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Pattern of Environmental Degradation and Associated Health Implications in Osun State, Nigeria

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Abstract

Environmental degradation poses significant challenges to sustainable development, particularly in Osun State, Nigeria, where mining activities, improper waste disposal, and land deformation have increased ecological and public health crises. This study investigates the spatial patterns of environmental degradation and the resulting health implications in Osun State. Employing an integrated methodological framework, the study utilizes Global Positioning System (GPS) for spatial mapping, Normalized Difference Vegetation Index (NDVI) for monitoring vegetation changes, field observation for physical assessment, and questionnaire administration for collecting residents' perspectives. Four Local Government Areas were selected in each of the three Senatorial Districts in Osun State making a total of twelve (12) Local Government Areas (LGAs). One hundred adult subjects in each of the LGAs were selected and interviewed. Data collected were analyzed using descriptive and inferential statistical tools to identify trends, relationships, and the significance of observed phenomena. Results indicate that artisanal mining, prevalent in areas like Ilesa and Ife, has resulted in land scarring, water contamination, and air pollution, leading to respiratory illnesses, waterborne diseases, and other health challenges. Improper waste disposal in urban centers such as Osogbo contributes to soil degradation and the proliferation of vector-borne diseases. Furthermore, land deformation, including gully erosion in areas like Ede and Ilesa, has led to habitat loss, displacement of residents, and further environmental instability. NDVI analysis revealed significant vegetation loss over the past decade, corresponding to intensified mining and urban expansion activities. Also, river channels across the study area are more degraded as revealed during field observation conducted across the study area. Implication of mining, waste disposal, pollution and deforestation is obvious on the health of people in Osun State. Residents acknowledge occurrence of environmental-related health issues like Cholera, Dysentery, Malaria, Cough. More than Seventy percentage (70.2%) survey responses revealed limited access to healthcare and inadequate policy enforcement as major barriers to mitigation. The study concludes that the pattern of environmental degradation in Osun State is driven by human activities and exacerbated by insufficient regulatory frameworks. It recommends the implementation of stricter environmental policies, community sensitization, and sustainable practices to mitigate environmental degradation and its associated health risks. This research contributes to the growing body of knowledge on environmental management and public health in developing regions, providing a foundation for evidence-based interventions.

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Keywords: Environmental Degradation, Pollution, Residents' Perception and Health Implications.

1. Introduction

Environmental degradation is not new and in the recent years has become a global challenge (Intergovernmental Panel on Climate Change (IPCC), 2018). Danlami et al, (2018) state that over the past decade, carbon emissions (CO2) worldwide have been growing to the extent of deteriorating the ecosystem, habitat, economic performance and development in both advanced and emerging countries.

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In addition, carbon dioxide emissions from both industrialized and emerging countries grow at 1.3 % annually, and it is projected to be double by the year 2030, if control measures are not put in place (IPCC, 2018). Also, Talibet al, (2021) reported that the rapid growth in industrialization and urbanization has adversely affected the ecological balance and agricultural activities due to environmental degradation and climate change. Castells-Quintana and Wenban-Smith (2020) argued that urbanization is now a sign of the times, and urban-rural migration which started in the developed nations has gradually reached developing nations, and many people have moved to cities in hopes of better, more prosperous ways of living. Walther (2021) stated that urban growth was further escalated by a combined improvement in technologies, sanitation and medical services, which caused both mortality and birth rates to decline, while net population increased. The increasing human population in many urban areas appears to put some level of pressure on many aspects of urban life. it is now estimated that by 2050 (68%) of the world's population will live in urban areas (UN, 2018) . Many studies have argued that, various factors such as population growth, energy consumption, urbanisation, and urgent need for both industrialised and developing countries to pursue higher economic growth and development, are the main causes of environmental degradation (Sehrawat, Giri, & Mohapatra, 2015). However, economic development does not only bring prosperity for people but it alsocomes with its own damages to the environment, which includes pollution of air, water and soil.

Environmental degradation is a growing concern globally, particularly in developing regions where rapid urbanization, industrialization, and unsustainable practices often compromise environmental integrity. Osun State, Nigeria, is no exception, as various human activities, including artisanal mining, improper waste disposal, and land deformation, have significantly impacted its environment. These activities alter the natural landscape, deplete biodiversity, and deteriorate the quality of air, water, and soil. Consequently, these environmental changes pose severe threats to public health, ranging from respiratory and waterborne diseases to mental and social well-being challenges.

In Osun State, mining activities, particularly in Ilesa and its environs, have led to land degradation, deforestation, and contamination of water sources by heavy metals. Similarly, the proliferation of waste in urban centers such as Osogbo contributes to unsanitary living conditions and increases the prevalence of diseases caused by rodents and other vectors. Land deformation, particularly through gully erosion, disrupts local ecosystems, destroys farmland, and displaces communities. Despite these pressing challenges, limited studies have holistically examined the patterns of environmental degradation in Osun State and their associated health implications.Understanding these patterns is crucial for designing effective policies and interventions to mitigate their impacts. This study employs a combination of geospatial techniques, such as Global Positioning System (GPS) mapping and Normalized Difference Vegetation Index (NDVI) analysis, alongside field observations and questionnaire administration. These methods aim to identify the spatial distribution of degradation, quantify its extent, and explore its correlation with health outcomes in affected communities.

This paper seeks to bridge the knowledge gap by providing a comprehensive analysis of the interplay between environmental degradation and public health in Osun State. By doing so, it offers evidence-based recommendations to guide sustainable environmental management practices and public health strategies in the region.

2. Materials and Methods

The Study Area

Osun State as a political entity came into being on the 27th of August, 1991 when it was carved out of the old Oyo State. Osun State is made up of 30 Local Government Areas (Figure 1). It is located on latitudes 6o N and 8o001N of the equator and between longitudes 4O051and 50021E east of the Greenwich Meridian. The state covers a land area approximately 8,602 km2. It is bounded in the north by Kwara State, in the south by Ogun State, in the west by Oyo State, in the east and north west by Ondo and Ekiti State respectively (Figure 1). A reconnaissance survey involving dedicated trips were made with the aid of tour guard across each of the selected local government area. Visual observation of river banks in terms of river bank degradation were made, pictures of some areas of obvious land degradation were taken and residents in the observed areas were interrogated to account and to justify the observed pattern.

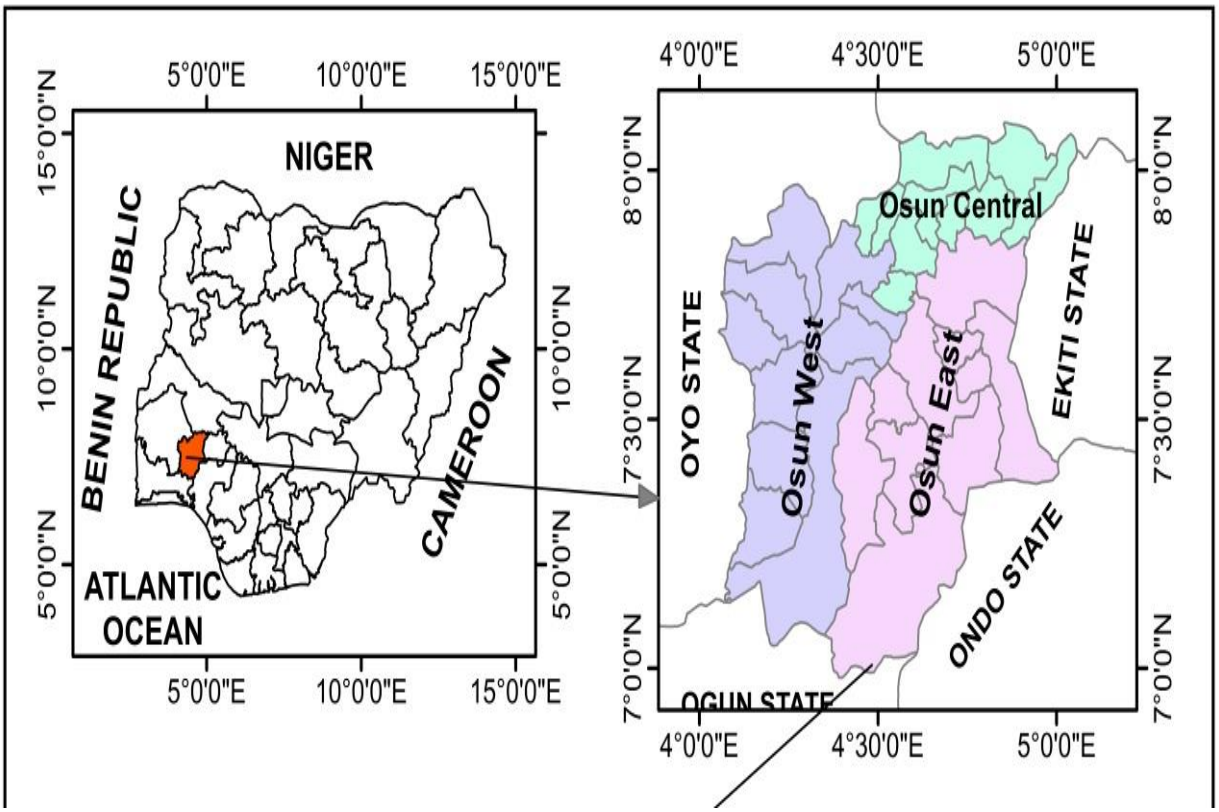


Figure 1: Map of the Study Area
Source; Field Work 2024

This research work by its nature was informed by concurrent mixed method research designs that include quantitative and qualitative data. The quantitative data was captured through a structured. geographic information system while qualitative data include focus group discussion and interviews. Global Positioning System GPS was used to capture the geographic coordinates of areas of obvious environmental degradation across the study area, two types of structured questionnaire were administered. Section A of the questionnaire seeks data on the social- demographic characteristics of the respondents; Section B and C contain questions on pattern of environmental degradation and associated health implications while Section D explained data on possible ways of striking balance in man-environment interaction.

A set of questionnaire for the residents' perception of environmental degradation and associated health implication while the second set of questionnaire were administered to staffs of ministries of environment and of health in the state. Four local government areas were selected in each of the three senatorial districts in Osun State making a total of twelve (12) local government areas. One hundred adult subjects in each local government area were selected and interviewed. Purposive sampling was adopted to select long-stayed residents between 30 years and above. Secondary data include multi – dated (1991, 2001 and 2021) landsat imageries. Data were analyzed using geographical information system, descriptive and inferential statistics**.**

3. Results and Discussion

Degradation of the environment refers to the breaking down of ecosystems, the loss of wildlife, and the depletion of natural resources such as soil, water, and air (Tyagi et al., 2014) as observation during the tour across the state showed that the primary cause of environmental degradation is human disturbance. The degree of the environmental impact varies with the cause, the habitat, and the plants and animals that inhabit it. Humans and their activities are a major source of environmental degradation. The major cause of environmental pollution is modern urbanization, industriali-

zation, over-population and deforestation etc. Environmental pollution refers to the degradation of quality and quantity of natural resources. Different kinds of the human activities are the main reasons of environmental degradation. This has led to environmental changes that have become harmful to all living beings.

According to a 2010 in habitat report, African is the continent that is urbanizing the factors with cities like xauro, Lagos, Nairobi and kinsgasua among others (UN, 2018). This outcome is evidence of the third world countries' explosive growth rate. The provision of urban infrastructure services to stop the spread of urban slums is impacted by the extremely rapid urbanization of our cities. Therefore, among other social services needed in urban communities, urban garbage management is impacted by cities' increasing expansion. Figure 2 showed the dumpsites in Osun State and the pattern of the spread of dumpsites across the state with more concentration in the northern part than the southern part.

The lack of adequate social services, such as safe housing and access to clean water, in Osun State (Ogunbode T.O & Ifabiyi I.P., 2022) and other urban communities has led to ineffective solid waste management, leaving the study area littered with waste dumps that are eventually covered in flies, which serve as a breeding ground for disease-carrying mosquitoes, rodents, and flies Ogunrinola and Adepegba (2020). As opposed to the southern portion of the state, the Figure 2 shows that the northern portion of the state has more waste disposal sites. This surggests that the upper region will see higher levels of air pollution than the southern region. Study by Ogunrinola and Adepegba (2020) corroborates the finding in this research that one of the main sources of pollution, which is connected to the health status, is the dumpsite. Northern part of Osun State with the highest number of dumpsites tends to be more polluted than the Southern or North Eastern part (Figure2). Also, different pattern of Vegetation degradation as revealed by the NDVI results of (1991, 2001, 2011 and 2021) is presented in Figure 3. Four optical data sets comprising Landsat OLI (2021) Landsat EMT (2011) and Landsat TM (1991) were utilized for the composition of NDVI for four epochs (1991, 2001, 2011, and 2021). Figure 3 shows the NDVI result in map format for the study area. The index values ranged from -0.9799381 to 0.589231 in 1991, 0.955517 to -0.947857 in 2001, -0.544149 to 0.0544001 in 2021 with greater extent of the study area having positive index values.

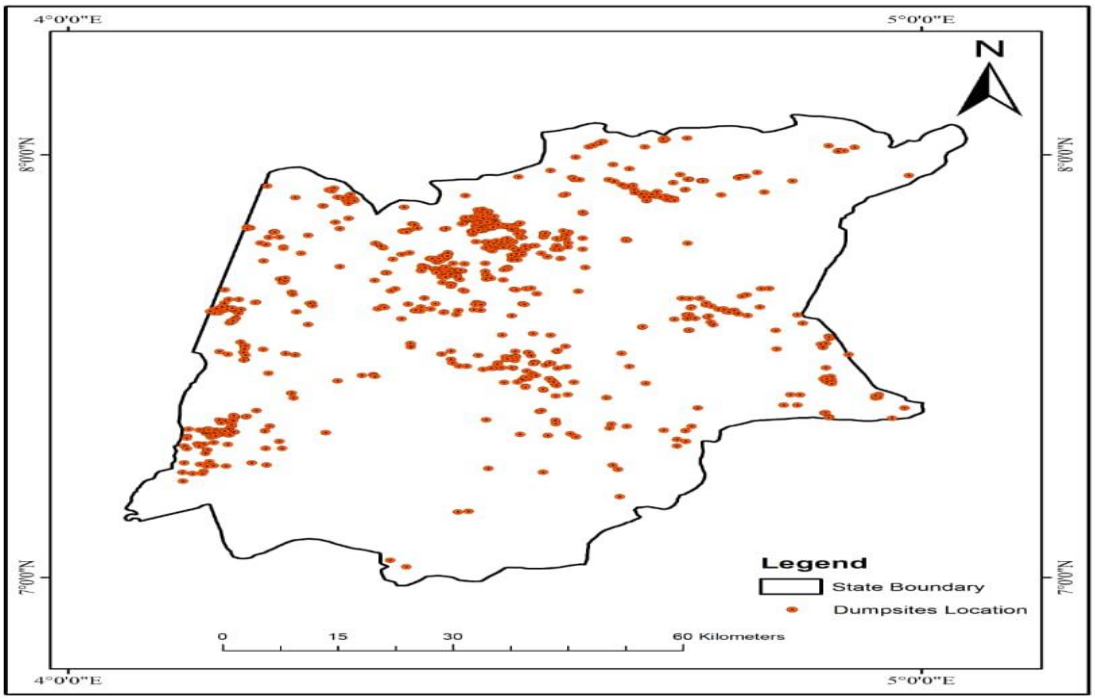


Figure 2: Map showing the dumpsites in Osun State
Sources: Field work 2023

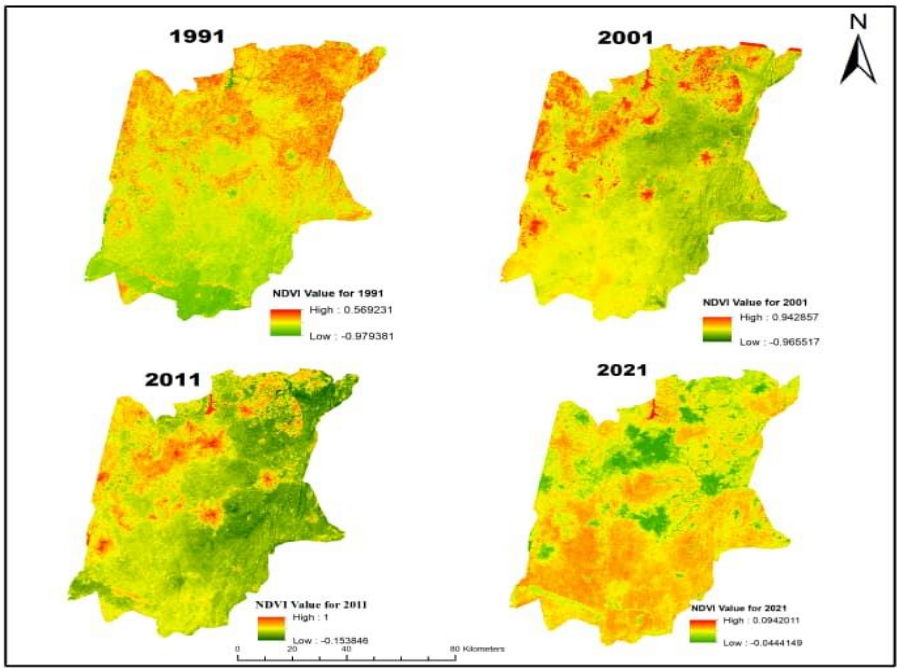


Figure 3: NDVI results of 1991, 2001, 2011 and 2021 showing pattern of vegetation degradation
Sources: Field work 2023



Plate 1: Water Channel Filled with Wastes dump along Osun River at Osunjela
Source: Field work 2023

Wastes dump along river channels is another pattern of environmental degradation noticed during the observation tour across the study area most of the water channels in the urban area has been converted to dump site by the residents. This is considered to be injurious to man's health and a terrible form of environmental degradation (Plate1). Orimoogunje (2014) noted that this can smother aquatic habitats, reduce water quality and alter the physical structure of riverbeds. Also, construction activities near river banks as observed in some places in the study area can disturb the soil further exacerbating erosion and sedimentation issues. These will definitely lead to contamination of water Olayungbo (2015) claimed that industrial and domestic waste water pollution is a factor responsible for eutrophication as a result of heavy metals, and toxic substances. Without doubts, plastic pollution with waste materials like plastic bags, bottles and micro plastics accumulating in the water bodies and thermal pollution from industrial processes that release heated water will definitely affect the aquatic life in the study area. It is obvious in some places especially along the course of major rivers in the study area as observed during the field work that deforestation, urban development and wetland agriculture increases soil erosion leading to higher sediment loads in rivers. This is evidenced in places like River Osun Bank at Osunjela.

An important pattern of environmental degradation discovered in the study area is environmental degradation along rivers/streams. This was noticed during the initial reconnaissance survey. Pattern of environmental degradation along rivers and streams vary significantly across the study area as a result of multiple factors such as geographical location, geological / mineral content of river bank, human activities and natural processes. However, the following are the common pattern as observed during the field work.

Pollution: This is one of the most prominent forms of environmental degradation along the streams in the major cities in the study area. Most of the rivers that drained Osogbo, Ilesa, Ife, Ede, Iwo and Ikirun serve as dumping sites in the core areas of the city. Industrial discharges are noticed in some places for instance, river Osun serves as dumping site for residents throughout it course in Osogbo, likewise Asoro stream in Ilesa that receives brewery waste and other domestic wastes likewise Opa River in Ile – Ife.

As revealed by the findings of this study, environmental degradation in Osun State manifests in several interconnected patterns influenced by both natural and anthropogenic factors considering deforestation and loss of biodiversity. Rapid urbanization in Osun State has also led to the conversion of forest and agricultural land into residential and commercial areas. Paul Ehrlich (2003) viewed over-population as a primary driver of environmental degradation. In Osun State as noted in this study, increasing population intensifies pressure on natural resources, leading to deforestation, soil erosion and water pollution. Therefore, the patterns of environmental degradation in Osun State, including deforestation, soil erosion water, waste disposal, pollution urbanization, and climate change, are deeply inter-wined with population growth and unsustainable practices. The views and theories of various authors provides valuable insight into these patterns and their underlying causes.

In rural or resource-dependent communities, perceptions tend to focus on the degradation of natural resources, where rapid population growth leads to deforestation, soil depletion and reduced biodiversity. These communities often express concerns about unsustainable resource use and the long-term viability of their ecosystem. Programme such as Community Based Natural Resource Management (CBNRM) has been explored as ways to address these concerns, integrating both environmental conservation and community development (Iranola 2018). In rapidly growing cities population expansion often exacerbates environmental degradation. In cities like Dhaka and Bangladesh rapid urbanization has led to severe environmental issues including deforestation, air pollution and the degradation of wetlands. A case study from Dhaka highlight residence growing concerns over environmental decline with Urban sprawl being a significance contribution to waste pollution and loss of green space Washington and Kopnina (2022).

Health Implication of Environmental Degradation in Osun State

The implication of waste disposal, mining, pollution and deforestation is obvious on the health of people in Osun State. Different types of health challenges are experienced by inhabitant of Osun State. It is evident from Table 1 that 45% of the respondents indicated that they have experienced malaria infection within the last one year. This can be attributed to the fact that blockage of drainage channel in the urbarn regions in the state impedes the free flow of water thereby serving as breeding grounds for mosquitos which is malarial carrying agent and other vectors of disease which are harmful to human health. Also, 40% of the respondents indicated that they have dysentery within the last one year, 13%

of the respondents indicated that they have Cholera and 2% indicated that they have cough. In addition, gold mining along the stream has been confirmed to be another source of water pollution as mercury and other heavy metals generated through gold wash are factors of water pollution (Al Jazeera, 2022) in the area.

Table 1: Health Challenges of the respondents

Diseases	Population	Percentage (%)
Malaria	527	45
Dysentery	513	40
Cholera	167	13
Cough	27	2
Total	1284	100

4. Conclusion

The pattern of environmental degradation identified in Osun State include waste disposal, mining, pollution, deforestation and land deformation as observed during the observation tour across the study area. The study concludes that the pattern of environmental degradation in Osun State is driven by human activities and increased by insufficient regulatory framework. It therefore recommends the implementation of stricter environmental policies, community sensitization and sustainable practices to mitigate environmental degradation and its associated health risks. This research contributed to the growing body of knowledge on environmental management and public health in developing regions providing a foundation for evidence based interventions

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