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The Role of Effective Plastic Waste Management in Promoting Urban Renewal and Environmental Restoration in Lagos

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ABSTRACT

Plastic waste has emerged as a major environmental challenge in rapidly urbanizing cities, particularly in developing countries. In Lagos, Nigeria, increasing consumption of plastic products combined with inadequate waste management systems has intensified environmental degradation, including drainage blockage, flooding, and pollution of urban spaces. This study examines the role of effective plastic waste management in promoting urban renewal and environmental restoration in Lagos. A qualitative approach was adopted using a Systematic Literature Review (SLR) to synthesize existing research on plastic waste management practices and their environmental implications. Twenty scholarly publications were initially identified, from which nine key studies were selected based on their relevance to plastic waste management, sustainability, and urban development in Lagos and comparable contexts. The analysis reveals that plastic waste significantly contributes to environmental deterioration through drainage obstruction, pollution of water bodies, and declining urban environmental quality. The review also identifies major barriers to effective waste management, including inadequate recycling infrastructure, poor waste segregation practices, limited public awareness, weak policy enforcement, and the marginalization of informal recycling networks. Despite these challenges, emerging strategies such as circular economy approaches, improved recycling systems, stronger regulatory frameworks, and increased community participation present viable pathways for reducing plastic pollution and enhancing urban environmental quality. The study concludes that strengthening plastic waste management systems can significantly support environmental sustainability, improve urban sanitation, and contribute to broader urban renewal initiatives in Lagos.

Keywords: *Circular economy, Environmental restoration, Plastic waste management, Sustainable cities, Urban renewal.*

INTRODUCTION

Plastic waste has become one of the most pressing environmental challenges confronting contemporary cities, particularly in rapidly urbanizing regions of the Global South. The global expansion of plastic production and consumption has significantly increased the volume of waste generated in urban areas. Although plastics are widely valued for their durability, flexibility, and low cost, these same characteristics contribute to persistent environmental pollution when waste management systems are inadequate (Oseni, Niyokwezira, & De-Souza, 2025; Yalwaji, John-Nwagwu, & Sogbanmu, 2022). As a result, plastic waste accumulation increasingly threatens urban environmental quality, ecosystem health, and public wellbeing. In many developing countries, the pace of urbanization has outstripped the capacity of municipal waste management systems. Expanding populations, changing consumption patterns, and insufficient waste infrastructure have intensified the challenges associated with plastic disposal. Previous studies indicate that ineffective collection, limited recycling capacity, and poor disposal practices contribute significantly to environmental degradation in densely populated urban areas (Adeniran, 2022; Jerie et al., 2024). These conditions often lead to obstructed drainage channels, contamination of water bodies, soil pollution, and the proliferation of disease vectors, all of which pose serious public health and environmental

risks (Audu & Orewere, 2023; Onuoha & Mohammed, 2025). Consequently, plastic waste management has emerged as a critical sustainability concern requiring coordinated technological, policy, and community-based interventions.

Nigeria, Africa's most populous country, faces significant challenges in managing plastic waste due to rapid urban expansion and increasing demand for plastic-based consumer products. Recent estimates suggest that plastic consumption and waste generation in the country will continue to rise considerably in the coming decades (Animashaun et al., 2024). Despite increasing public awareness of the environmental impacts of plastic pollution, waste management systems in many Nigerian cities remain inadequate, resulting in widespread environmental contamination and declining urban environmental quality (Nigerian Economic Summit Group, 2023). In addition, gaps in policy implementation and limited recycling infrastructure continue to constrain effective waste management practices (World Bank, 2024).

These challenges are particularly evident in Lagos, one of Africa's largest and most densely populated megacities. Lagos generates substantial quantities of municipal solid waste daily, a significant proportion of which consists of plastic materials such as sachet water bags, beverage bottles, and other single-use packaging (Allen-Taylor, 2022). Due to inefficient waste collection and disposal systems, large volumes of plastic waste accumulate in open spaces, drainage channels, and coastal environments, contributing to environmental degradation and recurrent flooding (Onamade et al., 2022; Okimiji et al., 2026). In response to these growing concerns, policy initiatives such as restrictions on certain single-use plastics have recently been introduced to mitigate pollution and improve environmental management (Associated Press, 2025).

Beyond its environmental consequences, ineffective waste management also affects urban livability and residents' perceptions of neighbourhood quality. Accumulation of waste in urban environments can reduce aesthetic appeal, degrade public spaces, and negatively influence housing satisfaction (Onamade et al., 2026). Such conditions undermine broader efforts toward sustainable urban development and environmental restoration. At the same time, emerging research highlights innovative approaches for transforming plastic waste into useful resources. For example, studies demonstrate the potential for incorporating recycled plastic materials into construction products such as concrete additives and paving blocks, thereby reducing environmental pollution while supporting sustainable construction practices (Ahmed & Abdulqudos, 2024; Mashaan, 2024). These approaches align with broader sustainability frameworks that promote circular resource use and waste-to-resource strategies for resilient urban systems (Li, Chen, & Kumar, 2022; Haba, Mensah, & Adusei, 2025). Addressing plastic waste management challenges also aligns with global sustainability priorities, particularly Sustainable Development Goal 11 (Sustainable Cities and Communities) and Sustainable Development Goal 12 (Responsible Consumption and Production), which emphasize the need for improved waste management systems, reduced environmental pollution, and the promotion of sustainable urban environments.

Despite the growing body of research on plastic waste management, significant gaps remain regarding its potential role in supporting urban renewal and environmental restoration in Lagos. While existing studies have largely focused on recycling technologies or the environmental impacts of plastic pollution, limited attention has been given to how improved waste management systems can contribute to broader urban environmental regeneration and neighbourhood improvement. Addressing this gap is important for informing policies and strategies aimed at improving environmental quality in rapidly growing cities.

The aim of this study is to examines the role of effective plastic waste management in promoting urban renewal and environmental restoration in Lagos.

The objectives of the study are to;

i. To examine the environmental impacts of plastic-waste pollution on urban environments in Lagos.
ii. To evaluate existing plastic-waste management practices and challenges in Lagos.
iii. To identify sustainable plastic-waste management strategies that can support urban renewal and environmental restoration in Lagos.

LITERATURE REVIEW

Waste Management and Environmental Sustainability

Effective waste management is widely recognized as a fundamental component of environmental sustainability and urban environmental quality. Rapid urbanization, increasing consumption, and population growth have intensified municipal solid waste generation in many cities, particularly in developing countries. Plastics constitute a significant proportion of this waste stream due to their widespread use in packaging and consumer goods. When poorly managed, plastic waste accumulates in urban environments, contributing to pollution, ecosystem degradation, and public health risks (Amosu & Morakinyo, 2024; Yalwaji et al., 2022). In rapidly expanding urban centres, inefficient waste collection systems and inadequate disposal infrastructure often result in the accumulation of waste in open spaces, waterways, and drainage channels, thereby undermining environmental quality and urban sanitation (Jerie et al., 2024).

The persistence of plastics in the environment further exacerbates these challenges. Because most plastic materials are non-biodegradable, they remain in the environment for extended periods and contribute to soil contamination, water pollution, and the obstruction of urban drainage systems (Adeniran, 2022). Such conditions are particularly problematic in densely populated cities where waste management systems struggle to keep pace with increasing waste volumes. Consequently, improving waste management practices has become a critical priority for enhancing environmental sustainability and maintaining healthy urban environments

Plastic Waste Management and Circular Economy Approaches

In recent years, the circular economy has emerged as a prominent framework for addressing plastic waste challenges. The circular economy promotes resource efficiency by encouraging the reuse, recycling, and recovery of materials, thereby reducing the volume of waste disposed into the environment. Babaremu et al. (2022) argue that sustainable plastic waste management requires a transition from the conventional linear model of "produce–use–dispose" to a circular system in which materials are continuously recovered and reused. Such approaches aim to minimize environmental pollution while maximizing the economic value of waste materials.

Advances in recycling technologies have further strengthened the feasibility of circular waste management systems. Jena, Mishra, and Moharana (2024) highlight that improved recycling techniques and material recovery processes can significantly reduce plastic waste accumulation. However, the effectiveness of such systems depends on several factors, including efficient waste collection, proper segregation practices, and active public participation. In many developing countries, including Nigeria, these conditions remain limited due to inadequate infrastructure and low levels of environmental awareness. The role of informal recycling systems is also increasingly recognized within circular waste management frameworks. In many African cities, informal waste collectors contribute significantly to material recovery by collecting recyclable plastics from households, streets, and waste dumps. Studies indicate that integrating informal recyclers into formal waste management systems can improve recycling efficiency while also generating economic opportunities for local communities (Solaja, Osifo, & Amoo, 2024).

Sustainable Built Environment and Urban Environmental Quality

Plastic waste management is closely linked to the broader discourse on sustainable urban development and the built environment. Effective waste management contributes to improved urban aesthetics, healthier living conditions, and enhanced environmental quality. Research within the built environment field increasingly emphasizes the importance of integrating sustainability principles into urban planning and design. For example, studies on environmentally responsive building systems highlight how sustainable design strategies can contribute to climate resilience and improved urban environmental performance (Afolabi, Ibitoye, Kalu, & Olaoye, 2025)

In addition to design strategies, the reuse of waste materials within construction processes has gained attention as a potential solution to plastic pollution. Several studies demonstrate that recycled plastics can be incorporated into building materials such as concrete additives, paving blocks, and insulation products (Ahmed & Abdulqudos, 2024; Mashaan, 2024). These applications not only reduce plastic waste entering landfills and natural environments but also support resource efficiency in the construction industry. Such approaches align with emerging sustainability frameworks that encourage the

transformation of waste into valuable resources within urban systems (Li, Chen, & Kumar, 2022; Haba, Mensah, & Adusei, 2025).

Institutional and Policy Dimensions of Waste Management

The effectiveness of plastic waste management systems also depends heavily on institutional capacity and governance structures. Strong policy frameworks, regulatory enforcement, and administrative coordination are necessary for implementing sustainable waste management strategies. Research highlights that effective governance structures play a critical role in ensuring compliance with environmental regulations and supporting recycling initiatives (World Bank, 2024). Policy instruments such as Extended Producer Responsibility (EPR) schemes have been widely proposed as mechanisms for improving plastic waste recovery. These policies require manufacturers to take responsibility for the lifecycle of plastic products, including their collection and recycling after use. In rapidly urbanizing cities such as Lagos, the implementation of such regulatory frameworks can encourage greater accountability among producers while also strengthening waste management systems.

Research Gap

Despite scholarly attention, gaps remain. Many studies focus on technologies or policies in isolation without examining how they contribute to broader outcomes like environmental restoration. Limited research has specifically explored the relationship between plastic management systems and urban quality improvements in Lagos. Therefore, comprehensive research is needed to examine how effective plastic waste management contributes to urban renewal and restoration in Lagos, providing insights for stakeholders seeking sustainable solutions to the plastic crisis.

RESEARCH METHODO

This study adopts a qualitative research approach using a Systematic Literature Review (SLR) to examine the role of plastic waste management in promoting urban renewal and environmental restoration in Lagos. The SLR approach was considered appropriate because it enables the systematic identification, evaluation, and synthesis of existing scholarly knowledge on a specific research problem. The initial search yielded twenty (20) scholarly publications, including peer-reviewed journal articles, conference papers, and policy reports. To ensure relevance and quality, studies were screened based on the following inclusion criteria: (1) focus on plastic waste management or plastic pollution; (2) relevance to urban environmental sustainability; and (3) applicability to Lagos, Nigeria, or comparable developing-country contexts. Publications that did not address plastic waste management directly or lacked sufficient methodological rigor were excluded from the analysis.

Following the screening process, nine (9) core studies were purposively selected for detailed analysis because of their strong relevance to the study objectives and their contributions to understanding plastic waste management practices and environmental impacts. The selected studies were analyzed using thematic synthesis, which enabled the identification of recurring themes relating to environmental impacts, existing management practices, institutional challenges, and sustainable strategies for plastic waste management. The synthesized findings form the basis for the discussion on how effective plastic waste management can contribute to urban renewal and environmental restoration in Lagos.

RESULTS AND DISCUSSION

Environmental Impacts of Plastic Waste Pollution in Lagos

The reviewed studies consistently indicate that plastic waste constitutes a significant environmental challenge in Lagos. Rapid population growth, expanding consumption patterns, and insufficient waste management infrastructure have contributed to the increasing accumulation of plastic materials in the urban environment. One of the most visible consequences of this accumulation is the obstruction of drainage systems, which frequently leads to urban flooding during periods of heavy rainfall. Ajayi, Adebanjo, and Salami (2023) identify plastic waste, particularly discarded sachet water bags and plastic bottles, as a major contributor to the blockage of drainage channels across the city. Such blockages restrict water flow and increase the vulnerability of surrounding communities to flooding and associated environmental hazards.

Beyond drainage obstruction, plastic waste also contributes to broader environmental degradation. Olatunji, Ogunleye, and Ajibade (2022) report that plastic materials constitute a substantial proportion of municipal solid waste in Lagos, largely due to widespread use of single-use packaging products. Their findings indicate that poor waste segregation practices, irregular waste collection, and limited recycling infrastructure contribute to the persistent accumulation of plastic waste in both residential and commercial areas.

Table 1: Research Findings

S/N	Authors	Year	Country	Paper Title	Study Area
1	Ajayi, Adebanjo & Salami	2023	Nigeria	Urban plastic pollution and drainage blockage in Lagos metropolis	Lagos metropolis
2	Alrazen, Rahman & Nor	2025	Global	A review of the pathways, limitations, and perspectives of plastic waste recycling	Global
3	Babaremu et al.	2022	Global	Sustainable plastic waste management in a circular economy	Global
4	Odeyemi, Adebayo & Yusuf	2024	Nigeria	Assessment of recycling practices and barriers to sustainable plastic waste management in Lagos, Nigeria	Lagos State
5	Olaoti	2024	Nigeria	Plastic pollution in Lagos State, Nigeria: Challenges and sustainable solutions	Lagos State
6	Olatunji, Ogunleye & Ajibade	2022	Nigeria	Composition and management gaps of municipal solid waste in Lagos State	Lagos State
7	Pilapitiya & Ratnayake	2024	Global	The world of plastic waste: A review	Global
8	Santos, Esmizadeh & Riahinezhad	2024	Global	Recycling construction, renovation, and demolition plastic waste: Status quo, challenges and opportunities	Global construction sector
9	Tyllianakis	2025	Nigeria	A behavioural risk perspective to plastic waste management: Insights from Nigerian SMEs	Nigeria (SMEs)

The environmental implications extend further to water and coastal ecosystems. Olaoti (2024) highlights that plastic waste entering waterways eventually reaches coastal environments, contributing to marine pollution and degradation of aquatic habitats. In addition to ecological impacts, the presence of plastic waste in public spaces diminishes the aesthetic quality and functional value of urban environments. Such conditions undermine efforts to maintain clean and sustainable urban spaces and reduce the overall quality of life for residents.

These local observations align with global research on plastic pollution. Pilapitiya and Ratnayake (2024) describe plastic waste as one of the fastest-growing environmental challenges worldwide due to its persistence in natural ecosystems and increasing production rates. In rapidly urbanizing cities such as Lagos, these challenges are intensified by limited waste management capacity and high population densities. Collectively, the reviewed studies highlight the urgent need for improved plastic waste management strategies to mitigate environmental degradation and enhance urban environmental quality.

Plastic Waste Management Practices and Challenges in Lagos

Although several initiatives have been introduced to address plastic waste in Lagos, existing management practices remain constrained by structural, institutional, and behavioural challenges. Recycling programmes and waste recovery initiatives exist in the city; however, their effectiveness is often limited by inadequate infrastructure and low levels of public participation. Odeyemi, Adebayo, and Yusuf (2024) identify several barriers affecting plastic waste management in Lagos, including insufficient recycling facilities, limited waste segregation at the household level, and weak regulatory enforcement.

Institutional and economic factors further influence waste management practices. Tyllianakis (2025) observes that many small and medium-sized enterprises (SMEs) in Nigeria demonstrate limited engagement with sustainable waste management practices due to financial constraints and risk perceptions associated with environmental investments. These findings suggest that economic considerations and institutional support mechanisms play an important role in shaping waste management behaviours within the urban economy.

Policy instruments have also been proposed to improve plastic waste recovery and recycling. For example, Allen-Taylor (2022) recommends the integration of Extended Producer Responsibility (EPR) and Deposit Refund Systems (DRS) as policy mechanisms capable of increasing plastic recovery rates. These systems require producers to take responsibility for the post-consumer phase of plastic products, thereby encouraging improved recycling and waste collection practices. However, despite the potential benefits of these policy tools, their implementation remains limited due to regulatory gaps and infrastructural constraints. As a result, plastic waste management in Lagos continues to operate within a fragmented system characterized by limited coordination among stakeholders.

Table 2: Analysis of Research

S/N	Methods Used	Advantages Highlighted	Limitations Identified	Key Findings
1	Field observations, waste assessment and environmental analysis	Provides empirical evidence linking plastic waste with drainage blockage and flooding	Limited to selected urban drainage locations	Plastic waste, particularly sachet bags and bottles, significantly contributes to drainage blockage and increased flood risk in Lagos.
2	Systematic literature review	Identifies multiple recycling pathways and technological innovations	Implementation barriers in developing countries	Effective recycling systems require integrated infrastructure, supportive policies and stakeholder collaboration.
3	Literature review and sustainability analysis	Promotes circular economy strategies such as reuse, recycling and waste valorization	Transition from linear to circular systems remains slow	Circular economy models can significantly reduce plastic waste and improve resource efficiency in urban systems.
4	Survey and waste management assessment	Highlights opportunities for improving recycling programs	Weak infrastructure, poor segregation and low awareness	Recycling practices in Lagos remain limited due to institutional and infrastructural barriers.
5	Policy review and	Identifies policy and management	Weak policy enforcement and infrastructure gaps	Plastic pollution has major environmental impacts including

	environmental analysis	solutions for plastic pollution		water contamination and urban environmental degradation.
6	Waste composition analysis and municipal system assessment	Provides detailed breakdown of waste composition	Limited data coverage across the entire state	Plastics constitute a significant portion of municipal waste and poor management systems contribute to environmental pollution.
7	Comprehensive literature review	Highlights global trends in plastic production and waste management strategies	Limited focus on local socio-economic contexts	Rapid growth in plastic production requires urgent adoption of sustainable waste management strategies worldwide.
8	Technical review of recycling technologies	Demonstrates potential for reusing plastic waste in construction materials	Limited industrial-scale implementation	Recycling plastic waste in construction materials can reduce landfill waste and support sustainable building practices.
9	Behavioural analysis and business survey	Provides insights into business decision-making on waste management	SMEs face financial and awareness barriers	Behavioural and economic factors strongly influence plastic waste management practices among Nigerian SMEs.

Sustainable Strategies for Plastic Waste Management and Urban Renewal

The literature also identifies several strategies capable of improving plastic waste management while supporting urban environmental restoration. Central among these is the adoption of circular economy principles that emphasize material recovery, reuse, and recycling. According to Alrazen, Rahman, and Nor (2025), effective recycling systems require integrated management frameworks that combine efficient collection networks, advanced recycling technologies, and supportive policy environments. Such integrated systems can significantly reduce the volume of plastic waste entering urban environments.

Another emerging strategy involves the reuse of plastic waste within construction and infrastructure development. Studies demonstrate that recycled plastics can be incorporated into building materials such as paving blocks, insulation products, and concrete composites (Ahmed & Abdulqudos, 2024; Santos, Esmizadeh, & Riahinezhad, 2024). These applications not only reduce the environmental burden of plastic waste but also contribute to sustainable material use within the construction sector. In rapidly expanding cities like Lagos, such approaches offer opportunities to transform waste materials into valuable resources while supporting urban development.

Improved plastic waste management can also contribute directly to urban environmental restoration. Pilapitiya and Ratnayake (2024) emphasize that reducing plastic pollution improves urban aesthetics, protects natural ecosystems, and enhances the quality of public spaces. In the context of Lagos, strengthening recycling systems and promoting waste recovery industries could reduce pollution levels while generating employment opportunities within the green economy. Consequently, effective plastic waste management should be viewed not only as an environmental necessity but also as a key component of broader urban sustainability and renewal strategies.

Barriers to Effective Plastic Waste Management in Lagos

Despite growing recognition of the need for improved plastic waste management, several barriers continue to hinder progress in Lagos. Infrastructure limitations remain a major challenge, as existing waste collection and recycling systems lack the capacity to process the large volumes of plastic waste generated daily in the city. Odeyemi, Adebayo, and Yusuf (2024) identify insufficient recycling facilities, inadequate waste segregation practices, and limited public awareness as major obstacles to effective waste management. Behavioural and economic factors further complicate the situation. As noted by Tyllianakis (2025), businesses and households may be reluctant to adopt sustainable waste management practices when financial incentives are limited or when awareness of environmental risks is low. In addition,

institutional challenges such as weak policy enforcement and fragmented governance structures reduce the effectiveness of existing waste management policies.

Although policy tools such as Extended Producer Responsibility and deposit-refund systems have been proposed to address these challenges, their implementation remains limited within the Lagos context. Allen-Taylor (2022) argues that without sufficient infrastructure and regulatory enforcement, such policy instruments are unlikely to achieve their intended outcomes. Addressing these barriers therefore requires coordinated action involving government agencies, private sector stakeholders, and local communities to strengthen waste management systems and promote sustainable environmental practices.

CONCLUSION

Plastic waste has become a major environmental challenge in rapidly urbanizing cities, particularly in developing countries such as Nigeria. This study examined the role of effective plastic waste management in promoting urban renewal and environmental restoration in Lagos through a systematic literature review. The findings indicate that plastic waste significantly contributes to environmental degradation in Lagos through drainage blockage, flooding, and declining urban environmental quality. The study also identified key barriers to effective management, including inadequate recycling infrastructure, poor waste segregation, limited public awareness, and weak policy enforcement. Despite these challenges, sustainable strategies such as circular economy approaches, improved recycling systems, and stronger institutional frameworks can reduce plastic pollution and enhance urban environmental quality. Strengthening plastic waste management systems is therefore essential for improving sanitation, supporting environmental restoration, and promoting sustainable urban development in Lagos.

RECOMMENDATIONS

Based on the findings, the following recommendations are proposed to improve management and support restoration in Lagos:

1. **Strengthening Waste Collection and Recycling Infrastructure:** Government authorities should invest in modern collection systems and segregation infrastructure to improve efficiency across the city.
2. **Implementation of Extended Producer Responsibility (EPR) Policies**: Stronger enforcement of EPR should be introduced to ensure manufacturers take responsibility for the lifecycle of plastic products, including collection and recycling.
3. **Promotion of Public Awareness and Community Participation:** Environmental education campaigns should be implemented to increase awareness of pollution impacts and encourage responsible disposal among residents.
4. **Integration of Informal Waste Recyclers into Formal Systems**: Informal collectors should be recognized and integrated into formal systems to improve efficiency and create economic opportunities.
5. **Strengthening Institutional Capacity and Policy Enforcement:** Regulatory agencies should be strengthened through improved funding and monitoring to ensure effective implementation of waste policies.

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