its citizens.

Keywords: *Biodiversity, Mechanisms, Medicinal Herbs, Ethnobotanist, Economic Development, Sustainable Development*

JEL Classification: *I30; I38; J18; J38; Q01*

Introduction

Existing research has found that biodiversity-rich locations frequently lack the financial means, as well as the human and institutional skills, to enable effective conservation, despite their obvious need (Campos-Arceiz et al., 2018). There has been a case for unchecked economic expansion and the imminent repercussions of fast population growth, urbanisation, and various consumption patterns and habits on biodiversity's declining fortunes (Ünal et al., 2019; Coşkun, 2005). The difficulties of a lack of awareness of the potential effects of conservation aims and interconnections among target regions were not overlooked. Nicholson et al. (2019) additionally observed that passivity on actions required to achieve tangible goals accounted for (a) unusual, poor, or weak protection results, (b) inefficient actions,

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and (c) missed opportunities for achieving commitments to stemming the tides of extinction.

Biodiversity governance hence necessitates the employment of legislation to aid in its protection, management, and long-term usage (Food and Agricultural Organisation, 2023; Barral, 2017). The law determines a framework that supports countries in their efforts to achieve biodiversity objectives, both in response to national priorities and needs and in terms of commitment to addressing global biodiversity issues, by providing rules and institutional mechanisms through which action on biodiversity and ecosystems can be taken. It serves as a framework for governmental policies and actions to conserve and manage biodiversity and ecosystems, and by establishing relevant boundaries and social safeguards, it can ensure that the benefits of genetic resource utilisation are distributed fairly and equitably (Ullah and Kim, 2021). By establishing incentives and recognising rights and obligations, the law may also be used to enable local governments, individuals, indigenous peoples, local communities, entrepreneurs, enterprises, and others to take action for biodiversity.

Despite the evident imperative for the sustainable preservation of biodiversity, very little is known about the perspectives of those directly affected, particularly individuals whose daily livelihood relies on biodiversity resources. It is essential to gain insights into their understanding of the regulatory measures designed to ensure biodiversity's continuity. This study seeks to address this gap in knowledge and make a valuable contribution to the fields of biodiversity, sustainability, and the SDGs.

To bridge this knowledge gap, this study endeavors to investigate the following key research questions: what are the economic and social impacts stemming from the utilization of biodiversity resources in Nigeria? What are the legal and policy frameworks governing the utilization of these resources in Nigeria? How are the medicinal herbs and associated risks linked to the utilization of biodiversity resources? What are the lived experiences of those affected by the unregulated utilization of biodiversity in Nigeria? Finally, what is the effectiveness of the prevailing mechanisms in safeguarding and preserving biodiversity resources.

Introduction shall have a page at the most, however not less than half a page. The text must provide answers for four questions. (1) What matter does the paper cover? (2) Why is the studied matter important? (3) How does the author intend to answer to this matter? (4) What is the relation between the paper and the already existent specialized literature? This introductory section shall be written clearly and any confusion in communicating the four answers might result in paper rejection.

Literature Review

The study adopts the qualitative approaches of in-depth (IDI) and key informant interviews (KII). It involved 40 herb sellers that were engaged in IDI and sampled from herb markets selected from Oja-Oba Osogbo (Oyo speaking subgroup), Ereja Ilesa (Ijesa speaking subgroup), Ayegbaju (Ife speaking subgroup), and Ila (Igbomina subgroup). 12 KII participants were sampled among the herb sellers' group leaders, traditional health care providers, government officials in charge of forest resources management, practicing ethnobotanists in Osun State, and academics from Obafemi Awolowo University, Ile-Ife, and Osun State University, Ejigbo campus with expertise in forestry and biodiversity conservation. The herb markets were found in areas generally known as Oja-Oba (King's Market) across the state. The willingness to take part in the study was used to pick replacements in stalls where the qualified person refused to take part. The qualitative data collected were analysed using an open-source software package and ethnographic summaries. Some important quotations from respondents during IDI and KII sessions were reported verbatim for further illustration of the issues under focus.

Ethical Consideration

The principles of ethics governing research on human beings were strictly observed in this study. An informed consent form was administered prior to the conduct of interviews and discussions. The introductory part of the instruments for data collection (interview guides), which emphasised the issue of voluntary participation, was read and interpreted (where necessary) by each participant. The participants were informed of their rights to decline participation if they so desired. Thus, their right to withdraw from the study at any point was emphasised, and some respondents actually withdrew before the end of the process, and such responses were disregarded at the analysis stage. Also, respondents were free not to answer any question they considered offensive or an extreme intrusion into their privacy.

Section must comprise referrals to specialized literature, compared against the paper's subject, emphasizing the most important and relevant contributions on which the author will ground his/her argumentation. In the reviewing process there shall be taken into consideration the share of referrals to papers published in international journals recognized by the scientific community. This section must stress the fact that the author is familiar with the knowledge level in the studied

area, that he/she has sufficient scientific training, allowing him/her to have a pertinent opinion over the studied issues.

Data Presentation and Discussion

Demographic Distributions of Participants

This research work examined ethno-medical healing praxis and the unaccounted challenges of extinction associated with consumption of biodiversity resources in Osun State, Nigeria. The study adopted interview sessions as the main approach for data collection. The study population is composed of (a) herb sellers, (b) herb sellers' group leaders, (c) herb dealers, (d) traditional health care providers, (e) government officials in charge of forest resource management, (f) ethnobotanists, and (g) scholars in forestry and conservation. The majority of them are in the age range of 32 to 49 years of age. The educational qualifications of the participants included a university degree or higher national diploma, a national diploma or Nigerian certificate of education, secondary school education, some secondary school education, and primary school education. Their years of experience on the job they are engaging in range from 11 to 60 years. In line with the findings of this study, the participants demonstrated reasonable knowledge of what biodiversity and its resources imply, though from cultural perspectives. Virtually all aspects of biodiversity were declared useful for therapeutic purposes. Involvement in professions that require biodiversity resource usage (especially herb selling and traditional healing) was revealed to be in-house and through training. It is in-house because the majority of them met their parents engaging in the activities, hence their being socialised into it. Some were inducted into it through the normal entrepreneurial training system. The activities were shown as not limited to the unlettered but now involved formally educated people.

Economic and Social Impacts of Biodiversity Resources Utilization

Biodiversity offers a variety of ecological services that are critical to human well-being now and in the future. People rely on biodiversity in ways that are not often obvious or acknowledged in their daily lives. Human health is ultimately dependent on ecosystem products and services (such as access to clean water, food, and fuel), which are required for good human health and productive lives (Imarhiagbe et al., 2020). It has a significant impact on human nutrition because of its influence on the global food supply, since it assures soil fertility and supplies genetic resources for all crops, animals, and marine creatures collected for food.

Access to a sufficient supply of a nutritious variety of food is a critical health determinant.

The principal drivers of biodiversity loss include habitat destruction, overexploitation, pollution, and species introduction (Roka, 2021; He et al., 2020; Akamani, 2020). Consumption and production patterns, human population dynamics, commerce, and the use of technology are all influenced by society's values, inequalities, and behaviours. Irrigation, fertiliser usage, plant protection (pesticides), or the introduction of crop types and cropping patterns all have an impact on biodiversity (United Nations Environmental Programme, 2021; Luswaga and Nuppenau, 2020). This has a knock-on effect on global nutritional status and human health. Habitat simplification, species loss, and species succession frequently increase community vulnerabilities as a result of environmental receptivity to disease. When biodiversity loss occurs through these and other developing avenues, it has major direct human health consequences, particularly if ecosystem services are no longer enough to support social requirements. Changes in ecosystem services have an indirect impact on livelihoods, income, and local migration and, on occasion, may instigate or intensify political conflict (Abdul-Aziz, 2018).

Climate is an essential component of ecosystem functioning, and the effects of climatic conditions on terrestrial and marine ecosystems have an immediate and indirect impact on human health. Ocean acidification, which is linked to carbon levels in the atmosphere, has an impact on marine biodiversity. Climate change has an impact on terrestrial biodiversity. Extreme weather events, such as drought and floods, have a direct impact on ecosystem health as well as the productivity and availability of ecosystem commodities and services for human use. Longer-term climatic changes have an impact on the sustainability and health of ecosystems, influencing changes in the distribution of plants, diseases, animals, and even human settlements. This was supported by statistics on accessible species in Nigeria. According to data, Nigeria has an indigenous flora of 91 species from 44 groups, with the Rubiaceae having the most. A faunal species list was also provided. According to the IUCN Red List 2013, Nigeria has 309 threatened species in the following taxonomic groups: mammals (26), birds (19), reptiles (8), amphibians (13), fishes (60), mollusks (1), other invertebrates (14) and plants (168). (UNESCO, 2023; UNEP, 2021; He et al., 2020; Federal Ministry of Environment, 2015).

Legal and Policy Frameworks Governing the Utilization of Biodiversity Resources

The contributions of biodiversity and ecosystems to human development and well-being have long been recognized. All over the world, there is a high alarm rate at which biodiversity is being degraded. The loss of biodiversity resources continues as a result of both direct and indirect pressures, including habitat destruction, overexploitation, the spreading of invasive alien species, climate change, and population pressure. National, bilateral, and multilateral efforts to halt and reverse the loss have given rise to a number of legal, regulatory, and policy regimes that are currently under implementation. While policy and regulatory regimes are intended to provide an overarching framework for action on the ground, legal regimes and instruments provide the interpretation and protection services necessary for ensuring that policy and regulatory regimes are effectively implemented (UNEP, 2018). Governments at both national and international levels have devised several methods to curb the incessant assault on biodiversity. One of such methods is the instrument of legislation, which provides regulations for improving the protection and conservation of biodiversity (Ijaya, 2021).

Over the past three decades, most sub-Saharan African (SSA) countries have developed national policies, legislation, plans, and institutions that are geared towards biodiversity conservation and management. However, evidently lacking in these instruments are the mechanisms for the generation, processing, and sharing of biodiversity information. In the case of biodiversity conservation, governance-related actions have been taken. The Rio Conference of the Convention on Biodiversity has been the leading conference on biodiversity conservation under the global governance agenda. There have been some case-study-oriented works that follow the biodiversity governance perspective.

Many SSA countries have formulated separate policies and legislative instruments such as forest policy, wildlife policy, environmental policy, forest code, wildlife act, fisheries act, and environment management act, among others, that are implemented by different institutions with sometimes overlapping and duplications in responsibility. A major policy gap for biodiversity is that while all these policies are presumably geared towards biodiversity conservation and management, they have not been able to adequately address biodiversity due to the fact that biodiversity issues are spread between different policies and managed by different institutions. Most of the SSA countries, as revealed through the analysis, do not have a standalone biodiversity policy that specifically targets biodiversity issues, including biodiversity information. In the analyses of institutions in SSA

countries, it became evident that many countries have yet to establish specialised institutions that facilitate the generation, processing, and access to biodiversity data and information in Africa (Ozor *et al.*, 2016).

Conservation practices in Nigeria matter regarding the interaction between governments and NGOs. Government efforts regarding oil pollution in Nigeria have supported legal and institutional actions related to biodiversity (Altıparmak, 2022). It has been found that although attempts have been unsuccessful, Nigerian governments are aware that a governance approach is needed to solve biodiversity loss. However, a lack of local authority and disconnection between civil society and governments prevent a healthy working governance process for sustainable biodiversity. In the words of Ijaiya (2021), the legislation put in place in Nigeria on biodiversity conservation is rarely enforced, unlike what is being done in India and the United Kingdom. Also, the right to a clean environment, as a right in India and the United Kingdom, is lacking under the Nigerian Constitution.

Medicinal Component and risk of Utilizing Biodiversity Resources

Biodiversity is an essential ecological predictor of human health; conservation and sustainable use of biodiversity promote human health by preserving ecosystem services and providing future possibilities (King *et al.*, 2023; WHO and CBD, 2015). Aside from that, it supports human and societal necessities such as food and nutrition security, energy, medicine and pharmaceutical research, and freshwater, all of which contribute to good health (WHO, 2020; Hillman and Baydoun, 2016; WHO and CBD, 2015). A vast range of plants, animals, and fungi are employed in medicine, necessary vitamins, pain relievers, and other applications. Medicinal plants are now gaining prominence due to their unique properties as a rich source of medicinal phytochemicals that may lead to the creation of innovative medications (Azwanida, 2015). According to Venugopal and Liu (2012), most phytochemicals derived from plants, such as phenolics and flavonoids, have been shown to improve health and cancer prevention.

Many animals are recognised for their capacity to self-medicate with plants and other things. Plant medicine is used nearly totally for basic health care by more than 60% of the world's population (Gaston and Spicer, 2004). For example, around 119 pure compounds are isolated from less than 90 species of higher plants and used as medicines across the world (such as caffeine, methyl salicylate, and quinine) (Yeshiwas *et al.*, 2019; Izah *et al.*, 2016). Plants have been employed by humans for illness control and prevention since time immemorial (Yirga *et al.*, 2011). Medicinal plants continue to play key roles in the everyday lives of people

living in developing Asian and African nations (Yeshiwas et al., 2019). These plants not only supplement or substitute for current medical treatments, which are frequently in short supply, but they also improve the health and security of local people (Agidew, 2022; Sofowora et al., 2013). As a result, medicinal plants play essential roles in everyday life and are closely linked to a variety of social, cultural, and economic events related to life, ageing, disease, and death (Eshete and Molla, 2021; Ezekwesili-Ofilu and Okaka, 2019).

Globally, the estimated number of medical plant species ranges from 35,000 to 50,000, with between 4000 and 6000 species entering the global medicinal plant market (Bekele, 2007). Ethiopia has 6500 species of higher plants, making it one of the world's most varied floristic areas (Bekele, 2007). In terms of fundamental human requirements, the plant kingdom is the most important to human well-being. The number of people who use herbal medicine items and supplements has reportedly increased significantly. According to Ekor (2014), at least 80% of people globally rely on them for some aspect of basic health care. Traditional healers in Africa were acknowledged to have a thorough awareness of the therapeutic qualities of biological resources in their surroundings. The quantity of plant species with therapeutic properties that a community understands is usually astounding (Yeshiwas et al., 2019; Omobuwajo et al., 2008). With reference to the beneficial phytochemicals in medical plants and the trend towards natural goods in the pharmaceutical and cosmeceutical industries, medicinal plant research is very important (Azwanida, 2015).

Existing Regulatory Mechanisms for Regulating Biodiversity Resources Utilization

The Nigerian government has developed a variety of organisations to protect and maintain the country's biodiversity, including the Federal Environmental Protection Agency (FEPA), the National Resources Council (NARECO), the Nigerian Conservation Foundation (NCF), and others. These organisations collaborate with other efforts such as the World Wide Fund (WWF), the United Nations Environmental Programme (UNEP), and others. There are also a few biosphere reserves, or protected regions, throughout the nation. These include 8 national parks, 445 forest reserves, 12 stringent nature reserves, and 28 game reserves, all of which contribute to safeguarding wildlife and complementing domestic protein sources (Obayelu, 2014). The environmental dimensions of sustainable development as they pertain to this subject are best seen in light of the fact that the natural ecosystem in which people live is intrinsically linked to all

societies in the world. Given their relevance and need, stakeholders are unlikely to overlook the overall threat of overcollection of these resources in the course of fulfilling market demand. This indicates that they must recognise the importance of implementing conservation measures while utilising these resources. This is intended to be common practice for the long-term viability of their initiatives and overall growth. Scholars (Qiu et al., 2018, Waddington et al., 2018, Joshi and Rao, 2017, Sterling et al., 2017, Virapongse et al., 2016) have uncovered a high incidence of biodiversity resource loss in African communities, including our research location. Participants in this survey also recognised the critical significance of protected areas (Pas) in the long-term growth and preservation of biodiversity. According to one important informant, "the establishment of protected areas (PAs) is another mechanism for preserving biodiversity." PA designation has been a key method for preserving biodiversity for more than a century. It is well known that well-managed PAs not only help healthy ecosystems and threatened species, but they also provide many benefits to people; without them, global biodiversity loss would be even greater and more inevitable than it is now (Female KII/49 years old/Academic/Obafemi Awolowo University, Ile-Ife, Osun State, 2023). PAs continue to be at the heart of multi-party international policy activities. The RAMSAR Convention on Wetlands of International Importance, Waterfowl Habitat, the 2030 Agenda for Sustainable Development, and the Convention on Biological Diversity (CBD) are examples of these (Birben, 2019; UNEP WCMC et al., 2018; Bertzky et al., 2012). These are the most significant environmental and sustainable development promises made by nations in the international arena to date.

It demonstrates existing initiatives and the issues that result from them. 'We participate in the cautious use of these resources,' says one of them. We have various woods from which we obtain these materials. Our attention is not always focused on a certain forest; instead, we draw our requirements from other woods while leaving one forest to fallow. However, there are limitations on how this may be completely realised due to the lack of limits on the activities of our colleagues or those shopping for plants for personal use or as professional herbalists' (Female IDI/44 years old/Oja-Oba, Ila-Orangun, Osun State, 2023).

Another attendee stated, "Conservation is very difficult for us as herbal merchants because we are always in our shops on every blessed day." We rarely go out to collect herbs by ourselves; we hire somebody to do it. They wander about seeking the species we require or those they anticipate we may require. We don't know how they acquired it; our job is to price the things supplied to us' (Female

IDI/57 years old/Ereja Market, Ilesa, Osun State, 2023). Shedding light on conservation matters, another participant revealed that 'we often discuss the possibility of the extinction of biodiversity resources that are constantly needed in our business among ourselves, but we are incapacitated based on the fact that we do not know how to overcome this. This is in view of our customer expectations in the face of the increasing rate of entrants into the business as well as the increasing operational cost of securing the commitments of our suppliers' (Female IDI/50 years old/Ayegbaju Market, Ile-Ife, Osun State, 2023).

According to another statement, "we were told of the implications of biodiversity resource usage on the environment by some government officials who invited us to their Secretariat a few years ago." They told us about irreplaceable biodiversity values as well as a variety of other critical ecological services. They taught us about the importance of ensuring proper use of these resources in order to slow the fast loss of the world's remaining primary forest. However, no solution has been proposed on how to maintain us in business because we don't have any other source of income' (Male IDI/41 years old/Ereja Market, Ilesa, Osun State, 2023). According to one participant, "the officials who invited us for a discussion on environmental management informed us about the dangers inherent in unregulated harvesting of biodiversity resources." We were informed that this might lead to damaged landscapes and declining species, which would have disastrous effects for everyone's quality of life' (Female IDI/42 years old/Ayegbaju Market, Ile-Ife, Osun State, 2023). 'Aside from the exploitation of biodiversity resources for therapeutic purposes, numerous of these resources are under serious strain from increasing human populations and a burgeoning global economy,' it was also found. Several local and international non-governmental organisations (NGOs) have expanded their activities beyond seminars and workshops. They are continuously in contact with individuals whose actions have an influence on and are likely to result in the loss of biological biodiversity due to unregulated use.' (Academic/Obafemi Awolowo University, Ile-Ife, Osun State, 2023/Female KII/49 years old)

It was also noted that "herb sellers, professional herbalists, and individuals who use herbs for their daily survival and that of others rarely consider the possibility that these resources will not be available." During the conversation, participants were encouraged to reconsider herbs that were formerly readily available in their area but are no longer available as one of the many consequences of the wrong use of biodiversity resources. Others that were available but had to be conveyed many kilometres through 'middlemen' before they could be accessed equally constituted

components of what they were made to reflect upon. Through observation of the effects of several enlightenment programmes given to these people, ‘I have strong belief that they are ready to embrace whatever conservation policies are available as long as they are going to safeguard their business interests’ (Male KII/53 years old/Academic/Osun State University, Ejigbo Campus/Osun State, 2023). In corroboration of this, another participant said, ‘positive behavioural change is possible among the herb dealers; however, the commitment on the part of the government is poor. It is more or less a lip service being played every May 22 when celebrating World Biological Diversity Day or June 5 when World Environment Day is being celebrated. After the celebration, nothing is heard again. This has discouraged those directly involved in harvesting these resources. They more or less see our coming as ritualistic activity aimed at just fulfilling the righteousness’ (female KII/49 years old/Academic/Obafemi Awolowo University, Ile-Ife, Osun State, 2023).

In the words of another participant, ‘the beauty of nature can be affected through unregulated biodiversity resource usage. The attraction created by a rich and varied environment could be harnessed for nature tourism. However, these potentials could be lost when land and resources are strained by excessive use, as well as when impacts on vegetation, wildlife, and other elements within that are made up of biological diversity exceed the carrying capacity’ (Male KII/53 years old/Academic/Osun State University, Ejigbo Campus/Osun State, 2023). Further submission revealed that ‘NGOs and government agencies are working with partners in all sectors to better understand the implication of unregulated consumption of resources on global biodiversity and to promote conservation. I have worked as a consultant on this project a couple of times for NGOs such as the Nigeria Conservation Foundation (NCF), the Wildlife Conservation Society, the Global Environmental Facilities (GEF), and the National Park Service, among others. The efforts of these NGOs focus on mitigating climate change, conserving biodiversity, and promoting human welfare’ (female KII/49 years old/Academic/Obafemi Awolowo University, Ile-Ife, Osun State, 2023).

Effectiveness of existing Mechanisms in Protecting Biodiversity Resources

Natural forests are being destroyed by other forms of land use, like agriculture, grazing, and construction activities, as a result of uncoordinated land use policies and rapid urbanisation, leading to desertification and degradation of the environment (FAO, 2017). This thus pointed out the fact that the environment and, by extension, biodiversity lag behind other sectors in terms of policy and

legislative reforms (UNEP, 2018). The underpinning value elements of biodiversity as a life support system for millions of Nigerians have yet to receive recognition and serious consideration in national policy and legislative action. The existing laws relating to biodiversity are obsolete. Each succeeding administration at the federal level in Nigeria over the years has exhibited an absence of political will to implement various provisions of policies and acts enacted for the successful protection of biodiversity (Obayelu, 2014).

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 to the background and have only been the concern of conservationists, scientists, and environmentalists, despite their significant contribution to the livelihoods of rural and peri-urban communities and the ecosystem services they provide. FAO (2017) and USAID (2008) equally noted, among others, that the absence of adequate data on the status of biodiversity and the extent of degradation in the country are two of the factors obstructing the effective implementation of the Land Use Act and conservation policies.

The Federal Government of Nigeria has committed to international conventions and treaties, but their implementation has been plagued by substantial delays. This is reflected in the significant backlog of annual contributions to the trust funds linked to these conventions. Furthermore, as emphasised in a UNEP assessment from 2018, insufficient funding allocations to carry out decisions reached during conferences and meetings linked to these conventions, along with weak institutional ability, have resulted in suboptimal implementation.

Furthermore, cultural issues continue to impede the successful implementation of conservation programmes in the country. Many Nigerian groups view land as holy, passing it down through generations as a prized inheritance. Great opposition normally follows attempts by the government to convert what is regarded as personal or communal property to reserves. Many laws on biodiversity and forestry are difficult to enforce because of the high level of poverty in the country (USAID, 2008). A lot of people in both rural and urban areas depend on firewood and charcoal for cooking. Thus, the local trade in firewood and charcoal continues to thrive.

The medicinal plant business was not accounted for as part of the resources being overexploited. Yet, people depended on it for survival. In the process of shedding light on events within the study areas, the key informants in this study noted the inadequacy of a top-down approach to solving biodiversity challenges. According to one of the respondents, ‘...this approach has failed to deliver

effective management strategies for biodiversity conservation' (Male KII/53 years old/Academic/Osun State University, Ejigbo Campus/Osun State, 2023). Another submission also identified poor legislative enforcement as a glaring setback for biodiversity conservation in Nigeria. In her words, there is evidence of land conversion to agriculture in some forest reserves without any serious effort by the authorities to stop the trend, which is glaring' (female KII/49 years old/Academic/Obafemi Awolowo University, Ile-Ife, Osun State). Supporting this observation, it was further emphasised that many programmes and initiatives aimed at achieving their objectives suffer from inadequate design and ganization. An illustrative example is the lack of proper coordination in nationwide tree-planting campaigns, as noted by a senior Forest and Conservation Superintendent in the Ministry of Environment, Osun State, in 2023.

Another significant hindrance is the issue of inconsistent commitment to policies, exacerbated by the frequent turnover of political leadership in the country. This has led to varying levels of dedication to program implementation, as highlighted by an ethnobotanist from Oke Ayepe Community, Osogbo, Osun State (Male KII/69 years old/Ethnobotanist/Oke Ayepe Community, Osogbo, Osun State, 2023).

Discussion of Findings

There have been attempts at policy, political, institutional, organisational, and national levels for a solution to the unregulated utilisation of biodiversity resources. However, these interventions have largely missed their intended target due to a lack of political will on the part of the government in implementing the existing biodiversity laws and regimes. In this study, it has been made manifest that the poor commitment of the government to environmental and biodiversity issues has equally been the bane of biodiversity challenges in Nigeria. The study further implies that the regulatory mechanisms initiated by the government to regulate the utilisation of biodiversity failed to achieve the purpose of their existence. Some of the laws and policies on conservation of biodiversity and related matters could not achieve the expected results. The cause of this has been variously reported by several scholars as being systemic in nature. Typical in this case are the activities of the stakeholders in the medicinal herb business that were not adequately addressed. Policies and laws governing biodiversity have not also been subjected to periodic assessment and review in order to capture emerging realities. Meanwhile, periodic reviews of these policies will enhance the accommodation of those that were excluded at the beginning but whose activities are negatively impacting the

substance of biodiversity in Nigeria. For instance, Ayeni (1995), espousing wildlife resource conservation, noted that the laws enacted for the purpose of safeguarding the resources discriminated against local communities. By operation of this law, the local communities could not utilise wildlife resources for their basic necessities of life. The people therefore became alienated. Apart from this, the laws were repressive with no respect to the local populace, rural communities, or their traditional and cultural values.

Also worthy of note is that the bulk of the efforts at informing the grassroots of the necessity of biodiversity conservation are left with NGOs. Hence, much has not been achieved in this regard because the NGOs stake in the matter is limited by (a) the availability of funds to carry out their activities and (b) their constitutional role in the management of biodiversity, which is exclusively the preserve of the governments but only delegated as occasion demands. With this poor commitment to effective biodiversity management, it is obvious that Nigeria will continue to incur losses from environmental, biodiversity, and other allied ventures such as tourism, which effective management of biodiversity would have afforded the country.

Conclusions

The Biodiversity, arising from the outcome of this study, continues to face a number of threats in Nigeria, despite numerous policies that seek to address issues of conservation of biodiversity resources. It was affirmed that several policies, agencies, and departments were established to ensure proper protection and management of biodiversity resources. The implementation of the policy has not achieved the desired result of properly conserving the country's biodiversity. Management of protected areas in Nigeria is a top-down approach that involves only the agencies responsible and the managers. This approach is associated with several shortcomings, as they are unable to incorporate indigenous or local communities, which makes them lose their support in management. Involvement of local communities in protected area management is among the requirements of Decree 46 of 1999, in an effort to improve the management and conservation of national parks in Nigeria. Several factors contributed to this. First, for instance, Olawuyi and Olusegun (2018) traced the challenges to legal barriers to the implementation and attainment of the SDGs on biodiversity in Nigeria to a lack of institutional coordination, an absence of political will, and inadequate stakeholder engagement in evolving national biodiversity plans in Nigeria. The future of effective biodiversity preservation in natural ecosystems is constrained by factors

arising from overharvesting of resources, population increase, unequal land tenure systems, reliance on wild biotic resources by rural economies, and a land-intensive technique of agricultural production (Sambe *et al.*, 2021). Arising from the findings and analyses, the following recommendations are believed to be of critical expediency in addressing unregulated use of medicinal herbs and other biodiversity in Nigeria:

- (a) In order to generate a lasting change of behaviour in favour of conservation, critical audiences need to be reached. This should include decision maker/opinion leaders within the communities, journalists, teachers who should be commissioned with the assignments of developing an array of tools to implement effective communications and education strategies.
- (b) Environmental forestry should be encouraged at community level, most especially in the rural areas for adequate protection and effective management. This form of forestry entails gardening usually design for creative use of forest vegetation. It also involves land reconstruction for continuous and rational use of its renewable resources for humans' benefits.
- (c) Application of environmental forestry is very necessary in salvaging the biodiversity from impending depletion and genetic extinction. This can range from establishment of recreational parks, shelterbelt, trees or shrubs purposively planted for their ornamental and conservative effects.
- (d) Efforts should be made by the government to encourage constant interactions between the herbs' sellers and the herbalists or other stakeholders whose livelihood depends on biodiversity resources. Enlightenment programmes that will ingrain in them the implication of unsustainable usage of biodiversity resources on their means of livelihood. The same programme should educate them about their relevance in biodiversity conservation so as to reduce human impact and pressure on the limited natural resources in rural and biologically rich areas.

Conclusions section shall cover three elements: (1) it shall summarize the main outcomes; (2) it shall undertake the implications of such outcomes; (3) suggestions for future researches

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