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Review Article

Impact of illegal logging operation on Nigerian economy: A concise review

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ABSTRACT

Encroachment into forest estates and illegal timber logging activities in Nigeria have serious and negative effects on the country's economy, environment, forest soil, forest biodiversity, and rural communities. This study reviews concisely how illegal logging hurts Nigeria's GDP and suggests ways to tackle the problem. Illegal logging causes deforestation, loss of plant and animal species, soil erosion, water pollution, and contributes to climate change by releasing more carbon into the atmosphere. These environmental problems harm forests and make life harder for people who rely on them. In addition, illegal logging not only hinders everyone's ability to flourish but also exacerbates conflict, weakens the government, and breeds corruption. Hence, the need to strengthen and enforce the forest policy laws better, involve local communities in forest management, improve how forests are governed, promote sustainable logging practices, create new job opportunities in rural areas, work with other countries to stop illegal logging, and do more research to understand the problem better. By doing these things, Nigeria can reduce the damage caused by illegal logging, protect its environment, help communities thrive better, block loopholes, and improve income generation in the government treasury.

K E Y W O R D S : *Economy, Illegal logging, Timber, Utilization, Wood products*

INTRODUCTION

Illegal logging poses a global challenge impacting both developing and developed nations (FAO, 2001). It results in forest degradation or deforestation, jeopardizing valuable ecosystem services, biodiversity, and the livelihoods of forest-dependent communities (Hansen & Treue, 2008). Moreover, it undermines government revenue, distorts timber prices, and discourages investments in the formal forest industry (Tacconi, 2007b). Furthermore, illegal logging can contribute to a broader culture of lawlessness, enabling other illicit activities like poaching, wildlife trade, drug trafficking, and money laundering (Glastra, 1999).

There is no universally accepted definition of illegal logging. Interpretations vary from a narrow scope, which involves logging beyond concession boundaries or exceeding authorized timber extraction, to broader definitions encompassing all aspects of timber processing, transportation, and trading that violate national or sub-national laws (Kleinschmit *et al.*, 2016a). While different

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organizations, both governmental and nongovernmental, may have divergent views on what constitutes illegal logging, numerous studies and reports recognize its multifaceted and intricate nature, acknowledging the existence of various types of illegal logging (Turner *et al*., 2008). Sometimes, illegal logging is conflated with unsustainable timber harvesting practices, but this is not always accurate. Logging can technically be illegal yet sustainable or legal yet unsustainable (Contreras-Hermosilla *et al.,* 2007).

A series of laws govern Nigeria, with the aim of safeguarding and conserving its environment. One significant characteristic of a developing country like Nigeria is the prevalence of primary production in human and economic activities. This primarily involves the extraction of natural resources, such as tree felling and wildlife hunting, as well as livestock grazing and crop cultivation. In such a context, maintaining the quality and productivity of the environment hinges on achieving a balance between natural resources, with forests being a dominant element, human population density, and the means of production. Historically, Nigeria maintained such a balance until recent centuries. Low population density and limitations on population movements, stemming from insecurity caused by inter-tribal conflicts, constrained human occupation of the land and mitigated environmental impact (Oriole, 2009).

In Nigeria, the forest industry encompasses both formal and informal sectors, with products including fuelwood, charcoal, roundwood, sawn wood, wood-based panels, pulp, and paper. Economic development has spurred significant wood processing activities in the latter sector. The current demand for forest products is substantial and continually growing, potentially leading to long-term shortages. However, prioritizing the restoration of national forest coverage is paramount, surpassing the need to balance wood supply and demand. Reforestation for ecological purposes rather than purely economic gain must be a priority. The depletion of forest cover poses severe threats to agricultural production, climate stability, and living conditions. Reforestation serves as an essential initial step toward ecological rehabilitation and the initiation of new human endeavors (Kolade, 1974). Nigeria, with a total land area of 947,800 km2, has forests covering 10% of its land, harboring over 4,600 identified plant species, and ranking as the 11th most biodiversity-rich country in Africa. The nation's forests boast over 560 tree species, with densities ranging from 30 to 70 species per hectare. Some of the most popular tree species peculiar to Nigeria are Iroko (*Melicia excelsa*), Obeche (*Triplochiton scleroxylon*), Mansonia (*Mansonia altissima*), Mahogany (*Entandrophragma cylindricum*), Omo (*Cordia millenii*), Aye (*Sterculia rhinopetalia*), Afara (*Terminalia superba*), Ayinre (*Albizia lebbek*), Danta (N*esogordonia papaverifera*), and Abura (*Mitragyna ciliata*) (Kolade, 1974).

Nigeria's tree cover spans approximately 10 million hectares, with an average biomass of over 189 metric tons per hectare. Above-ground biomass accounts for 79.37%, while below-ground biomass makes up 20.63% per hectare. Teak trees dominate around 60% of the total forest coverage, while plantations cover 25%. The country boasts approximately 445 forest reserves distributed across five main ecological zones: freshwater mangrove, lowland rainforest, savanna and sahel, and Sudan savanna. Wildlife conservation areas cover over 5% of the land, distributed among these ecological zones. Nigeria's forests offer a diverse array of non-wood products and environmental benefits, including animal hunting, medicinal resources, watershed protection, hydrological stability, and carbon sequestration (Okonji, 2001). The total tree coverage in Nigeria amounts to 8.86 million hectares, representing an estimated 9.8% of the land area, while non-forest areas cover 81.5 million hectares, accounting for 90.2% of the total land area as of 2010.

Forests play a significant role in Nigeria's national gross domestic product and support the livelihoods of its people while also providing vital environmental and ecological services. Illegal logging of trees in the forested areas of Nigeria has posed a serious challenge to the environment and so underscores the need to look at the causes and effects of illegal logging in Nigeria.

Deforestation

Deforestation entails the extraction of wood from the earth's surface using various methods and techniques for diverse purposes, disrupting local ecosystems and climatic conditions. Approximately 1.6 billion people rely on forest resources for their daily needs. Tropical forests hold significant value, both nationally and internationally, yet many are being rapidly depleted, presenting a pressing concern. Deforestation and forest degradation are gradual processes exacerbating this alarming trend, particularly in developing countries, posing a major environmental challenge (Meyerson, 2004).

Illegal logging stands as a primary driver of deforestation, encompassing various illicit practices such as logging protected or endangered species, violating logging regulations, using forged permits, tax evasion, and processing wood without proper documentation (White, 2018). Unauthorized forest activities contribute to deforestation, disenfranchisement of local communities, environmental degradation, and increased fraudulent practices. The value of unauthorized logging is determined by the disparity between the total harvested wood and the legitimate consumption, with illegal logging estimated to be ten times higher than legal logging.

According to the Royal Institute of International Affairs, around $150 billion is spent annually in the global trade of wood products, but unofficial forest activities account for approximately ten times this amount globally. Various methods are employed to estimate unofficial wood cutting, including wood flow analysis, interview-based data collection, and statistical comparisons of import and export figures. The extent of unofficial wood harvesting fluctuates based on the dynamic balance of supply and demand for wood (Peck, 2001).

Gross Domestic Product Per Capita

Research suggests that there is a correlation between lower national incomes and poverty and higher rates of illegal logging (Hiller *et al.*, 2004; Alemagi and Kozak, 2010; Islam and Sato, 2012). This association is attributed to the tendency in low-income countries for people to prioritize extractive (i.e., consumptive) values of forests over non-extractive and preservation values. Consequently, individuals in economically disadvantaged nations are generally more accepting or tolerant of illegal logging activities compared to those in wealthier countries (Tacconi, 2007b). It is thus hypothesized that a nation's level of wealth is inversely related to the prevalence of illegal logging. To test this hypothesis, gross domestic product (GDP) per capita adjusted for purchasing power parity can be employed. These data, which are logged are sourced from the World Bank (2021) and expressed in constant international dollars.

Economic growth: The literature suggests two potential impacts of national economic growth on illegal logging, with the overall outcome remaining uncertain (Tacconi, 2007c; Pokorny *et al.*, 2016). Firstly, it is proposed that high rates of economic growth could stimulate domestic demand for timber and forest products, such as pulp and paper, potentially leading to an increase in illegal commercial harvesting (Pokorny *et al.*, 2016). Consequently, a positive correlation between economic growth and illegal logging might be anticipated. Conversely, high rates of economic growth, often accompanied by a proliferation of appealing job opportunities in other sectors, may draw individuals away from forest-related work, including (illegal) logging operations, typically hazardous jobs undertaken by the most impoverished individuals (Tacconi, 2007d). This suggests a negative correlation between economic growth and illegal logging. In essence, the anticipated effects of a country's economic growth rate on illegal logging are indeterminate. Data on annual GDP growth rates are sourced from the World Bank (2021).

Overview of Deforestation and Economic Growth: The transformation of forested areas into alternative economic and social purposes entails the cutting down of trees and the displacement of diverse biodiversity. These ongoing displacements have detrimental effects on the environment and ultimately impact human well-being. Deforestation stands as a widely recognized indicator of environmental degradation, with consequences extending from macroeconomic impacts to posing risks to human health. The disruption of the carbon dioxide (CO2) balance in the atmosphere due to diminishing forests has been identified as a hazard to human health (Van der Werf *et al*., 2009), and deforestation can lead to a heightened incidence of malaria (Petney, 2001). Furthermore, the subsequent occurrence of natural disasters resulting from the absence of windbreaks can escalate contingent liabilities and diminish development expenditures (Damnyag *et al.*, 2011).

The study of deforestation transcends national borders due to the influence of globalization on deforestation, particularly through the trade in natural resources. Leblois, Damette, and Wolfersberger (2017) argue that agricultural exports significantly drive deforestation, although the impact varies among countries based on their forest cover. Therefore, a global understanding of development trends is crucial for assessing deforestation patterns. Consequently, robust agricultural and forestry policies are essential to mitigate deforestation (Culas, 2012).

Forest resources offer inherent benefits like income generation and economic growth, making them prone to continuous exploitation. Inadequate policy measures to regulate this exploitation can lead to environmental issues that were previously prevented by the presence of forests (Manuel *et al.*, 2019). Recently, there has been a growing discourse on the necessity for sustainable growth, emphasizing the importance of pursuing growth in a manner that can be sustained across generations. Therefore, understanding the relationship between economic growth and deforestation is crucial for addressing environmental challenges and achieving sustainable development.

The relationship between the environment and growth has been extensively discussed in theoretical literature, notably through the environmental Kuznets curve (Kuznets, 1995). This curve suggests that economic growth initially correlates positively with environmental degradation until reaching a threshold, after which the relationship becomes negative. Additionally, it is anticipated that environmental degradation resulting from economic growth will eventually diminish due to changes in preferences and advancements in technology over time. This may be attributed to varying rates of forest consumption across countries based on their developmental stages (Ewers, 2006). Moreover, population size and distribution can influence the extent of biodiversity loss (Armenteras *et al.*, 2006). In the

Nigerian context, research on deforestation primarily focuses on its causes and effects (Ogunwale, 2015).

Identified causes include poverty, inadequate enforcement, and population pressure. However, studies investigating the relationship between deforestation and economic growth are limited, and the explanations provided vary. Ibrahim *et al.* (2015) suggest that the impact of gross domestic product (GDP) on deforestation is indirect, while Kalu and Okojie (2009) found that the exploitation of forest resources through timber export increased GDP. Nathaniel and Bekun (2019) discovered that GDP initially increases deforestation but decreases it in the long run, whereas Alege and Ogundipe (2013) found no evidence of the environmental Kuznets curve (EKC) in Nigeria regarding environmental degradation. Empirical trends indicate that net forest depletion has outpaced GDP per capita growth between 1981 and 2018 (World Bank, 2018).

Nigeria's economy relies heavily on the primary sector, particularly the exploitation of natural resources, which has been the cornerstone of economic activity with limited value addition over time. Forest resources are also utilized for economic gain, notably through timber export, which contributed to a 0.23% increase in GDP and a 13.2% rise in the timber price index between 1970 and 2000 (Kalu and Okojie, 2009). However, these economic benefits have been accompanied by excessive exploitation, leading to biodiversity loss. Additionally, factors such as urban development and expansion of agricultural lands exert pressure on forest resources in Nigeria (Nzeh *et al.*, 2015).

Another study (Ibrahim *et al.*, 2015) found that the prices of forest products and GDP indirectly influence deforestation, while population growth and poverty exacerbate deforestation, whereas education mitigates it.

Causes of Illegal Logging in Nigeria

Illegal logging in Nigeria can be attributed to several factors, including uncontrolled logging and the proliferation of unregistered small and medium-sized sawmills owned by local entrepreneurs. These factors contribute to the high demand for wood products, leading to overexploitation and the export of industrial roundwoods to countries like China and India. The significant demand for timber products in Nigeria has resulted in considerable public pressure to manage forests effectively, which has led to continuous forest loss (Aliyu *et al.*, 2012).

While the logging industry has undoubtedly facilitated the development of indigenous entrepreneurs, it has also posed challenges in regulating forest exploitation. An estimated 286,000 cubic meters of logs are lost annually due to illegal logging activities, exacerbating the problem of overexploitation (Aliyu *et al.*, 2012).

Ignorance: Many Nigerians attribute forest offenses to ignorance, perhaps because they are unaware of the ecological benefits provided by forests and therefore do not understand the importance of conserving them or the detrimental effects of illegal logging. A lack of awareness about the necessity of sustainable forest management and limited alternative livelihood options may lead individuals to engage in illegal forest activities. Rural dwellers, who often rely on illegal logging for sustenance, may not fully grasp the hazards associated with such activities (Ajala *et al.*, 2018).

Poverty: Poverty stands as a significant contributing factor to deforestation in Nigeria. The country's high poverty rate is a primary driver of illegal logging, as approximately 95% of the population relies heavily on kerosene for cooking. However, due to its high cost and scarcity, a considerable portion of the populace resorts to using wood fuel for both personal and commercial purposes. This substantial demand for wood fuel leads to widespread tree felling in rural areas on a daily basis, resulting in a significant increase in illegal logging activities (Connor, 1991). Poverty is recognized as a pervasive issue in numerous developing countries worldwide, including Nigeria, and is often characterized as a vicious cycle perpetuating hunger and malnutrition, further exacerbated by rapid population growth. The root causes of poverty are closely linked to food insecurity within the state. Food insecurity affects approximately 71% of rural households and 79% of low-income urban households, limiting their economic and physical capacity to maintain their current standard of living or withstand economic shocks. To cope with these challenges and ensure survival, community members resort to converting forest lands into agricultural areas (Orewa & Iyangbe, 2010).

Poverty is considered one of the underlying causes of forest offenses; it is argued that poor people living adjacent to forest areas fall back on forest resources for their livelihood. Timber thefts are mostly committed to satisfy the demands of local people for fuel wood and are often driven by poverty and the drive to sustain livelihoods (Ahmed, 2008). Poverty has made the struggle for survival and the struggle to meet daily needs more intense and daring. Moreso, poverty is one of the primary causes of forest offenses because the economic recession induces many people to indulge in illegal acts to get money.

Illegal trading: Inadequate management planning has resulted in harmful timber exploitation within the tropical rainforest ecosystem, negatively impacting environmental and biodiversity conservation over time. The ongoing

exploitation within this ecosystem has led to a heightened rate of timber harvesting, undermining the goals of sustainable forest management in Nigeria (Adekunle, 2005).

Policy issue: Forest governance in producer countries is characterized by significant deficiencies, with existing laws often proving inadequate in addressing concerns related to illegal logging. Factors such as limited resources, weak institutions, and lax regulations have contributed to ineffective law enforcement and a lack of proper land use management. Moreover, many countries suffer from unclear and poorly defined legal frameworks, with some laws even being contradictory. These combined issues create numerous gaps in forest management and governance, making it challenging for formal systems to effectively enforce laws aimed at curbing illegal logging. This situation provides opportunities for businesses and individuals to exploit these gaps and engage in activities such as overharvesting.

In Nigeria, forestry is undergoing a period of transition, necessitating the implementation of a functional system by the Ministry of Environment to promote forest investment, considering the economic and ecological benefits of forests. This highlights the crucial role of the government in incentivizing individuals and private organizations to invest in forestry, including through the imposition of bans on the export of forest products to mitigate the influence of demand on investment decisions in the forest industry. Additionally, the government's role includes the introduction of forest policing to support effective forest legislation enforcement. Moreover, policymakers in forestry need to undergo extensive education on the multifaceted aspects of sustainable forest management, encompassing ecological, economic, social, cultural, and political factors.

IMPACT OF ILLEGAL LOGGING IN NIGERIA

Deteriorating Living Conditions of Indigenous Communities: Because of illicit logging, indigenous groups and people living nearby frequently confront a variety of difficult circumstances. Such actions damage their cultural legacy in addition to upsetting their customs and means of subsistence. Their ability to obtain necessary materials is put in jeopardy when forests disappear, endangering their survival. Furthermore, some people's only source of income is the forest; this forces them into a cycle of reliance on illicit logging, which is similar to modern-day slavery and further isolates them from their cultural roots (Gutman, 2001).

Global Warming and Climate Change Impacts: Illegal logging exacerbates global warming and climate change by destroying trees, which are essential carbon sinks and climate regulators. This practice increases global temperatures and reduces the amount of forest cover, making large areas more vulnerable to extreme weather. Unauthorized forest clearing for the purpose of logging contributes around 11% of carbon emissions, which worsens the effects of global warming.Illegal logging exacerbates global warming and climate change by cutting trees, which are essential carbon sinks and climate regulators. This practice increases global temperatures and reduces the amount of forest cover, making large areas more vulnerable to extreme weather. The unauthorized cutting down of forests for the purpose of extracting timber is responsible for roughly 11% of carbon emissions.

Biodiversity Decline: The richness of forest ecosystems is seriously threatened by the clearing of forests for illicit logging purposes. Widespread biodiversity loss results from the disturbance of natural environments, which impairs the interconnectedness necessary for the existence of several species. Many plant and animal species are in danger of going extinct due to the massive deforestation and fragmentation that has occurred in these areas. According to current estimates, the pace of species extinction is alarming and ranges from one to ten species every year. This rate is equivalent to the loss of biodiversity in the past caused by catastrophic events like huge volcanic eruptions (Poore, 1989).

Economic Losses: The illegal logging industry, which destroys over 500,000 hectares of forest annually, is the main cause of the growing dangers to Nigeria's forests (Poore, 1989). Officials from the government acknowledge that widespread illicit exploitation occurs throughout the nation and involves both forest reserves and unreserved forest areas, leading to revenue loss. Consequently, illegal logging poses the risk of depleting high-value timber species if access to these resources is not effectively regulated by mandated institutions. The forest holds significant potential for revenue generation, and its destruction translates to government revenue deprivation. Without addressing the issues of illegal exploitation, efforts to promote sustainable forest management investments are likely to remain ineffective, resulting in economic losses (FAO, 2003).

In addition, illicit logging causes financial losses that affect the employment and profit prospects that could arise from the forest's resources, which include plants, animals, timber, natural resources, and medicinal herbs. According to Ogundele & Oladipo (2016), Nigeria's annual loss of forest cover is estimated to be worth US $750 million at 1989 prices. Illegal logging has numerous negative effects on the environment, but it can also harm the economy of developing countries. It is estimated that illegal logging reduces worldwide timber prices by 7% to 16% yearly, costing the world's economy between $15

billion and $20 billion. Governments in developing nations lose money on taxes, levies, and other costs related to stopping illegal logging.

Additionally, illicit logging causes financial losses that affect prospective earnings and job prospects from forest resources, such as plants, lumber, and other natural resources. In addition, illicit logging causes financial losses that affect the employment and profit prospects that could arise from the forest's resources, which include plants, animals, timber, natural resources, and medicinal herbs. According to Ogundele and Oladipo (2016), who reported that Nigeria's annual loss of forest cover is estimated to be worth US $750 million at 1989 prices. Illegal logging has numerous negative effects on the environment, but it can also harm the economy of developing countries. It is estimated that illegal logging reduces worldwide timber prices by 7% to 16% yearly, costing the world's economy between $15 billion and $20 billion. Governments in developing nations lose money on taxes, levies, and other costs related to stopping illegal logging. Also, driven by the depletion of invaluable resources, these losses could have substantial long-term impact on the economy in addition to their immediate effects on revenue.

Socio-Economic Impacts: Deforestation is causing indigenous tribes in many parts of the world to have fewer rights to hold forest land, which puts a great deal of pressure on these populations to move to more crowded areas. Extremely ambiguous land ownership structures intensify the clash between the interests of the wood sector and local populations (Izursa *et al.*, 2015). In many parts of the world, illegal logging and forest degradation are commonplace. Large-scale illicit logging has a number of socioeconomic negative effects, such as desertification, drought, loss of traditional cultures, increased runoff, financial losses, reduction of soil fertility, breaches of human rights, and an increase in homelessness (Reboredo, 2013).Deforestation is causing indigenous tribes in many parts of the world to have fewer rights to own forests, which puts a great deal of pressure on these populations to

The profits generated from these illegal activities may finance national or regional conflicts, as observed in countries such as Myanmar, Cambodia, Liberia, the Democratic Republic of Congo, and various other regions globally (TEFSO). In Indonesia, conflicts related to timber exploitation can result in property damage, injuries, and even fatalities. The rapid economic growth of China is exerting significant pressure on wood consumption, driven by the extensive importation of timber and the expansion of plantations (Nazir & Olabisi, 2017).

Enforcement Mechanism against Illegal Logging in Nigeria: Deploying qualified, experienced, and competent officers within enforcement teams might improve the efficiency of forest law enforcement, especially when interacting with illegal loggers who may use impromptu strategies to avoid capture (Rhodes *et al*., 2006). To ensure sustainable harvesting techniques and stop illicit activity in forests, effective enforcement of forest laws is crucial. Proactive actions, such tracking adherence to legislation pertaining to forests and bringing legal action against offenders, can be implemented with strict enforcement protocols. Enforcement teams are responsible for monitoring the area for suspicious activity, investigating crimes, apprehending offenders, and obtaining vital evidence for prosecution. For law enforcement to be more successful, coordination between the various enforcement agencies at the federal level must be improved. This will allow for better strategic planning of enforcement operations to prevent, detect, and combat forest crimes more efficiently (Lawson, 2010).

Moreover, the public and non-profit organizations might have to be involved in order to improve forest law enforcement. These groups can work with government agencies, enforcement teams, and legislative bodies to prevent unlawful logging. In policy and regulatory frameworks, taking into consideration customs, conventions, and the rights of forest inhabitants and groups that rely on forests is equally vital. By including those components, initiatives to manage forests sustainably can benefit from the active involvement of people and organizations.

CONCLUSIONS AND RECOMMENDATIONS

The review indicated that there is minimal compliance with forest laws and policies, even in spite of the relative awareness of the financial losses linked to illegal wood activities to national security and income production in Nigeria. The recommendations below are based on the complexity of the issue of illicit logging's influence on Nigeria's GDP, which includes social, economic, and environmental factors.

Strengthen the application of current forestry management and illicit logging laws and regulations. This can entail stepping up patrols in wooded areas, toughening up on the punishments for illicit logging, and enhancing law enforcement agency coordination.

- The local populations that reside close to wooded regions are involved in sustainable forest management. In order to decrease the dependency on illicit logging as a source of income, promote community involvement in the monitoring and reporting of illegal logging

activities and offer substitute livelihood options.

- Improving the forestry sector's willingness and governance to reduce crime and corruption. Reforms in the licensing, monitoring, and tax collecting procedures for forests may be necessary to guarantee accountability and reduce chances for illicit logging.

- Promoting sustainable forestry practices among timber industry stakeholders, including logging companies and timber traders. This could include promoting certification schemes such as the Forest Stewardship Council (FSC) to incentivize responsible forest management and provide market access for sustainably sourced timber products.

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Authors' Contribution

OSA, ONAO, ALA & ROO managed the data collection, collation and writing of the manuscript. AOO managed the development and reviewed of the article.

Ethical Statement

Not applicable

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