

URBANIZATION AND ENVIRONMENTAL DEGRADATION: A SOCIOLOGICAL ANALYSIS OF METROPOLITAN KANO, NIGERIA

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ABSTRACT

Keywords:

Urbanization, Environmental Degradation, Metropolitan Kano, Waste Management, Governance Policy.

Original research



This paper provides a comprehensive sociological explanation of the nexus between urbanization and environmental degradation in Metropolitan Kano, Nigeria. As urban expansion increases in this rapidly growing city, environmental challenges have also intensified, affecting air and water quality, waste management, deforestation, and resource depletion. The primary aim is to analyze the sociological implications of urbanization on environmental degradation while evaluating the effectiveness of policies and governance. Using a systematic literature review (SLR) methodology, this research analyzes 33 scholarly articles, focusing on themes such as pollution, waste management, and urban governance. The findings reveal significant environmental degradation linked to industrial emissions, improper waste disposal, deforestation, and inadequate waste management. Poor governance, weak institutional structures, and policy failures have further exacerbated these issues, affecting low-income communities. The study concludes that the unregulated growth of Kano poses a serious environmental threat, which requires urgent policy reforms. Recommendations include strengthening environmental governance, enhancing waste management systems, reforestation, and enforcing stricter air and water quality regulations. Moreover, public engagement and urban planning reforms are crucial to mitigating further degradation and fostering sustainable urban development.

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1. INTRODUCTION

The proliferation of cities worldwide is a clear indication of the urbanization trend, which transforms these cities and brings several latent environmental consequences, particularly in developing countries. Metropolitan Kano, a megacity in northern Nigeria and a hub of commercial and industrial activities in the region, is one of the rapidly growing cities in Africa. Kano is the largest and most populous city in West Africa (Coleman, 2022). It faces multifaceted environmental challenges resulting from

uncoordinated human activities, such as deforestation and the disturbance of open spaces (Okopi, 2021).

Urbanization leads to the growth and development of cities due to large-scale industrialization and economic advancement, which, in turn, results in changes in urban specializations, the division of labor, and human behavior (Sivakkolundu & Sujatha, 2018). It has been identified as a key cause of numerous environmental problems, including air, water, land, and noise pollution, deforestation, climate change, and traffic congestion, among other issues. The rapid urbanization of Nigerian

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cities, particularly Kano, has brought about significant environmental challenges, compounded by weak governance and ineffective policies (Okopi, 2021; Winter & Ujoh, 2020).

Inefficient waste management, poor air quality, and inadequate urban planning are direct results of institutional failures, policy constraints, and limited funding (Winter & Ujoh, 2020; Chima, 2020). Nigeria's environmental governance system is further hindered by unenforceable laws, weak institutional structures, and limited public participation (Ogunkan, 2022). The importance of the environment to human existence cannot be overstated. Scholars across various fields have extensively studied the changing nature of human activities on the environment. However, the present time calls for a more critical reassessment of the impact of urbanization on the environment, particularly on natural ecosystems (Falaki & Nasidi, 2021).

The purpose of this paper is to review existing studies on the environmental impacts of urbanization in metropolitan Kano, focusing on sociological aspects such as human-environment interactions, governance, and the role of public policy.

1.1 Review methodology

This paper adopts the systematic literature review (SLR) method to identify and analyse studies that address the relationship between urbanization and environmental degradation. Relevant literature was sourced from online databases such as Google Scholar, JSTOR, ResearchGate, and Semantic Scholar. The search terms used included "urbanization," "environmental degradation," "Kano," "waste management," "water scarcity", "deforestation", "loss of green space", "climate change", and "pollution." Only peer-reviewed articles, and academic studies published strictly within the last 10 years were included in the review. A total of 33 articles were selected based on their relevance to the sociological aspects of urbanization and the environment in Kano. The literature was categorized into thematic areas, including air quality pollution; waste management and environmental stress; water scarcity and resource depletion; deforestation and lost of green space; climate change and urban vulnerability; population growth and social inequality; urban planning, governance and policy failure.

1.2 Objectives of the Study

The study aims to provide a sociological analysis of the impact of urbanization on environmental degradation in Kano. It specifically seeks to examine the sociological implications of urbanization on environmental degradation in metropolitan Kano. The study also aims to identify the main environmental challenges caused by the urbanization process, as highlighted in the literature. It will also evaluate the effectiveness of existing policies and governance structures in addressing environmental issues in Kano and propose areas for further research and policy interventions to mitigate environmental degradation. Moreover, this article aims to contribute to

the discussion on the consequences of urbanization on the environment in Nigeria's urban centers.

1.3 Significance of the study

Metropolitan Kano is home to over 5 million people, who have, over the years, experienced the challenges of environmental degradation brought about by the urbanization process. Understanding the relationship between urbanization and environmental degradation in Kano is crucial for developing sustainable urban policies. Without a clear understanding of this relationship, the city will continue to grapple with environmental challenges in the face of rapid urbanization and complex climate changes. While previous studies have addressed individual environmental challenges in Kano, there is a lack of a comprehensive sociological analysis that ties these issues together. This review aims to bridge that gap by synthesizing available literature and providing a broader sociological perspective on urbanization and environmental degradation. The findings are expected to inform policymakers, urban planners, and environmental advocates in their efforts to promote sustainable urban growth.

2. THEMATIC LITERATURE REVIEW

This section presents the key themes identified from the literature on urbanization and environmental degradation in Kano.

2.1 Air Quality and Pollution

Urbanization in metropolitan Kano has significantly increased air pollution, mainly due to rising vehicle use, industrial emissions, and unregulated activities (Abdullahi et al., 2023; Oji & Adamu 2021). Studies show that carbon monoxide (CO) and carbon dioxide (CO₂) levels vary by area, with some localities facing intense pollution, both outdoors and indoors (Abdullahi et al., 2023). GIS mapping has identified industrial zones like Bompai, Sabon Gari and Sharada as pollution hotspots with tremendous health concerns (Oji & Adamu 2021).

In low-income areas, the widespread use of firewood, kerosene, and charcoal for cooking has also led to serious indoor air pollution. Prolonged exposure to these pollutants poses serious health risks. This is similar to patterns observed in other cities such as Port Harcourt and Ilorin (Weli et al., 2021; Abdul Raheem et al., 2022). Furthermore, a study by The Colonist Reporters Africa revealed that industrial areas like Challawa, Sharada, and Bompai in Kano Metropolis release excessive ammonia into the air and nearby waterways which contribute significantly to environmental and health problems for surrounding communities (Kevin-Alerechi, 2024).

2.2 Waste Management and Environmental Stress

The rapid urbanization in Kano has led to improper waste disposal which contributes to environmental degradation. As the city's population grows and living standards

change, waste generation has also increased, straining the current waste management systems (Ali et al., 2017; Dharwal et al., 2022). A study by Umar & Naibbi (2021) reveals that only 26% of existing solid waste disposal sites in Kano are suitable, while 74% are unsuitable. This poor waste management contributes to the degradation of the environment, affecting living conditions of the urban dwellers.

Abdullahi et al. (2023) explored the impact of urban expansion on water pollution in metropolitan Kano, focusing on historic ponds such as Hauran Wanki and Shema. Their findings showed high levels of suspended solids, salinity, and pollution from solid waste and sewage discharge, further emphasizing the environmental stress caused by improper waste disposal. Another study also revealed that out of 300 waste disposal sites, 80% are located near roads, settlements, or water bodies, while 92% remain open dumping sites (Naibbi & Umar, 2017), increasing the risks of environmental contamination.

In addition, the analysis of water samples from boreholes, taps, and wells across Kano's 8 municipal L.G.A.s indicated dangerous levels of heavy metals, particularly Chromium and Lead, exceeding WHO standards (Dabo & Saleh, 2017). This contamination, largely due to corroded brass fittings and sewage seepage, poses severe public health threats which highlights the urgency of addressing waste and water management issues in Kano.

2.3 Deforestation and Loss of Green Spaces

Urban expansion in Kano has led to significant deforestation and a loss of green spaces, negatively affecting air quality and biodiversity. This rapid development has transformed agricultural and forest lands into residential and commercial areas, often without proper environmental planning. As a result, important green spaces that help maintain air quality and ecological balance have diminished.

Research by Buba et al. (2021) emphasized the importance of urban trees in Kano. Areas with dense tree cover were found to have fewer pollutants and cooler temperatures compared to areas with less vegetation. This difference highlights the role trees play in improving air quality and reducing pollution, which ultimately benefits public health.

Additionally, the rising number of buildings in Kano has contributed to the decline in vegetation cover. Idris (2022) observed a strong inverse relationship between vegetation density and building density, illustrating how urban growth has led to the loss of green spaces, thereby worsening environmental degradation.

Increased urbanization and deforestation have also heightened the risk of flooding in the city. Mukhtar et al. (2020) emphasized that following Kano's master plan and constructing proper drainage systems could help alleviate flood risks by addressing the loss of green areas and increasing impermeable surfaces.

2.4 Water Scarcity and Resource Depletion

Rapid population growth and urbanization have intensified water resource challenges in Kano Metropolis, creating a significant gap between water demand and supply. Currently, the city's water demand is around 550 million liters per day, but only 200 million liters—about 36%—can be supplied (Bello & Abdullahi, 2014). This shortfall forces heavy reliance on alternative sources such as groundwater and water vendors, with sachet water being a common drinking source for many residents (Suleiman, 2020).

Moreover, this increasing demand, coupled with the effects of climate change, is expected to severely reduce water availability. By 2050, downstream water resources, which is the main source of water, could decrease by 70%, leaving the city's water needs far exceeding the available supply (Ahmad & Haie, 2018). According to Kankara and Farouk (2018), insufficient water treatment facilities, frequent power failures, and funding shortages further aggravate Kano's water scarcity, making it difficult for the supply to meet the growing demand.

2.5 Population Growth and Social Inequality

Rapid population growth and rural-urban migration in Kano have spurred significant environmental and social challenges. Urban sprawl has resulted in deforestation, the disruption of wildlife habitats, and the encroachment upon cultural heritage sites (Özden et al., 2021). This expansion has also reduced green spaces, with a notable negative correlation between vegetation density and built-up areas, exacerbating environmental pressures (Idris, 2022). These pressures include increased land imperviousness, overburdened infrastructure, and the degradation of natural ecosystems (Idris, 2022; Nasidi, 2022).

To address these issues, the Kano State government has introduced urban development laws and established agencies such as KASEPPA and KNUPDA to mitigate the effects of rapid urbanization (Nasidi, 2022). Despite these efforts, inequality remains evident in waste management. Approximately 180 waste disposal sites exist across the metropolitan area, many of which are concentrated in slums and impoverished neighborhoods. Unfortunately, most of these sites are unauthorized and unregulated, primarily due to inadequate waste collection coverage (Ali et al., 2017). This highlights the socio-environmental disparities in Kano, where poorer communities bear the brunt of environmental neglect.

2.6 Climate change and urban vulnerability

The city of Kano faces mounting climate change challenges exacerbated by rapid urbanization. Between 1986 and 2018, the city expanded from 39.2 km² to 256 km², accompanied by a temperature rise of almost 2°C (Mohammed et al., 2019). This expansion worsened vulnerability to climate risks such as flooding, especially in informal settlements lacking adequate municipal support (Barau & Wada, 2021).

Climate records from 1960 to 2007 indicate a warming trend, with more frequent hot days and longer warm

spells, along with an increase in extremely wet days (Gbode et al., 2015). These changes are likely to raise energy demand for cooling and evaporation, placing additional stress on urban resources. Poor urban communities, particularly those in informal settlements, are disproportionately affected by floods and droughts, and this vulnerability is expected to worsen with future climate scenarios (Winsemius et al., 2018).

2.7 Urban Planning, Governance and Policy Failure

The rapid urbanization of Nigerian cities, particularly Kano, has brought about significant environmental challenges, which are compounded by weak governance and ineffective policies (Okopi, 2021; Winter & Ujoh, 2020). Inefficient waste management, poor air quality, and inadequate urban planning are results of institutional failures, policy constraints, and limited funding (Winter & Ujoh, 2020; Onwuanyi & Chima, 2020). Nigeria's environmental governance system suffers from unenforceable laws, weak institutional structures, and limited public participation (Ogunkan, 2022).

These inadequacies lead to unregulated urban spaces, inadequate urban services, and worsening environmental problems, such as air pollution, flooding, and poor sanitation (Onwuanyi & Chima, 2020). Furthermore, the current waste management systems in Kano are disorganized, with insufficient collection and disposal facilities that are unable to meet the growing demand (Ali et al., 2017). Despite the existence of REMASAB, the agency overseeing waste collection, and the state's policy encouraging monthly sanitation exercises (Naibbi & Umar, 2017), many residents, particularly in suburban and informal settlements, still lack access to basic waste management services (Bello, 2021).

The literature reviewed above consistently shows that the expansion of Kano State through the process of urbanization brings numerous environmental consequences. These consequences include environmental degradation in the form of improper waste management, poor air quality and pollution, deforestation and loss of green space, climate change and urban vulnerability, social inequality, water scarcity, population growth, and resource depletion. Moreover, it is evident that the lack of effective policies and the government's attitude toward addressing environmental degradation significantly amplify these challenges.

3. SYNTHESIS OF THE FINDINGS

This paper provides a comprehensive sociological explanation of the relationship between urbanisation and environmental degradation in Kano. The reviewed literature revealed a clear link between urbanization and environmental degradation in the city of Kano. The major findings include:

- **Air pollution and Water Pollution:** the rapid growth of the city being the commercial hub in the northern region and the largest industrial city in the region comes with increased air and

water pollution as a result of raising industrial activities and vehicular emissions especially in the industrial zones. Low-income households relying on firewood and charcoal also face health risks due to indoor air pollution.

- **Waste management:** The current waste disposal systems are inadequate, with 74% of sites unsuitable for proper waste management. Poor waste handling leads to environmental contamination, including water pollution and public health risks.
- **Deforestation and loss of green space:** Urban expansion has led to the destruction of green spaces, which exacerbates air quality degradation and increases flood risks.
- **Water Scarcity:** Urbanization has worsened water resource depletion, with a significant gap between water supply and demand, forcing reliance on unsafe alternative water sources.
- **Governance and Policy:** Weak governance, lack of enforcement of environmental regulations, and insufficient urban planning exacerbate these environmental challenges.

A common theme across the reviewed literature is the role of governance failures in exacerbating these environmental issues. While there are several policies that have been in place for many decades such as the monthly sanitation exercise, and agencies like REMASAB and KASEPPA, their implementation has been hindered by poor governance, lack of resources, and insufficient public engagement.

4. DISCUSSION OF THE MAJOR FINDINGS

The major findings of the reviewed literature suggest that the environmental degradation in metropolitan Kano is largely a result of unregulated urban growth. The rapid urbanization of Kano, while bringing economic growth and development, is causing severe environmental degradation. The urbanization is mainly the result of influx of people from rural areas to the city of Kano in search of greener pastures. They mostly based in low-income neighbourhoods of the city which further exacerbates the development of slum areas.

Weak governance and poor urban planning has been pointed as the cause of the degradation in the sense that, the government has not fully prioritize proper urban planning, and also institutional incapacity. The lack of effective waste management, air pollution, deforestation, and water scarcity are all by-products of uncoordinated urban expansion. The industrialization that develops Kano's economy, though beneficial, comes at the cost of poor environmental conditions, especially in low-income areas where health risks are more prevalent.

Deforestation and lost of green space as a result of transforming agricultural and forest lands into residential and commercial areas, often without proper environmental planning. Other important findings from the literature include ineffective policy implementation

for combating environmental degradation, rapid population growth and social inequality, water scarcity and resource depletion as well as climate changes and urban vulnerability.

One of the critical sociological implications of these findings is the disparity in how different socio-economic groups are affected. Low-income communities face more exposure to indoor pollutants due to reliance on traditional cooking methods, while wealthier neighbourhoods have better access to cleaner resources. Moreover, ineffective policies and governance create a feedback loop, where environmental degradation worsens, but policy solutions remain underfunded or unenforced.

Outcomes:

1. **Increased Environmental Degradation:** Urbanization has intensified environmental degradation in Kano Metropolis through pollution, deforestation, and resource depletion, affecting both ecosystems and human health.
2. **Public Health Impacts:** Poor air quality and contaminated water sources have led increased health risks, especially for low-income communities exposed to industrial emissions and unsafe drinking water.
3. **Social Inequality in Environmental Stress:** Low-income communities bear the brunt of inadequate waste management and exposure to pollutants, highlighting socio-environmental disparities in Kano.
4. **Increased Flooding Risks:** The loss of green spaces and deforestation have contributed to higher risks of flooding in Kano, particularly in densely populated areas without proper drainage systems.
5. **Increased Climate Change Vulnerability:** Kano's urban sprawl and lack of climate adaptation measures have increased the city's vulnerability to climate-related impacts, including heatwaves and floods.

5. CONCLUSION

The study concludes that rapid urbanization in metropolitan Kano has significantly contributed to environmental degradation, manifesting in poor air and water quality, inadequate waste management, loss of green spaces, water scarcity, and climate change. These environmental challenges are compounded and exacerbated by weak governance, administrative inefficiency, institutional incapacity, and a lack of effective urban planning policies. Without immediate intervention, the negative impact on public health and quality of life will likely worsen as Kano continues to urbanize. This study recommends strengthening environmental governance in the sense that, policies should focus on enforcing existing environmental regulations, improving urban planning, and promoting public participation in environmental governance. There

is also dire need for mass public enlightenment on the detrimental effects of environmental degradation on the environs of Kano city. Furthermore, there is a need to prioritize urban reforestation programs to restore green spaces and implement tree-planting initiatives to improve air quality and reduce flood risks. Implementation of comprehensive waste management systems that include recycling programs and public education on proper disposal methods is also recommended. Lastly, this study recommends establishing strict air and water quality control measures, particularly in industrial zones, to reduce harmful emissions and protect public health.

6. RECOMMENDATIONS FOR FUTURE WORKS

6.1 General Recommendations:

1. **Strengthen Environmental Governance:** Implement stronger policies and governance structures to address environmental degradation and improve regulation of industrial activities, particularly in the industrial zone.
2. **Improve Waste Management Systems:** Establish efficient waste management systems with proper disposal sites, particularly in low-income areas, to reduce environmental contamination.
3. **Reforest and Protect Green Spaces:** Launch reforestation initiatives and preserve green spaces to improve air quality and reduce urban heat.
4. **Upgrade Water Infrastructure:** Invest in water infrastructure to increase access to clean water and ensure proper treatment of wastewater.
5. **Public Awareness Campaigns:** Conduct public education programs to raise awareness of the importance of environmental protection and engage communities in sustainable practices.

6.2 Theoretical Recommendations:

1. **Human-Environment Interaction Models:** employ sociological theories that explore the relationship between human behavior and environmental change to better understand urbanization impacts.
2. **Urban Ecology Theory:** Apply urban ecology theory to study how urban development affects ecosystems, biodiversity, and resource management in Kano.
3. **Political Ecology Perspective:** Investigate the role of power and politics in shaping environmental governance and resource allocation in Kano.
4. **Risk Society Theory:** Examine how the risk of environmental hazards (e.g., pollution, climate change) is socially distributed in urban Kano using the risk society framework.

6.3 Methodological Recommendations:

1. Mixed-Methods Research: Combine qualitative and quantitative research methods to capture the complex socio-environmental dynamics of urbanization in metropolitan Kano.
2. Longitudinal Studies: Conduct long-term studies to assess the environmental impacts of urbanization and policy interventions over time.
3. Participatory Research: Engage local communities in participatory research to better understand the lived experiences of those most affected by environmental degradation.
4. Comparative Studies: Conduct comparative studies with other Nigerian or African cities facing similar urbanization challenges to identify best practices in environmental governance and urban planning.

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