

# Urbanization and Environmental Management in Newly Created Town Councils in Uganda. A Case Study of Mbarara District

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## Abstract

The study was about Urbanization and Environmental Management in Newly Created Town Councils in Uganda; a case Study of Mbarara District. It was guided by four research objectives, namely: to examine the current trend of Urbanization and environment management in Mbarara district; to assess the effect of urbanization on environment management; to assess the current laws governing environmental management; and identify the challenges experienced in environmental management and suggest possible mechanisms for addressing environmental management gaps in Mbarara District. The study adopted both a descriptive and cross-sectional study designs. Both qualitative and quantitative research approaches were used. The study population consisted of the Chief Administrative Officer (CAO), the Deputy and Assistant CAO, Senior Assistant Secretaries, and Parish Chiefs, Political Leadership, the District Councilors, the District Environment Committee Members and the Local Community Members. A sample of 133 respondents was relied on for the study. Both simple random and purposive sampling were used to select the sample. Questionnaires, interview guides and observation checklists were used to collect data. Quantitative data was analysed using SPSS version 22.0 and presented using statistical tables. Majority of the respondents (90percent) believed that urbanization has significantly increased, 77percent of respondents observed a notable reduction in green spaces due to urbanization and 78percent of respondents believe that urbanization in Mbarara district is characterized by better infrastructure. Also, 75 percent of the respondents believed that development activities have hurt the environment's value and 77percent mentioned that urbanization increases demand for resources like water, land, and energy which directly affects the environment. 72 percent of respondents believe there is a lack of environmental policies and regulations as a significant concern and 48 percent of respondents believe that the National Environmental Action Plan (NEAP) provides a framework for addressing environmental management gaps and 75 percent of respondents stated that increasing public education and awareness is crucial in addressing environmental management gaps. The study recommended a need to regularly review and update environmental regulations to address the challenges posed by urbanization. The study concluded that the rapid urbanization in newly created town councils in Mbarara District presents both significant challenges and opportunities for environmental management. While urban growth brings economic and social benefits, it also imposes pressures on land use, pollution control, and

infrastructure.

**Keywords:** Urbanisation, Environmental Management, Newly Created Town Councils, Uganda.

## INTRODUCTION

### Background of the Study

Urbanization entails the conversion of uninhabited or sparsely populated areas into densely populated cities. The expansion of urban areas can occur due to population growth or migration into these areas (Abd-Elmabod et al., 2019). This process often leads to the clearing of forests, destruction of natural habitats, and depletion of freshwater reserves from the ecosystem, resulting in reduced biodiversity and changes in species distributions and interactions (Atkinson & Davila, 2019). Additionally, human activities within urban settings, such as the combustion of fossil fuels and the discharge of industrial waste, contribute to increased environmental pollutants that can adversely affect both human health and other species (Saurav et al., 2021). As outlined in the UN habitat report (2022), the climate crisis and the imperative to limit global average temperature rise to under 1.5 degrees Celsius, while preventing mass extinction, have become paramount concerns across governance levels. Cities persist in leading environmental and sustainability efforts, yet, following a decade of optimism, their capacity to shape sustainable urban futures is now subject to growing scrutiny by the public, particularly among younger generations who feel a pressing sense of urgency driven by concerns for their future. In summary, the envisioned achievement of sustainable urbanization remains elusive (Seifollahi et al., 2022).

The New Urban Agenda is intricately linked with the 2030 Agenda for Sustainable Development. Recognizing that the Sustainable Development Goals (SDGs) represent a broad framework necessitating a more detailed action plan, the New Urban Agenda offers a spatial blueprint for achieving several of these goals and targets (UN Habitat Report, 2022). Within this context, urgent appeals for addressing the climate and biodiversity crises underscore the imperative to forge sustainable urban trajectories. The task for diverse stakeholders is to envision pathways toward livable urban environments for humans without exacerbating environmental deterioration (Price, 2019). However, numerous uncertainties shape environmental endeavors. Amidst the Anthropocene epoch, it's essential to acknowledge humanity's profound impact on the planet, which carries implications for both human societies and ecosystems. Previous iterations of the UN-Habitat World Cities Report have contended that opportunities exist to leverage the benefits of sustainable urbanization to propel forward green, resilient, and more equitable futures (Onifade et al., 2021).

As of 2011, the global population had reached 7 billion (Population Reference Bureau, 2013). Presently, the world is witnessing the most substantial urbanization boom in history, with over half of the global population living in urban regions. Projections indicate that by 2030, this number will rise to 5 billion, primarily driven by urban expansion in Africa and Asia (United Nations Organization, 2011). The recent surge in the global population has amplified the impacts of agricultural and economic endeavors. However, amid this population surge, a potentially more noteworthy human-environmental dynamic is unfolding: as the world population doubles, urban populations are tripling. It is anticipated that within the coming years, over fifty percent of the world's population will reside in urban regions (Seifollahi-Aghmiuni et al., 2022).

In Uganda, the urbanization trend mirrors global patterns but presents unique challenges and opportunities.

The National Environment and Management Authority (NEMA) Report on the State of the Urban Sector 2021-2022 highlights that Uganda is experiencing a significant rate of urban expansion, posing a substantial threat to wetland ecosystems and other natural resources. In particular, Mbarara City, located in southwestern Uganda, exemplifies the rapid urbanization seen across the country. Once a modest town, Mbarara has transformed into a bustling urban center, leading to increased pressure on land and water resources, exacerbating environmental degradation, and impacting local biodiversity (NEMA, 2021).

The Uganda Vision 2040 serves as a comprehensive national development roadmap, acknowledging the pervasive impact of climate change across all segments of the economy, the environment, and society. It emphasizes the need to incorporate climate change governance into development planning and strives to elevate Uganda from its current status as a predominantly low-income nation to a competitive upper-middle-income country. To operationalize this vision, the country has formulated three successive National Development Plans (NDP) (Bananuka et al., 2021).

The National Urban Policy (NUP) in Uganda outlines several policy statements and strategies aimed at addressing key challenges within the country's urban sector. This policy introduces criteria for the establishment and enhancement of urban areas, along with a hierarchy of urban and rural settlements (Muheirwe et al., 2022). Recognizing Uganda's rapid urbanization, with projections indicating that by 2050, half of the nation's population will reside in urban areas, the NUP is designed to manage this transformation. It also contributes to ongoing environmental management discussions and concerns that have persisted in the country for the past four decades (Bananuka et al., 2021). However, the integration of environmental issues into policy formulation did not gain momentum until the 1980s, when a robust Civil Society Organization community emerged to advocate for environmental conservation amidst Uganda's burgeoning development. Pressures stemming from population growth and diminishing resources underscored the relevance of environmental concerns in the country's development agenda (George et al., 2020).

The government has established directives for the Environment and Natural Resources (ENR) non-wage conditional grant, designed to support district local governments in implementing prioritized programs and projects within the sector. These endeavors are collaboratively determined by the Ministry of Water and Environment and the local governments. The allocated funds are designated for monitoring projects to ensure adherence to policies, laws, and regulations, as well as for the management of diverse ecosystems such as hilly and mountainous regions, forests, wetlands, riverbanks, lakeshores, and rangelands (Isse, 2023).

Challenges and prospects in environmental management abound, as the persistent reliance on natural resources coincides with a notably rapid pace of urbanization. This has resulted in the proliferation of numerous industries in and around major water bodies, alongside significant alterations in land use and cover around cities and towns (Kasei et al., 2019). While this phenomenon is often referred to as urban explosion, there also exists urbanization by implosion, characterized by higher population densities in certain rural areas or trading centers surpassing those in established urban hubs. In conjunction with other human activities, urbanization has contributed to heightened eutrophication and pollution of major water bodies, while escalating resource consumption is expanding the urban ecological footprint (George et al., 2020).

As per Article 237(2b) of the 1995 Constitution, it is the responsibility of the Government or local government, as designated by Parliament, to hold in trust and safeguard various natural assets such as lakes, rivers, wetlands, forest reserves, game reserves, national parks, and any other land set aside for ecological and touristic

purposes. This responsibility aims to serve the collective welfare of Uganda's citizens. Additionally, the Local Government Act of 1997 decentralizes powers to local governments, including the management of natural resources, thereby assigning the stewardship of natural resources as a responsibility of local governments (Tumwesigye et al., 2023).

The urbanization of Mbarara City has resulted in the proliferation of built-up areas and small-scale agricultural plots, leading to land fragmentation and the emergence of slums. Approximately 41 percent of the district's total area is experiencing degradation, with 12 percent in a severe state of degradation. Soil erosion, largely due to agricultural and construction activities, is the most common form of degradation (Kwiringira et al., 2021). Over 4,000 hectares of wetlands in Mbarara have been lost to encroachment, with the most affected wetland of Rucece covering over 1,500 hectares (Mbabazi & Atukunda, 2020). Moreover, the expanse of 1500 acres encompasses three wards within Mbarara City South Division: Rukido, Nyarubungo, and Rwakishazis. Rucece, one of the wetlands, serves as a natural water reservoir, storing water for River Rwizi. However, this wetland has suffered significant damage, contrary to Section 36 of the National Environment Act, which mandates the protection of wetlands and prohibits activities such as land reclamation and the unauthorized construction of structures

The urbanization of newly created town councils like Mbarara poses critical questions about sustainable development, environmental management, and the balancing of urban growth with ecological conservation. The Uganda Vision 2040 and the Uganda Green Growth Development Strategy (UGGDS) 2017/28-2030/31 emphasize the need to integrate climate change governance into development planning to elevate Uganda to a competitive upper-middle-income country. This vision underscores the importance of promoting green, resilient, and sustainable urban growth (Kakuba & Kanyamurwa, 2021).

This study aims to investigate the environmental impacts of urbanization in Mbarara Town Council and propose sustainable urban planning strategies that can mitigate these impacts. By examining the local context, identifying key areas of degradation, and engaging with stakeholders, the study seeks to develop actionable recommendations for promoting sustainable urbanization in Mbarara. The focus will be on enhancing environmental management practices, protecting natural resources, and ensuring that urban growth contributes positively to the well-being of the community and the ecosystem.

### **Problem Statement**

Urbanization remains a significant tool of development, promising positive transformation across all dimensions of sustainable development, including the alleviation of inequality (Adebayo et al., 2021). When effectively planned and supervised, urbanization can diminish poverty and inequality by enhancing access to employment opportunities and elevating the quality of life, which encompasses improved education and healthcare services. Additionally, as Aladejare (2023) highlights, the urbanization process aligns with the objective of modernization, fostering advancements in the global economy and playing a role in the ongoing industrialization trend.

Urbanization in Mbarara District is accelerating environmental degradation, manifesting in habitat destruction, pollution, water scarcity, energy consumption, soil erosion, and socio-economic challenges. Effective Environmental management strategies are crucial for safeguarding the survival of humans, animals, and plants, while preserving natural resources for future generations. It mitigates the adverse effects of industrial activities on the environment, fostering a healthier planet and enhancing daily well-being.

Environmental protection efforts can curb material waste, reduce pollutant emissions, and mitigate the environmental footprint of industrial facilities within a region (Akubia et al., 2020).

However, as the rate of urbanization increases, the cost to the environment cannot be underestimated. According to Musingwire et al., (2019), the extent of environmental damage in Mbarara District is so big that reversing it would require a lot of effort not only from the government but also from community members, development partners, and non-governmental organizations. In 2021 for example, The River Rwizi suffered significant damage from plastic waste pollution discharged by factories and beverage companies, as well as medical waste originating from Buremba village, Kakiika, in Mbarara North Division. (Mbarara District Development Plan, 2020/2021). Wetlands in areas around Urban areas in Mbarara District have been cleared because of population pressure resulting from the environment.

The evidence from Mbarara District Report (2022) demonstrates a clear link between urbanization and environmental management challenges. Rapid urban growth, driven by both natural populations increase and rural-urban migration, has led to significant environmental degradation. The impact on water quality, air pollution, loss of biodiversity, and soil erosion underscores the critical need for integrated urban planning and environmental management strategies. Efforts by the National Environment Management Authority, development partners, non-governmental organizations, and local authorities have included instituting laws, conducting sensitization campaigns, and evicting people from wetlands. However, the persistence and worsening of environmental issues highlight the need for more effective and sustainable approaches (Mbabazi & Atukunda, 2020)..

The problem of urbanization in Mbarara District Newly Created Town Councils in Mbarara District directly influences environmental management. Addressing the environmental impacts of urbanization through comprehensive urban planning and sustainable practices is essential.

### **General Objective**

To examine the effect of urbanization on environmental management in newly created town councils in the Mbarara district

## **LITERATURE REVIEW**

### **The current trend of Urbanization**

In the future, we can anticipate more and larger cities. In 1900, only 10percent of the global population resided in urban areas. Today, this proportion has exceeded 50percent, and projections suggest it will rise to 75percent by 2050 (The Urban Age Project, London School of Economics) (Qian et al., 2022). As of 2010, the number of individuals living outside their country of birth surpassed 200 million, contributing to the growing diversity of cities as they attract residents from various national, cultural, and religious backgrounds. Young people, who perceive urban areas as offering greater opportunities to fulfill their aspirations compared to rural areas (Tuan, 2022), primarily drive the trend of urban migration.

Metropolitan areas are increasingly pivotal to national economies, serving as hubs of wealth accumulation. Rather than focusing solely on the 200 nations, attention has shifted to the 600 cities identified as the driving force of the global economy (McKinsey & Co). Looking ahead, cities will vie with nations for investment, talent, and influence, as highlighted by Nigussie & Altunkaynak (2019). To succeed in this competitive landscape, cities must demonstrate their appeal to both residents and investors by providing a secure and

inviting environment. Failure to implement effective strategies may have severe repercussions, given the escalating significance of cities in national affairs (Chien et al., 2022).

Between 1991 and 2011, more than half of low- and middle-income countries in Europe and Central Asia experienced a decrease in urban population (Wilke et al., 2019). The aging population in Eastern Europe and Central Asia (ECA) is primarily driven by declining fertility rates rather than increased longevity, distinguishing aging trends in this region. The outmigration of young individuals further exacerbates these demographic shifts. Consequently, both the region and its urban centers will witness varied and contrasting patterns of growth and decline, with the acceleration of population aging projected to impact major cities (Sampson et al., 2020).

Latin America and the Caribbean stand out as one of the world's most urbanized regions, achieving an urban majority as early as 1960, a milestone that the global community reached only in 2008. Presently, the average growth rates in cities are diminishing, with certain urban cores experiencing population declines as residents move to the urban periphery. Urbanization is gradually gravitating towards smaller and mid-sized cities. Notably, the region is undergoing a rapid aging process, particularly conspicuous within urban settings (Zimmerer et al., 2022).

The Middle East and North Africa (MENA) region is already experiencing a high level of urbanization, with 64percent of its population residing in urban areas. While a substantial portion of the region's future urban growth is expected to occur in its major cities, there is also a significant projected growth in secondary cities, albeit at a faster rate in relative terms (Yao et al., 2021). Unique factors such as conflict-induced displacement, climate-driven migration, and cross-border movement in pursuit of economic opportunities are shaping urbanization trends in certain countries within the region, diverging from typical patterns. Although aging is not currently a prominent issue in MENA, demographic shifts indicate a rapid increase in the elderly population in the coming decades. Concurrently, the region's significant youth population presents a demographic dividend that, if effectively managed, could contribute to higher growth rates, particularly in urban areas (Sumari et al., 2020). Therefore, understanding and addressing the implications of these demographic shifts are crucial for sustainable urban development and socio-economic advancement in the MENA region.

In South Asia, a combination of factors such as increasing life expectancy, decreasing fertility rates and low ratios of old-age dependency has led to the emergence of a "youth bulge" generation. This demographic trend, characterized by a disproportionately large population of young individuals, presents unique challenges and opportunities for the region's socio-economic landscape (Jing et al., 2020). Notably, South Asia exhibits a skewed gender ratio, particularly evident in the lower number of female births compared to the global average, which could have far-reaching implications for future labor force dynamics and societal participation (Jing et al., 2020).

Contrary to popular belief, the growth of urban populations in South Asia is primarily fueled by natural population growth and internal reclassification rather than rural-to-urban migration. However, challenges such as congestion and inadequate urban management practices pose significant obstacles to the attractiveness of South Asian cities, potentially undermining their ability to serve as hubs for economic and social opportunities (Bosch et al., 2020). Addressing these issues is imperative for fostering sustainable urban development and maximizing the potential of South Asian cities in the face of demographic shifts and

urbanization pressures.

The East Asia and Pacific (EAP) region is undergoing swift urban expansion, ranking second only to Sub-Saharan Africa in this regard. By 2018, EAP had achieved a 50percent urbanization rate, with a majority of urban dwellers located in secondary cities. Notably, the region hosts the highest elderly population among all global regions, although there exists considerable diversity in aging demographics across different nations within the region. These variations in aging patterns often align with the respective income levels of the countries. Migration is presumed to play a significant role in propelling the urbanization trajectory observed in the EAP region (Zhang et al., 2020).

The urbanization rate in Africa reached nearly 44 percent in 2021, marking a steady increase from 35 percent in 2000. This trend is anticipated to continue in the forthcoming years, indicating a progressive shift towards urban living across the continent. Nevertheless, there exists notable variability in the distribution of rural and urban populations within Africa. For instance, in 2019, Gabon and Libya emerged as the most urbanized nations in Africa, with each surpassing an 80 percent urbanization rate (Ali et al., 2019). In contrast, countries like Burundi and Niger exhibited a significantly lower urbanization rate, with only around 13 and 17 percent of their populations residing in urban areas, respectively. Overall, Africa's urbanization level remains lower than the global average, which stood at 56 percent in 2021. During that period, Africa, alongside Oceania, exhibited the lowest urbanization rates among all continents (Beckers et al., 2020).

The proportion of Africans residing in urban regions is expected to escalate from 36 percent in 2010 to 50 percent by 2030. This surge in urbanization, ranking as the highest globally, holds the potential for fostering economic expansion, facilitating transformative changes, and alleviating poverty across the continent. Conversely, it also harbors the risk of exacerbating inequality, amplifying urban poverty, and exacerbating the proliferation of informal settlements. Hence, the formulation of appropriate laws, policies, and interventions to harness the beneficial outcomes of Africa's urbanization process assumes paramount importance in steering the continent toward comprehensive transformation (Tulibaleka et al., 2021).

In Uganda, urbanization stands out as a prominent and dynamic trend, characterized by a rapid growth rate of 4.5percent annually, poised to nearly double the urban population between 2010 and 2030. Currently, with 26percent of its populace residing in urban areas, Uganda is witnessing swift urbanization alongside significant transformations in its urban landscape and overall land utilization. Notably, after Niger, Uganda claims the distinction of harboring the world's second- youngest population. This demographic composition, coupled with the potential youth dividend and the rapid pace of urbanization, positions Uganda on a trajectory toward sustainable development (Tumwesigye et al., 2023). Nonetheless, certain developments cast doubt on whether the prevailing development trajectory will steer the country toward sustainable development, particularly concerning sustainable urbanization. These developments encompass adverse and fluctuating weather patterns, declining competitiveness of urban centers, the rapid influx of displaced populations into the country, and stagnating economic growth, among other factors (Tulibaleka et al., 2021).

In 2022, the proportion of Uganda's urban population saw a notable rise, increasing by 0.6 percentage points (+2.35 percent) compared to the previous year. Consequently, the urban population share in Uganda reached its pinnacle in 2022, reaching 26.16 percent. Remarkably, this share has exhibited a continuous upward trend in recent years. The urbanization rate of a country denotes the percentage of its total population residing in urban areas. Discrepancies in international comparisons of urbanization rates may arise due to variations in

the definitions of urban centers, which may be based on criteria such as population size, geographic area, or spatial distribution of dwellings, among other factors (George et al., 2020).

### **The National Urban Policy**

The National Urban Policy (NUP) serves as a sector-specific policy framework designed to offer directives for structured development and to amplify the urban sector's contribution to the country's socioeconomic transformation and overall development. The Goal of the NUP is established as:

“To promote livable urban areas that are organized, inclusive, productive and sustainable” (Bandauko et al., 2021).

To accomplish the policy objective, the NUP outlines several policy statements and strategies aimed at addressing key issues affecting Uganda's urban sector. The policy introduces criteria for establishing and enhancing urban areas, along with a structured hierarchy of urban and rural settlements. Recognizing the rapid pace of urbanization in Uganda, with projections indicating that by 2050, half of the country's population will reside in urban areas, the NUP emphasizes the need for proactive measures (Tulibaleka et al., 2021). Moreover, the NUP plays a vital role in enhancing agricultural productivity and sustainability. It proposes various strategies, such as promoting urban agriculture, supporting the development of regional urban infrastructure projects to stimulate sustainable economic activity across urban and rural areas, and advocating for planned urban expansions based on principles of fairness, efficiency, and sustainable land and resource utilization (Sladoje et al., 2020).

In Uganda, the rapid urban growth rate of 5.2percent poses significant challenges, potentially exacerbating social constraints in both rural and urban centers if not adequately planned. The National Urban Policy (NUP) underscores the importance of planned urbanization as a crucial strategy for poverty alleviation, highlighting the potential benefits of agglomeration. Planned urbanization can enhance access to essential services, reduce service delivery costs, and stimulate demand for goods and services (Mbabazi & Atukunda, 2020). The NUP's guiding principles emphasize the adoption of Smart/Green Growth strategies, advocating for the development of urban, suburban, and rural communities with accessible housing, transportation options, and proximity to employment opportunities, businesses, and educational institutions, thereby fostering economic growth while safeguarding the environment. Additionally, the NUP prioritizes Social Equity and Inclusion, aiming to ensure equitable distribution and access to resources and opportunities within urban areas. All stakeholders are encouraged to actively participate, sharing responsibilities and benefits associated with urbanization (Goodland, 2019).

### **Uganda Vision 2040 and Urbanization**

Urbanization is a pivotal factor in the trajectory of development. Nations with substantial urbanization, exemplified by Malaysia, Singapore, and China, often exhibit elevated income levels, economic stability, and robust institutional frameworks. The achievement of high urbanization rates in these countries is attributed to cohesive physical planning and strategic investments, facilitating the creation of specialized commercial and industrial zones. These zones act as magnets for population influx, thereby alleviating land pressure on other economic sectors like commercial agriculture. Notably, urban-centric economic activities contribute significantly to the Gross Domestic Product (GDP), constituting between 50percent to 80percent of the total output (Tumwesigye et al., 2023).

Uganda's urbanization rate stands at approximately 15percent, with the Greater Kampala Metropolitan Area



(GKMA) contributing around 10percent to this figure. Urbanization in Uganda has been characterized by fragmented planning and development, leading to the uncontrolled growth of major cities and towns. The disproportionate focus on development in Kampala has elevated its importance, thereby straining the city's overall functionality equated to other urban centers across the country. As part of the Vision period, plans are underway to establish four regional cities, including Gulu, Mbale, Mbarara, and Arua. Additionally, strategic cities such as Hoima (focused on oil), Nakasongola (industrial), Fort Portal (tourism), Moroto (mining), and Jinja (industrial) are slated for development. Furthermore, careful consideration will be given to emerging urban centers with the prerequisites for attaining city status (Reddy, 2021).

Legislation, integrated physical planning, and stringent development control measures will be employed by the government to regulate urban sprawl and enhance settlement density, particularly through the creation of high-rise buildings. This approach aims to establish well-designed high- density settlements in Kampala, while regional and strategic cities will be developed with a focus on medium-density settlement patterns (Elheddad et al., 2020). The government will prioritize the formulation and enactment of comprehensive physical master plans for the Greater Kampala Metropolitan Area (GKMA), regional cities, strategic urban centers, and other emerging urban locales. These plans will encompass the establishment of essential social amenities such as education and healthcare facilities, as well as recreational spaces (Fang et al., 2020).

Furthermore, traffic and transportation management strategies within cities and other urban areas will align with the national transport master plan outlined in section 4.2.2. In Kampala, recognized as the primary national city, plans include the construction of several ring roads aimed at alleviating traffic congestion and improving traffic flow (Finn & Cobbinah, 2023). Similar traffic management schemes will be implemented in other cities well ahead of their anticipated development. Throughout the duration of the Vision period, heightened emphasis will be placed on environmental and waste management practices by integrated physical planning frameworks. This will involve stringent measures to control pollution, manage wetlands, handle waste, and safeguard green spaces, open areas, and corridors (Halder et al., 2021).

### **Uganda Constitution and Environment**

The Environmental Act, Cap 153 of Uganda delineates provisions for the sustainable management of the environment, establishing an authority tasked with coordination, monitoring, and supervision in this regard, along with other incidental matters (George et al., 2020). This authority is mandated to ensure adherence to the principles of environmental management as outlined in subsection (2) (George et al., 2020). These principles encompass guaranteeing all individuals residing in the country the fundamental right to an environment conducive to their health and well- being, fostering maximum participation of Ugandan citizens in environmental policymaking processes, and ensuring equitable utilization and conservation of the nation's environmental and natural resources for the benefit of present and future generations, while considering population growth rates and resource productivity (Kasimbazi, 2023).

Moreover, the Act emphasizes the conservancy of Uganda's cultural heritage and the sustainable utilization of its environmental and natural resources, maintenance of stable ecological relationships between living and nonliving components through biodiversity conservation, and adherence to the principle of optimal sustainable yield in resource utilization (Kasimbazi, 2023). Additionally, it mandates the restoration of lost ecosystems, reversal of natural resource degradation, the establishment of robust environmental protection standards, and regular monitoring of environmental quality changes (Kasimbazi, 2023). Furthermore, the Act

advocates for prior environmental assessments of proposed projects with significant environmental or natural resource implications, integration of environmental awareness into educational curricula across all levels, and allocation of environmental pollution costs to polluters. Lastly, it underscores the promotion of international cooperation in environmental matters between Uganda and other nations (Kasimbazi, 2023).

### **The National Physical Development Plan**

The inaugural National Physical Development Plan (NPDP) of Uganda marks a significant milestone in the country's modern physical planning landscape, stemming from the establishment of trading and administrative hubs dating back to the pre-independence era. Mandated by the Physical Planning Act of 2010 and referenced in various national policies including those about land use and urban development, the NPDP reflects Uganda's evolving spatial and physical planning frameworks. Its emergence aligns with a global trend observed in numerous countries and transnational entities, where similar physical and spatial blueprints are being formulated to guide sustainable development initiatives (Kassim, 2020).

The United Nations Economic Commission for Europe succinctly defines spatial planning as the endeavor to harmonize or unify the spatial aspects of sectoral policies through a territorial framework. The NPDP provides a strategic approach to address the competing pressures from various sectors regarding land use, recognizing land as a finite resource within Uganda's territory. This becomes increasingly pertinent as the population expands and the nation undergoes modernization processes, necessitating coherent strategies to manage spatial dynamics effectively (Putzer et al., 2022).

The Uganda NPDP functions within the context of two vital factors: Population and Urbanization Projections, and the National Land Use Balance Sheet. It provides a basis for incorporating physical and spatial aspects with the economic and social aspects of national development planning. Its core elements include the allocation of human settlements, land utilization for economic activities, and the infrastructure networks crucial for connectivity and service delivery (Edodi, 2023).

To ensure the smooth integration of physical and spatial components with social and economic factors in development planning, the NPDP aligns with the "Pillars" of Uganda's Vision 2040 and the sequence of five-year National Development Plans that guide the nation. Emphasizing the physical aspects of national development planning, the NPDP serves as a mechanism for integrating spatial perspectives alongside other economic and social considerations in the development planning processes (Kakuba & Kanyamurwa, 2021).

### **Local Government Act**

According to Article 237(2b) of the 1995 Constitution, the Government or local government, as designated by Parliament, is responsible for safeguarding and supervising a range of natural resources for the mutual advantage of Uganda's citizens. These resources include natural lakes, rivers, wetlands, forest reserves, game reserves, national parks, and any other land designated for ecological and touristic purposes. The Local Government Act of 1997 further decentralizes authority to local governments, granting them the responsibility for managing natural resources. This decentralization of power empowers local governments to oversee the preservation and sustainable utilization of natural resources within their jurisdictions (Mwesigwa & Muetsasira, 2021).

Article 237(2b) of the 1995 Constitution mandates that the Government or local government, as determined by Parliament, is responsible for the protection and conservation of various natural resources such as lakes, rivers, wetlands, forest reserves, game reserves, national parks, and any other land designated for ecological

and touristic purposes. This obligation aims to enhance the collective well-being of Uganda's citizens. Additionally, the decentralization of authority to local governments, as prescribed in the Local Government Act of 1997, authorizes them to supervise the management of natural resources. Consequently, local governments assume the duty of ensuring the workable utilization and preservation of natural resources within their respective areas (Kakuba & Kanyamurwa, 2021).

Effective planning plays a pivotal role in optimizing resource utilization, fostering synergies, and facilitating streamlined reporting processes. It is crucial for District Local Governments, encompassing ecosystems that transcend administrative boundaries, to collaborate and give precedence to the administration of shared ecosystems to attain greater impactful interventions. Therefore, joint planning efforts and coordinated management measures are essential to maximize the effectiveness of interventions (Akoth, 2021).

### **Mbarara District Urbanization and Environment**

The swift pace of urbanization in Mbarara has emerged as a significant challenge in environmental management, particularly over the past twenty years. This rapid urban expansion has been driven by various factors, such as a surge in population attributed largely to rural-to-urban migration, the presence of abundant natural resources like the River Rwizi and fertile grazing lands, as well as its strategic positioning along major highways. Additionally, government policies promoting urban development, coupled with a conducive environment of peace and security, have further propelled this urban growth trend (Musingwire et al., 2021). The swift pace of urbanization has resulted in a multitude of environmental challenges, including pollution, land degradation, soil erosion, floods, loss of biodiversity, and climate change. To mitigate these impacts, various conservation measures have been enacted, such as the implementation of environmental laws and policies, the establishment of waste disposal sites, fostering public awareness and participation, tree planting initiatives, water treatment efforts, and regulation of rural-urban migration. Additionally, strategies such as Environmental Impact Assessments, reinforcement of existing laws and strategies, capacity-building initiatives, and the adoption of multidisciplinary and multi-sectoral approaches are recommended to address these environmental concerns (Kakuba & Kanyamurwa, 2021).

### **Mbarara District and Environmental Management**

Environmental issues continue to hold significant importance in Mbarara district, particularly concerning River Rwizi. Spanning approximately 8200 kilometers and coursing through various districts such as Buhweju, Sheema, Rwampala, Ntungamo, Mbarara, Kiruhura, Isingiro, Mbarara City, Lyantonde, Lwengo, and Kyotera before flowing into Lake Victoria, the river has faced considerable degradation due to human activities. Factors such as deforestation, sand mining, and improper waste disposal have significantly impacted the river's health. Over time, residents of these districts have observed a decline in the water levels of River Rwizi, leading to both qualitative and quantitative deterioration. This decline is attributed to encroachment caused by various human endeavors, including agriculture, sand mining, brick making, and construction (Kabaseke, 2020).

The growing population in the area imposes stress on the delicate natural environment, aggravated by inadequate waste management practices resulting in a surge in garbage accumulation, littering, health hazards, water pollution, and blockage of road drainage systems. Additionally, the landfill site presents a concerning picture, with unorganized heaps of waste extending along the Kenkombe-Koranorya route and encroaching upon the Kaburangire Swamp, which serves as a vital water source for local wildlife (Mbabazi

& Atukunda, 2020).

### **Advantages of Environmental Preservation**

Based on World meter statistics, the present worldwide human population stands at 7.9 billion and is predicted to reach 10 billion by 2057. This escalating population growth aligns with an increase in resource utilization. Essential natural resources vital for sustaining life and enhancing our quality of life encompass water, air, sunlight, arable land, metal ores, and fossil fuels. Notably, China and India, the most populous countries globally, also rank highest in coal consumption. Recent studies indicate that global coal consumption peaked at 157.4 exajoules in 2020. Given our heavy reliance on fossil fuels for energy needs, their potential depletion poses unforeseen challenges globally, exacerbated by the fact that these fuels require millions of years to regenerate (Mugeere & Opara, 2022).

Moreover, it is widely acknowledged that freshwater resources constitute merely 3percent of the total water bodies on Earth, with a mere 1percent available for various essential purposes such as electricity generation, irrigation, and everyday consumption. The current trajectory of human utilization of these resources poses a looming crunch for future generations. Beyond minerals and water, escalating deforestation rates and other human interventions are rapidly depleting our natural forests and their biodiversity, exacerbating a plethora of environmental challenges. Hence, it is imperative to recognize the urgency of environmental conservation efforts (Putzer et al., 2022).

Understanding the reputation of environmental conservation is paramount to preserving the integrity of ecosystems. Forests, comprising approximately one-third of the globe, serve as crucial sources of drinking water for many of the world's major cities. Moreover, they harbor a staggering array of biodiversity, providing habitat for 80percent of amphibians, 75percent of birds, and 68percent of mammal species. The strategic planting of street trees has the potential to benefit an estimated 68 million people by reducing summer air temperatures by 0.5 to 2.0 degrees Celsius. Ecosystem degradation has already impacted around 40percent of the global population, underscoring the urgent need for action. According to a study by the International Resource Panel, restoration of degraded lands could enable the accomplishment of all 17 Sustainable Development Goals by 2030. These statistics highlight the imperative of protecting our planet from the ongoing exploitation of species, which disrupts the food chain and web, leading to ecosystem degradation. Hence, conserving our natural environment stands as the foremost measure to avert future repercussions (Isabirye, 2020).

In addition to human-induced accidents occurring annually, certain natural disasters stem primarily from increased human activities. A prominent instance is the ongoing COVID-19 pandemic, which, despite appearing as a natural calamity, is a result of human actions. Between 2020 and 2022, an estimated 5.9 million deaths worldwide are projected due to this anthropogenic coronavirus, inflicting significant economic losses on numerous nations. Other natural disasters, like floods, have resulted in the loss of around 6.8 million lives in the 20th century alone. Human actions such as deforestation, climate change, extended periods of rainfall, and increasing sea levels worsen the effects of these natural calamities. Apart from floods, various other forms of natural catastrophes are significantly affected by human activities, emphasizing the critical importance of promptly initiating environmental conservation efforts (Tulibaleka et al., 2021).

Some of the impacts of global warming include changes in climate patterns, the shrinking of glaciers, rising sea levels, acid rain, the greenhouse effect, and ocean acidification. A recent report reveals that the global

surface temperature has increased from 1.06 degrees Celsius to 1.26 degrees Celsius between 2017 and 2021, surpassing levels observed in the preindustrial era. The escalation in atmospheric carbon concentrations inevitably leads to phenomena such as climate change and acid rain. Additionally, the acidity resulting from the combination of atmospheric carbon with rainfall significantly contributes to mortality rates in heavily polluted nations (Adekunle, 2022).

Moreover, the escalating global temperature is accelerating the melting of glaciers at an alarming pace. Studies indicate that we are losing 267 gigatons of glaciers annually, contributing to a 21percent rise in sea levels throughout the 21st century. Nonetheless, by comprehending the significance of environmental preservation, the world can avert impending, unforeseen natural catastrophes (Akoth, 2021).

### **The effect of urbanization on environment management**

Human development endeavors yield numerous benefits for mankind, yet they also exert significant impacts on the environment. As previously noted by scholars, the environment holds profound importance for humanity and all other life forms (Wang et al., 2019). It facilitates various human activities, including agriculture, settlement, industry, and other forms of developmental pursuits. Globally, the sustainable utilization of environmental resources remains a subject of intense debate. While every individual on Earth aspires for development, environmental concerns have often been marginalized within human development agendas (Liu et al., 2021). Consequently, this oversight has led to the degradation of environmental resources, which are essential for the well-being of both present and future generations. Regrettably, the value of the environment has been underestimated, resulting in human activities proceeding without due consideration for their environmental impacts (Pour et al., 2020).

Urbanization is commonly perceived as a developmental process characterized by the expansion and evolution of urban areas into fully-fledged cities. It entails the migration of individuals from rural to urban regions, drawn by the allure of enhanced amenities and opportunities. Urbanization fosters a range of activities that cater to human needs and preferences, including improved access to healthcare, education, and recreational services within urban settings. Moreover, urban centers serve as magnets for job seekers, further driving the influx of population. However, the burgeoning urban population brings about a host of challenges, such as heightened demand for housing, educational, and healthcare infrastructure, among other essential services crucial for human well-being. Additionally, the surge in urbanization necessitates the utilization of more resources such as water, land, and energy to sustain the burgeoning urban populace (Feng et al., 2021). Since the inception of agriculture approximately 8,000 years ago, humans have initiated alterations to the landscape, and with the onset of the Industrial Revolution, our influence on the atmosphere became pronounced. The recent surge in global population has exacerbated the impacts of our agricultural and economic endeavors. However, perhaps overshadowing this demographic shift is another significant interaction between humans and the environment: while the global population is doubling, urban populations are tripling. It is projected that within the coming years, over fifty percent of the world's populace will reside in urbanized areas (Hoare et al., 2019).

The degree and pace of urbanization vary significantly across regions. Among developing nations, Latin American countries boast the highest proportion of urban dwellers. Over the next three decades, East and South Asia are expected to experience the most rapid urbanization. Nearly all future population growth worldwide will occur in urban areas. This demographic shift, both in terms of increase and redistribution, is

poised to impact the Earth's natural systems and the dynamics between urban environments and populations (Cai et al., 2020).

Climate change stands to adversely affect critical economic and social infrastructures, potentially diminishing the quality of life in cities, where many of these facilities are concentrated. Particularly vulnerable to these impacts are the urban poor, including residents of informal settlements in developing nations, who often reside in areas prone to environmental hazards such as river banks, landslide-prone slopes, or polluted sites, and structurally unsound dwellings susceptible to seismic activity (Onifade et al., 2021). The escalating population density is driving up the urban ecological footprint in both developed and developing countries, leading to heightened consumption of natural resources like water, energy, and fossil fuels. The extravagant lifestyle of urban dwellers poses challenges to replenishing these resources promptly, resulting in issues such as water scarcity and power shortages due to excessive electricity usage (Fang et al., 2020).

Urban expansion has notably impacted water resources, particularly surface water bodies. The nexus between urbanization and industrial growth has contributed to the emergence of industries, some of which rely on access to water supply. However, this development has brought about adverse effects, including the discharge of industrial effluents into water bodies and excessive extraction of water for industrial purposes. Moreover, the growth of urban centers has led to an increase in waste generation, with some of this waste finding its way into nearby water bodies. For instance, the Nairobi River has become a dumping ground for waste due to the settlement of people along its banks. Similarly, River Migori has suffered from pollution resulting from the development of Migori town (Zhang et al., 2021).

In many contexts, water is regarded as indispensable for life. Humans, along with other organisms, rely on access to clean freshwater sources. Once water becomes contaminated, it poses health risks and is no longer safe for consumption. The pollution deposited into rivers as a consequence of urban development compromises water quality, endangering the aquatic organisms reliant on these rivers. These organisms suffer from the pollutants present in the waste, often resulting in their demise. This loss of biodiversity underscores the detrimental impact of urbanization on natural ecosystems. Additionally, the construction of pavements as part of urbanization efforts impedes water infiltration into the soil. This not only affects soil moisture and microorganisms but also disrupts groundwater recharge, crucial for sustaining the water cycle. When one stage of the water cycle is compromised, it disrupts the entire process. Water that fails to permeate the soil due to pavement construction may contribute to flooding events (Xu et al., 2020).

Urban development also leads to the over-extraction of groundwater resources. As surface water becomes contaminated and deemed unsafe for consumption, individuals turn to groundwater sources. Numerous boreholes are drilled to meet the escalating water demands of urban populations. This reliance on groundwater extraction disrupts the natural water cycle, particularly if done excessively. Additionally, urbanization gives rise to the establishment of drainage systems such as sewer lines. While these systems may not always have an immediate impact, they can cause significant repercussions on water quality when they rupture or leak. Sewage may contaminate both groundwater and surface water as it flows downstream, posing risks akin to those posed by improperly treated industrial effluents, which may contain harmful heavy metals detrimental to aquatic ecosystems (Wang et al., 2019).

Initial studies examining the correlation between urbanization and environmental pollution concentrated on the interaction among economic growth, population expansion, resources, and the environment. In 1991,

economists Grossman and Krueger introduced the environmental Kuznets curve (EKC) hypothesis, proposing an inverted U-shaped relationship between environmental pollution and economic growth (Grossman and Krueger, 1995). Subsequent studies have confirmed this relationship in developed countries, demonstrating that population growth positively correlates with environmental pollution (Halder et al., 2021). However, urbanization is a multifaceted process encompassing population, economic, social, and spatial transitions. The influence of urbanization on environmental pollution fluctuates among countries and regions with varying developmental stages. Research exploring the effects of urbanization on energy consumption and carbon emissions demonstrates diverse results. Urbanization tends to decrease energy usage in low-income countries, while it increases in middle-income and high-income nations. Additionally, urbanization has a positive impact on carbon emissions across all countries examined (Ali et al., 2019). Furthermore, studies have revealed a curvilinear relationship between urbanization and carbon emissions in developing nations, indicating an inverted U-shaped pattern. Meanwhile, the connection between the quality of urbanization and the ecological environment has demonstrated variation in particular urban areas (Song, 2019).

The adverse effects of urbanization on natural landscapes and habitats are expected to intensify rapidly in the future. Urbanization leads to the creation of artificial and impermeable surfaces, thereby altering land cover types and the biodiversity of ecosystems. Consequently, this can change the frequency and types of disturbance regimes and impact the flow of nutrients, organisms, energy, and water within and between landscapes (Zahoor et al., 2022). Habitat loss caused by urbanization, shifts in hydrology, sedimentation, water contamination, and changes in soil properties can profoundly affect aquatic ecosystems. The replacement of natural vegetation with impermeable surfaces and the introduction of environmental stressors through increased human activity can dramatically alter aquatic habitats. Urban aquatic systems, in particular, are highly affected by these changes due to their dense population and pollution levels (Sharma et al., 2020). The conversion of urban land often results in unsuitable conditions for plant growth, with altered soil nutrient fluxes or deficiencies (Olajire et al., 2020). Soil, with its high capacity for retaining hydrophobic chemicals, may experience altered nutrient levels due to urbanization (Das et al., 2019). Moreover, elevated conductivity, indicative of dissolved metals and salts in water, has been found to negatively impact animal populations in urban areas (Aslam et al., 2020). Amphibians, for instance, exhibit reduced survival, growth, and development rates in urban environments due to nitrogen pollution and heavy metal contamination (Tsalis et al., 2020). Overall, urbanization significantly alters natural ecosystems and poses a substantial threat to biodiversity, underscoring the importance of ecological research, management, restoration, and conservation efforts (Gilal et al., 2019).

Water temperature and dissolved oxygen are interconnected environmental factors essential for the survival of aquatic organisms and their ability to withstand certain pollutants. Significant industrial facilities such as power plants utilize water for cooling, and the release of this water can affect downstream habitats. Reduced levels of dissolved oxygen indicate eutrophication, a situation where water quality declines, resulting in the death of organisms (Singh et al., 2019). High turbidity, associated with eutrophication, prevents sunlight from penetrating dense, grayish water, resulting in excess organic material and decreased oxygen levels. Phosphorus, a pollutant, is a leading cause of eutrophication in aquatic systems. Soil phosphorus enters aquatic environments via eroded soil particles and surface runoff, exacerbating the issue (Taylor et al., 2020). Water pH, conductivity, and salinity are also linked to dissolved oxygen levels. pH can be influenced by

waterborne chemicals, and maintaining stable pH levels within certain parameters is vital for organism survival and thriving. Fluctuations in pH values can affect species abundance and interactions (Goodland, 2019). The quantity of dissolved solids impacts water conductivity, which can affect its suitability for various uses, including domestic, industrial, and agricultural purposes. Elevated specific conductance levels may affect drinking water taste and odor and cause gastrointestinal issues. Similarly, high salinity can inhibit crop survival. Impervious surfaces may contribute to nutrient loss, high salinity, increased conductivity, and alterations in pH and dissolved oxygen levels (Muheirwe et al., 2022).

Human-induced changes in water salinity, conductivity, dissolved oxygen, and temperature have been observed to affect species survival and interactions between species (Edodi, 2023). Contrasting aquatic environments in urban settings with those in adjacent rural areas can reveal patterns in environmental factors linked to deteriorating water quality. Additionally, regional aquatic ecosystems can provide a reference point to assess the potentially increased human influence in urban locales (Bananuka et al., 2021).

Urban development entails the clearance of vegetation to make way for settlements, subjecting the land to erosion agents. Vegetation cover plays a crucial role in controlling soil erosion and infiltration rates, moderating water flow speed, contributing to the hydrological cycle, acting as a carbon sink, and enhancing aesthetic value (Juma et al., 2022). However, urban population growth necessitates the creation of more housing, leading to increased vegetation clearance. Vegetation also serves as a habitat for various life forms, and its destruction results in habitat loss and displacement of animals (Ndanyi, 2021). Agricultural activities in peri-urban and rural areas, driven by the demand for food in urban centers, further exacerbate land cover loss and soil degradation (Nigussie & Altunkaynak, 2019).

Urbanization alters land use patterns, with recreational open spaces being converted into built environments, leading to biodiversity loss. For instance, a study conducted in Nairobi in 2017 highlighted rapid urban development-induced land use and land cover changes (Chien et al., 2022).

### **The challenges experienced in environmental management due to created town councils**

The trend towards adopting sustainable development principles to mitigate climate change is growing. Key tenets of sustainable development encompass enhancing people's quality of life, promoting health, and safeguarding natural resource systems within a country. Consequently, governments have initiated measures to incentivize construction projects to incorporate environmental management plans (EMPs). Despite the construction industry's significant contribution to economic growth, its practices often have detrimental effects on the environment and society (Wilke et al., 2019).

Construction projects consume substantial energy and natural resources while generating significant air, water, noise, and land pollution. Moreover, construction and demolition waste produced by the sector adversely impacts the environment, economy, and public health (Sampson et al., 2020). These issues pose challenges to various external stakeholders. Ground surface disturbances resulting from construction activities notably escalate pollution damage, with clearing and excavation leading to soil erosion and sedimentation, perpetuating environmental degradation. Furthermore, the conversion of steep mountainous land into arable land exacerbates erosion and sedimentation issues due to terrain alterations. Hence, without effective EMPs, the construction industry's adverse environmental impact will remain a serious global threat (Zimmerer et al., 2022).

Despite the imperative for more efficient management of construction activities' environmental impact,



project stakeholders often lack conscious awareness and understanding of EMP implementation (Yao et al., 2021). Seeking professional advice could enhance this awareness and understanding; however, many stakeholders opt against this. Moreover, stakeholders' pessimism regarding EMP implementation is fueled by perceived low benefits and competitive advantages. Conversely, poor EMP implementation is anticipated due to the absence of industry standards, comprehensive regulations, and clearly defined responsibilities (Sumari et al., 2020).

This issue is particularly pronounced in Malaysia, where environmental policies and regulations are insufficient to enforce sustainability and monitor construction organizations' practices. Additionally, Malaysian construction firms allocate minimal resources to social responsibility activities aimed at environmental protection (Li et al., 2023). Financial aspects such as incentives and high implementation costs are also significant challenges. Project managers must commit long-term resources for EMP implementation, presenting a substantial financial burden, particularly for contractors (Jing et al., 2020).

Due to differences in resource availability across nations, the implementation of Environmental Management Plans (EMPs) cannot occur uniformly (Bosch et al., 2020). Developing countries such as Malaysia often face challenges due to the absence of financial support and regulatory requirements for EMP adoption. Additionally, attitudes towards sustainable practices and the implementation of EMPs vary among stakeholders within different contexts in the construction industry (Zhang et al., 2020). Thus, region-specific research on EMP implementation challenges is essential. Although existing literature extensively examines these challenges, limited research has focused on identifying and understanding EMP implementation challenges in Malaysia. Understanding these challenges provides valuable insights for environmental protection, aiding stakeholders in identifying areas in Malaysia requiring enhanced EMP practices (Dawood et al., 2021).

While EMP implementation fosters sustainable development, it encounters numerous challenges. In developed countries, low environmental awareness, minimal perceived benefits, and inadequate knowledge hinder EMP implementation (Beckers et al., 2020). Poor awareness and knowledge render EMP implementation unnecessary, diminishing motivation. Negative attitudes towards EMP implementation among construction industry professionals in countries like the UK and Australia also undermine environmental commitments. Governments play a crucial role in developing initiatives like media campaigns, educational programs, and incentives to promote EMP implementation (Adebayo et al., 2021). Furthermore, clearly defining project parties' roles and responsibilities is vital to ensure active participation and shared commitments to environmental protection, an area lacking in countries like Italy, the Netherlands, and France. Construction industry professionals in places like Hong Kong cite high implementation costs of environmental management systems as detrimental to project performance (Wang et al., 2019).

Despite persistent challenges in developed nations, construction industry practitioners in developing countries, such as China, are reluctant to embrace EMPs due to the associated high implementation costs (Liu et al., 2021). The implementation of EMPs demands substantial financial resources to cover expenses for skilled labor, machinery, equipment, and advanced materials. These hurdles are particularly pronounced for contractors who prefer to avoid additional expenditures arising from new operational costs. Furthermore, there is a dearth of comprehensive regulations and inadequate staffing to support sustainability initiatives (Pour et al., 2020).

Environmental regulations serve as controlling mechanisms to mitigate construction-related pollution through various protocols.

Similarly, Ghana and Malaysia encounter hurdles in promoting sustainability. In Ghana, challenges related to EMP implementation include a scarcity of qualified personnel, lack of knowledge, and high implementation costs. Feng et al. (2021) underscored the significance of governmental pressure through policies and regulations to enhance environmental sustainability performance in Malaysia. Hoare et al. (2019) highlighted that awareness of construction and demolition waste management, stakeholder commitment, and environmental protection costs are pivotal in advancing environmental sustainability. Additionally, Cai et al. (2020) revealed that not all contractors, including large, medium-sized, and small contractors, are willing to invest in enhanced construction waste management practices.

### **The current laws or policy mechanisms supporting environmental management about urbanization**

The Government of Uganda initiated the National Environmental Action Plan (NEAP) and the subsequent National Environment Management Policy (NEMP) between 1991 and 1994. The NEAP was developed to address gaps in environmental management and to integrate environmental considerations into national socio-economic development strategies (Nkundabanyanga et al., 2019). The NEMP, which emerged as a result of the NEAP, aims to achieve sustainable social and economic development while preserving or enhancing environmental quality and resource productivity over the long term, thereby ensuring the needs of both present and future generations are met (George et al., 2020).

This policy has been foundational to subsequent national policies such as the Poverty Eradication Action Plan (PEAP) and the Plan for the Modernization of Agriculture (PMA), both of which prioritize sustainable development practices (Kakuba & Kanyamurwa, 2021). Additionally, the NEMP outlines strategies to guide decision-makers and resource users at various levels, emphasizing the integration of environmental concerns into national planning processes, promoting inter-sectoral cooperation, and facilitating comprehensive and coordinated environmental management (Lugada et al., 2022).

Acknowledging the necessity for tailored approaches to different sectors, the National Environment Management Policy (NEMP) laid out a structure for the establishment of various sector-specific policies. These included the Water Policy (1995), National Wetlands Management Policy (1996), Wildlife Policy (1996), Fisheries Policy (2000), Forestry Policy (2001), and district-level environmental management policies (beginning in 2000) (Lugada et al., 2022). Furthermore, it formed the foundation for the development of a comprehensive environmental legal framework, encompassing the 1995 Constitution and the National Environment Act. This framework facilitated multi-sectoral resource planning and management (Sseviiri et al., 2022).

In line with these efforts, the National Environment Act of 2019 was introduced to comprehensively address emerging environmental challenges such as climate change, hazardous chemical management, and biodiversity conservation (Sendawula et al., 2021). This Act, along with the Environmental Protection and Management Act (No. 10 of 2019), aims to ensure integrated decision-making processes, preventive and remedial measures for environmental degradation, public participation in environmental matters, transparency in decision-making, and access to environmental information and justice (Kakuba & Kanyamurwa, 2021; Sseviiri et al., 2022).

### **Research Gaps**

The existing literature comprehensively discusses the global phenomenon of urbanization across various continents and countries. However, there is a notable absence of analysis regarding the regional variations in urbanization trends and the comparative effects of urbanization across different regions. Therefore, it is imperative to undertake multiple studies to address this gap. Similarly, while scholars have examined the environmental landscape, they often fail to delineate between severe, moderate, and low levels of environmental damage in different regions. This underscores the necessity for scientific inquiry to gather new evidence and data to elucidate these distinctions.

Moreover, literature highlights diverse perspectives on the benefits of environmental conservation, emphasizing the protection of nature and biodiversity for the well-being of humans, flora, and fauna. Nonetheless, there is a dearth of clear elucidation on the methodologies and applicability of environmental conservation practices across diverse geographical contexts. Additionally, while scholars discuss the impact of urbanization on the environment, there remains a lack of empirical evidence establishing the statistical relationship between urbanization and environmental changes, a gap this study aims to address.

Furthermore, existing literature outlines numerous challenges encountered in environmental management, including resource constraints, inadequate management strategies, and the absence of robust environmental policies and regulations. However, these challenges vary across countries and regions, yet scholars often overlook proposing potential solutions to address them. Concerning policy mechanisms supporting environmental management vis-à-vis urbanization, scholars fail to recognize the diversity of policy frameworks adopted by different countries, thereby necessitating a nuanced understanding of country-specific policy mechanisms.

## **RESEARCH METHODS**

### **Research design**

This study adopted two research designs. The first one was a descriptive research design. Franklin (2012) defines descriptive research as the one that includes a normative study, comparing data against a standard. It is used to illustrate what is in existence with respect to conditions or variables that are found in a given situation. The researcher used the case of Mbarara District whose findings represented the entire country. The researcher used a descriptive research design because it helped him to use various forms of data as well as incorporate human experience. It gave the researcher the ability to look at whatever was studied in so many aspects and provided a bigger overview as opposed to other forms of research. The study also used a cross-sectional design. Lee and James (2014) described a cross-sectional study as a research approach employed to collect data at a particular moment in time. This method involves gathering data from a diverse group of participants with varying characteristics and demographics, referred to as variables. The researcher opted for a cross-sectional design because it enabled capturing a population at a single time point and aided in eliminating assumptions.

With the two research designs, the researcher adopted both qualitative and quantitative approaches. With the quantitative approach, the researcher collected numerical data using questionnaires. This data was presented in statistical tables, graphs, and charts after generation of frequencies and percentages. The qualitative approaches involved the collection of non-numerical data using interviews and provided backup to the

quantitative data such that meaningful conclusions were drawn. These were adopted because they looked deeper than analyzing ranks and counts by recording attitudes, feelings.

### **Target Population**

According to the National Population Census, in 2012, the Mbarara district population was estimated at approximately 445,600. Out of this population, the study targeted 200 respondents from whom the sample was drawn. Mbarara District Administrators (The Chief Administrative Officer (CAO), the Deputy and Assistant CAO, Senior Assistant Secretaries, and Parish Chiefs), Political Leadership (The District Chairperson and the Speaker), the District Councilors, the District Environment Committee Members and the Local Community Members. It was from these that the researcher got the sample size.

### **Sampling**

This pertains to a method of choosing specific individuals or a subset of the population to draw statistical conclusions and estimate the characteristics of the entire population. Within this study, the researcher selected a sample that represented the views of the entire population in Uganda about urbanization and environmental management in newly created town councils. The researcher used Slovin's formula of 1970 to determine the appropriate sample.

### **Sample Size**

This refers to the number of individuals included in a research study to represent a population. The researcher relied on a sample of 133 respondents.

### **Sample Size Determination**

The sample size was determined using solvin's formula of 1970

$$n = \frac{N}{1 + N(e)^2}$$

Where n is sample size, N = Total population, e=marginal error or level of significance and it usually ranges from 1percent-5percent which is 0.01-0.05

$$n = \frac{200}{1 + 200(0.05)^2} \quad n = 200/1.5$$

$$n = 133$$

### **Sampling Techniques**

A sampling technique is the name or identification of the specific process by which the entities of the sample have been selected. In this study, the researcher used both simple random and purposive sampling techniques as explained below.

#### **Simple random sampling**

Simple random sampling refers to a sampling technique where every item in the population has an even chance and likelihood of being selected to participate in the study. With this method, the researcher defined the population, chose the sample size, listed the population, assigned numbers to the units, found random numbers, and selected the sample. It is used when dealing with a big population that has similar characteristics. The researcher used simple random sampling to select the Local Community Members of the Mbarara District. The researcher used simple random sampling because it gave respondents equal chances of participating in the study.

#### **Purposive sampling**

This is a sampling technique where the researcher follows specific guidelines in choosing the respondents. This is because respondents participate in the study. After all, they have more knowledge about the study.

These were the district administrators, the political leadership, the District Councilors, and the District Environment Committee Members. Purposive sampling was used because it helped in the selection of respondents who are more knowledgeable about the study which helped in the collection of reliable information.

**Table 1 showing categories of respondents, sample size and sampling procedures**

Nature of the Respondents	Population	Sample size	Sampling procedure
Chief Administrative Officer	1	1	Purposive sampling
Deputy CAO	1	1	Purposive sampling
Senior Assistant Secretaries	3	3	Purposive sampling
Parish Chiefs	20	10	Simple random
District Chairperson	1	1	Purposive sampling
The Speaker	1	1	Purposive sampling
District Councilors	20	10	Simple random
District Environment Committee Members	5	5	Purposive sampling
Local Community Members	148	101	Simple random
<b>Total</b>	<b>200</b>	<b>133</b>	

**Data Sources**

The term data source refers to the location where data that is used in a research study originates from. In this study, both primary and secondary data was used to fully understand the dynamics behind urbanization and environmental management in newly created town councils in Uganda.

**Primary sources**

These are sources of original information that have not existed before. The primary data was collected from the field using questionnaires and interview guides that were issued out to the systemally selected respondents in the area of study. These provided original information that was based on to draw meaningful conclusions regarding this study.

**Secondary sources**

These are sources of data from the published and documented sources that aided in providing answers to the research problem. Secondary sources were used to supplement the primary data as it made primary data more specific since with the help of secondary data, the researcher was able to identify the gaps and deficiencies and what additional information needed to be collected.

**Data Collection Methods**

This refers to the process of gathering and measuring information on variables of interest, in an established systematic fashion that enables one to answer stated research questions and evaluate outcomes. In this study,

both questionnaire survey and interviews were used to collect data as shown below;

### **Questionnaire Survey**

A questionnaire survey is a method for gathering data by a structured set of questions. (Silverman & David, 2011). The researcher used a questionnaire survey method to collect data from Local community members, parish chiefs, and councilors. This method was used because it gave the respondents a chance to fully express their views about the study without being intervened by the presence of the researcher.

### **Interview Schedule**

Soeters et al., (2014) define interviews as a conversation for gathering information. With the interview method, the researcher coordinated the process of the conversation and asked questions, and the respondent responded to those questions. This method was applied to collect data from the Chief Administrative Officer, Deputy CAO, Senior Assistant Secretaries, District Chairperson, Speaker, and District Environment Committee Members because they were believed to be more informed about the study.

### **Data Collection Tools**

Data collection tools refer to the devices/instruments used to collect data. In this study, the researcher used questionnaires and interview guides to collect data as explained below;

#### **Questionnaire**

During the data collection phase, respondents were provided with self-administered questionnaires. These questionnaires utilized a 5-point Likert scale, where the options were as follows: A=Agree, SA=Strongly Agree, NS=Not Sure, D=Disagree, and SD=Strongly Disagree. Respondents were instructed to select the option that best reflected their knowledge and understanding. The questionnaire was divided into four sections. Section A gathered biographic data such as age, marital status, educational background, position held within the organization, and duration of employment. Sections B, C, and D corresponded to the three specific objectives of the study. Each objective was accompanied by a table containing five opinion statements. Respondents had the flexibility to choose their preferred option for each statement at their convenience. This approach collected quantitative data, which was presented using statistical tables, graphs, and charts for analysis.

#### **Interview Guide**

An interview guide consisted of open-ended questions that guided the interview process. The questions were designed based on specific objectives to enable them to get reliable responses from the respondents. This was used to collect qualitative data from the Chief Administrative Officer, Deputy CAO, Senior Assistant Secretaries, District Chairperson, Speaker, and District Environment Committee Members because they were believed to be more informed about the study.

#### **Observation Checklist**

This is the list of observable items in a qualitative research study. The researcher objectively observed areas where wetlands had been reclaimed, the water quality of rivers like Rwizi, areas of adverse deforestation and afforestation, and whatever was observed was recorded or captured using cameras.

#### **Data Presentation, Analysis, and Interpretation**

This refers to the process of organizing data into logical, sequential, and meaningful categories and classifications to make them amenable to study and interpretation. In this study, the researcher did presentation, analysis, and interpretation explained below;

**Data Presentation**

Data presentation is defined as the process of using various graphical formats to visually represent the relationship between two or more data sets so that an informed decision can be made based on them. In this study, data was presented using statistical tables, graphs, and charts.

**Data Analysis and Interpretation**

Data analysis and interpretation is the process of assigning meaning to the collected information and determining the conclusions, significance, and implications of the findings. In this study, data analysis and interpretation was done as explained below;

**Quantitative Analysis**

The responses were analyzed using Statistical Package for Social Scientists (SPSS) version 22.0. Compiled data was analyzed and presented in tables, graphs, and charts using frequencies and percentages.

**Qualitative Analysis**

Thematic analysis was used. Qualitative findings were generated from the interviews and were used to interpret and strengthen the quantitative findings of the study.

**Research Procedure**

After the development of the research proposal, the researcher submit it to BSU-REC for ethical approval and after, the researcher was given an introductory letter from the director graduate school of Bishop Stuart University that introduced him to the administration of Mbarara District asking for permission to carry out the study in the area. After permission had been granted, the researcher asked for consent from the respondents of their willingness to participate in the study. The researcher then issued questionnaires and fixed interview appointments which were later fulfilled. After data collection, the researcher embarked on data processing to remove unnecessary mistakes. The process of data analysis and dissertation compilation followed.

**Quality Control**

Quality control (QC) of data refers to the application of methods or processes that determine whether data meets overall quality goals and defined quality criteria for individual values. In this study, the researcher relied on validity and reliability for quality control as explained below;

**Validity**

This is an indication of how sound research is. It means that the findings truly represent the phenomenon the researcher is claiming to measure. It is the extent to which a test measures what it is supposed to measure. In this study, the researcher availed the draft of the questionnaire to the research supervisor and some district environment committee members because they were believed to be more informed about the study. All these were requested to look at the items and check on language clarity, relevancy, comprehensiveness of content, and the length of the instruments. The researcher then made adjustments as guided by the supervisor before calculating the Content Validity Index (CVI).

$CVI = \frac{\text{Number of items rated relevant (n)}}{\text{Total number of items (N)}} \times 100\text{percent}$

Thus, for the instrument to be valid, the CVI was at least 0.7

**Reliability**

This also describes consistency. It is the extent to which that same questionnaire would produce the same results if the study was to be conducted again under the same conditions. In this study, the researcher conducted a pilot study on selected respondents. This was because they were believed to be knowing the

study. These questionnaires were analyzed using SPSS and Cronbach’s alpha test was run to test for internal consistency of the questionnaire. When the Cronbach Alpha came out to be greater than 0.70, the researcher printed out the copies of the questionnaire and administered them for data collection.

**DATA PRESENTATION, INTERPRETATION AND ANALYSIS**

**Response Rate**

Before the process of data collection, the researcher had targeted to collect data from a total of 200 respondents. However, only 133 respondents managed to successfully participate in the study as shown in the table below.

**Table 2: The Response Rate**

Targeted sample	200
Actual sample	133
<b>Response rate</b>	<b>66.5percent</b>

(Source: Field Data, July, 2024)

A response rate of 66.5percent is generally considered strong and indicates that a significant proportion of the targeted sample participated in the study. This suggests a good level of engagement and interest among the respondents.

With a response rate of 66.5percent, the researcher reasonably assumed that the sample was representative of the population he intended to study, assuming there were no significant biases in who responded versus who did not.

A response rate above 60percent is often deemed sufficient for ensuring that the findings are reliable and can be used to draw meaningful conclusions.

**Biographic Data of the Respondents**

**Table 3: Biographic Data of the Respondents**

Sex	Frequency	Percentage
Male	89	67
Female	44	33
<b>Total</b>	<b>133</b>	<b>100</b>
Age of the Respondent		
18- 28 years	40	30
39- 48 years	60	45
49 years and above	33	25
<b>Total</b>	<b>133</b>	<b>100</b>
Education Level		
Never been to School	15	11
Primary	45	34
Secondary	33	25



Diploma	15	11
Degree	20	15
Postgraduate	5	4
<b>Total</b>	<b>133</b>	<b>100</b>
<b>Responsibility in the Community</b>		
Farmer	53	40
Business	40	30
Teachers	15	11
Health workers	5	4
Local leaders	20	15
<b>Total</b>	<b>133</b>	<b>100</b>

(Source: Field Data, July, 2024)

Findings in Table above bring out the biographic data of the respondents. Majority of the respondents 89 (67 percent) were male whereas the minority 44 (33 percent) were female. About the age of the respondents, majority 60 (45 percent) were between 39- 48 years, followed by 40 (30 percent) who were between 18- 28 years and the minority 33 (25 percent) were 49 years and above. Also, majority of the respondents 45 (34 percent) had primary education, followed by 33 (25 percent) who had secondary education and the minority 5 (4 percent) had post-graduate education. On the responsibility in the community, majority 53 (40 percent) were farmers, followed by 40 (30 percent) who were business persons and the minority 5(4 percent) were health workers.

**The current trend of Urbanization and environment management in Mbarara district**

**Table 4: The current trend of Urbanization and environment management in Mbarara district**

Items	SA (%)	A (%)	NS (%)	D (%)	SD (%)	Mean	Std Dev	Decision
Urbanization in Mbarara district has significantly increased in the past 5 years	80 (60)	40 (30)	13 (10)	00 (00)	00 (00)	1.49	0.66	Low perception
The increase in urbanization has led to a decrease in green spaces in Mbarara District.	73 (54)	30 (23)	22 (17)	08 (6)	00 (00)	1.92	1.05	High perception
Urbanization has improved the economic opportunities in Mbarara District	65 (49)	35 (26)	23 (17)	05 (4)	05 (4)	1.62	0.89	Low perception
Urbanization has contributed to better infrastructure development in Mbarara District	70 (53)	33 (25)	15 (11)	15 (11)	00 (00)	1.81	1.03	Low perception

Urbanization has caused significant pollution issues in Mbarara District	58 (44)	40 (30)	22 (17)	15 (11)	08 (6)	1.50	0.67	Low perception
Water quality in Mbarara District has deteriorated due to urbanization.	63 (47)	40 (30)	10 (8)	08 (6)	12 (9)	1.49	0.66	Low perception
Urbanization has led to the destruction of wetlands in Mbarara District.	72 (54)	31 (23)	11 (8)	09 (7)	10 (8)	1.71	1.05	Low perception
There are effective environmental management strategies in place in Mbarara District	60 (45)	33 (25)	22 (17)	11 (8)	07 (5)	1.52	0.72	Low perception
The local government is actively involved in managing the environmental impacts of urbanization	50 (38)	22 (17)	11 (8)	20 (15)	30 (23)	1.51	0.69	Low perception
Residents are aware of the importance of environmental conservation in urban areas	32 (24)	41 (31)	10 (8)	30 (23)	20 (15)	2.13	1.02	High perception
Urbanization has led to increased air pollution in Mbarara District.1	31 (23)	20 (15)	12 (9)	40 (30)	30 (23)	2.54	1.06	High perception
There are adequate green spaces (parks, gardens) in urban areas of Mbarara District	22 (17)	12 (9)	04 (3)	45 (34)	50 (38)	2.65	1.07	High perception
Waste management systems in urban areas of Mbarara District are effective	45 (34)	55 (41)	13 (10)	10 (8)	10 (8)	1.89	1.01	High perception
Future urbanization plans should prioritize environmental sustainability.	40 (30)	60 (45)	10 (8)	15 (11)	08 (6)	2.01	1.06	High perception

(Source: Field Data, July, 2024)

**Note:** N=133, SA=Strongly Agree, A=Agree, NS=Not Sure, D=Disagree and SD=Strongly Disagree, Decision-weighted average= 1.84

According to the findings, majority of respondents (60 percent) strongly agreed that urbanization has significantly increased, while 30percent agreed. The mean score of 1.49 indicates a general agreement that urbanization has been substantial, but the low standard deviation of 0.66 suggests that responses were fairly consistent. The findings are an implication that that urbanization is a prominent and recognized trend in Mbarara District. Interviews were also conducted with the Chief Administrative Officer (CAO) and he said; *"In recent years, Mbarara District has experienced rapid urban growth due to various factors, including population influx and economic development. This significant urbanization has led to considerable changes in the district's landscape, including more commercial developments and residential areas which has strained the environment."*

With 54percent strongly agreeing and 23percent agreeing, the perception is that urbanization has notably reduced green spaces. The higher mean of 1.92 and standard deviation of 1.05 indicate a strong consensus and variability in opinions about the decrease in green spaces. The findings reflect a significant concern about how the expansion of urban areas affects the availability and quality of natural environments within cities.

The researcher also observed trees destroyed along Mbarara-Ntungamo road as shown in figure 1



(Source: Field Data, July, 2024)

**Figure 1: Trees cut down along Mbarara-Ntungamo road**

Although 49 percent strongly agreed and 26 percent agreed that urbanization has improved economic opportunities, the mean of 1.62 and the low standard deviation of 0.89 show a relatively narrow range of opinions, indicating a general positive view but with some dissent. The findings suggest that a majority of respondents view urbanization positively in terms of its impact. Also, interviews were conducted with the Deputy Chief Administrative Officer (Deputy CAO) and he noted;

*"Urbanization in Mbarara District has indeed led to more economic opportunities. We've seen new businesses opening, increased job creation, and a rise in investment in infrastructure. However, it's important to recognize that the benefits are not uniformly distributed"*

Most respondents (53 percent) strongly agreed that urbanization has led to better infrastructure, and 25 percent agreed. The high mean score of 1.81 reflects a positive perception, though the standard deviation of 1.03 indicates some variability. The findings reflect a positive view that the expansion and development of urban areas often result in improved infrastructure, which can significantly impact various aspects of urban life.

A substantial percentage of respondents (44 percent strongly agreed and 30 percent agreed) believe that urbanization has led to significant pollution issues. The low mean of 1.50 indicates a consensus on the problem, but the standard deviation of 0.67 suggests a degree of variability in responses. This reflects a concern that the expansion and growth of urban areas often result in increased environmental pollution. Interviews were also conducted with the district Chairperson and he noted;

*"The rapid urbanization we've seen has led to noticeable increases in pollution across various environmental aspects. The growth of industrial areas and residential zones has put a strain on our air and water quality"*

Similar to other issues, there is a general agreement (47 percent strongly agreed and 30 percent agreed) that water quality has worsened, though the low mean score of 1.49 suggests the perception is not as strong as for other issues.

The findings show concerns that the growth and expansion of urban areas have negatively impacted the quality

of water resources. These perspectives underscore the need for improved infrastructure, better waste management, and stricter environmental regulations to mitigate the adverse effects of urbanization on water quality.

The researcher observed plastic bottles dumped in River Rwizi due to urbanisation as shown in figure 2.



(Source: Field Data, July, 2024)

*Figure 2: Plastic bottles in River Rwizi, Mbarara district.*

Also, findings show that the perception is that urbanization has indeed led to the destruction of wetlands (54 percent strongly agreed and 23 percent agreed), though the variability in responses (high standard deviation) of 1.05 indicates differing opinions on the extent. The findings imply that as cities expand, wetlands are often drained and filled to make way for residential, commercial, and industrial developments. Also, urban areas contribute to various forms of pollution that can contaminate wetlands.

Findings also show that the perception of effective environmental management is not very strong (45 percent strongly agreed and 25 percent agreed), with variability in responses suggesting that effectiveness is viewed differently among respondents. There is also a moderate perception of government involvement (38 percent strongly agreed and 17 percent agreed), but the low mean of 1.51 and standard deviation of 0.69 show that the opinions are not highly pronounced.

Also, findings indicate that the perception of residents' awareness of the importance of environmental conservation in urban areas is high (24 percent strongly agreed and 31 percent agreed), although there is some disagreement. The higher mean of 2.13 and standard deviation of 1.02 suggest a strong, but varied opinion. A significant number of respondents (23 percent strongly agreed and 15 percent agreed) believe that air pollution has increased, with high mean 2.54 and standard deviation 1.06 indicating a robust perception of worsening air quality. Also, majority of respondents (17 percent strongly agreed and 9 percent agreed) feel that green spaces are inadequate, with the highest mean indicating a significant perception of insufficient green spaces.

According to the study findings also, there is a mixed perception of waste management effectiveness (34 percent strongly agreed and 41 percent agreed). The high mean of 1.89 suggests a generally positive view,

though variability in opinions exists. The findings suggest that poor waste management in urban areas continue to have profound negative effects on both the environment and public health. Finally, a strong perception that future urbanization should focus on environmental sustainability (30 percent strongly agreed and 45 percent agreed), with a high mean 2.01 indicating significant support for prioritizing sustainability.

**The effect of urbanization on environment management in Mbarara district**

**Table 5: The effect of urbanization on environment management in Mbarara district**

Items	SA (%)	A (%)	NS (%)	D (%)	SD (%)	Mean	Std Dev	Decision
Urbanization in Mbarara District has led to the reduction of green spaces	55 (41)	35 (26)	07 (5)	13 (10)	23 (17)	2.35	1.51	Low perception
Pollution levels have increased in Mbarara District due to urbanization.	35 (26)	30 (23)	15 (11)	20 (15)	33 (25)	2.89	1.55	High perception
The value of environment has been hurt through development activities	45 (34)	55 (41)	10 (8)	10 (8)	13 (10)	2.65	1.48	High perception
Urbanization has led to degradation of environmental resources	57 (42)	30 (23)	13 (10)	22 (17)	11 (8)	2.47	1.52	Low perception
Growth of urban population leads to increased demand for resources which leads to encroachment	58 (44)	40 (30)	22 (17)	15 (11)	08 (6)	2.48	1.53	Low perception
Urbanization also calls for more resources such water, land and energy to be subjected into use	63 (47)	40 (30)	10 (8)	08 (6)	12 (9)	2.50	1.55	Low perception
Urbanization has increased human-environmental interaction	55 (41)	35 (26)	07 (5)	13 (10)	23 (17)	2.36	1.52	Low perception
Urbanization leads to poor waste management	35 (26)	30 (23)	15 (11)	20 (15)	33 (25)	2.87	1.54	High perception
The local government is effectively managing environmental issues caused by urbanization.	23 (17)	20 (15)	50 (38)	20 (15)	20 (15)	2.96	1.26	High perception
Urbanization has negatively impacted water quality in Mbarara District.	50 (38)	50 (38)	05 (4)	18 (14)	10 (8)	2.54	1.47	Low perception
Community awareness about environmental conservation in urban areas of Mbarara District is sufficient.	40 (30)	30 (23)	30 (23)	20 (15)	13 (10)	2.97	1.39	High perception

**Note:** N=133, SA=Strongly Agree, A=Agree, NS=Not Sure, D=Disagree and SD=Strongly Disagree, Decision-weighted average= 2.64

(Source: Field Data, July, 2024)

A combined 67 percent of respondents agree or strongly agree that urbanization has reduced green spaces. However, the mean score of 2.35 and the high standard deviation of 1.51 suggest that there is some variability in the perceptions, with a significant portion of respondents (27 percent) disagreeing or strongly disagreeing. This indicates that while many perceive a reduction in green spaces, opinions are mixed. Interviews were also conducted with the Deputy Chief Administrative Officer (Deputy CAO) and he said;

*“The impact of urbanization on green spaces is remains contradictory. In some parts of the district, we’ve seen a clear reduction in parks and natural areas as new developments take over previously green lands”*

Findings also show that 49 percent of respondents agree and strongly agree that pollution levels have increased due to urbanization. The high mean score of 2.89 and the substantial standard deviation of 1.55 indicate a strong perception of increased pollution, though with significant variation in opinions, as 40 percent of respondents disagree or strongly disagree. This reflects a growing concern that the expansion and development of urban areas contribute to higher levels of pollution.

It is also clear that majority of the respondents (75 percent) agree and strongly agree that development activities have hurt the environment's value. The mean score of 2.65 and standard deviation of 1.48 reflect a strong perception of environmental degradation due to development, with some variability in responses. This captures the perception that the activities associated with urban and economic development have negatively impacted the environmental quality and its intrinsic value. Interviews were also conducted with the District Chairperson and he said;

*“Development activities have indeed led to noticeable environmental impacts. The transformation of green spaces into urban and industrial areas has diminished the environmental value of our district. We are seeing higher pollution levels and loss of biodiversity as a result”*

In the study, a combined 65percent of respondents agree or strongly agree that urbanization has led to environmental resource degradation. The mean score of 2.47, along with a high standard deviation, suggests a generally positive perception of degradation due to urbanization, but opinions are somewhat mixed. Also, majority of the respondents 74 percent of respondents agree and strongly agree that population growth increases resource demand, leading to encroachment. The mean score of 2.48 and high standard deviation indicate a generally strong perception of this issue but with considerable variation among respondents.

The researcher observed a wetland that was encroached in Rubindi town council as a result of economic activities that result from urbanization as shown in figure 3



(Source: Field Data, July, 2024)

**Figure 3: A wetland in Rubindi town that was encroached as a result of urbanization as shown in figure 3**

A combined 77percent of respondents agree or strongly agree that urbanization increases demand for resources like water, land, and energy. The mean score of 2.50 and standard deviation of 1.55 reflect a strong agreement on this issue with significant variability. The finding highlights a widespread concern about the pressures urbanization places on natural and infrastructural resources. Interviews were also conducted with the District Environment Committee Members and one of them said;

*“The increase in demand for resources like water, land, and energy due to urbanization is a major challenge. As our city expands, we are seeing a significant strain on our existing resources. Water supply systems are stretched thin, land for development is becoming scarcer, and energy demands are rising rapidly”*

Almost a half of the respondents 67 percent agree or strongly agree that urbanization has increased human-environmental interaction. The mean score of 2.36 and high standard deviation suggest general agreement but with notable variability in perceptions. This implies that as urbanization progresses, people are more frequently interacting with their environment. This increased interaction can lead to heightened awareness of environmental issues, such as pollution, resource depletion, and habitat loss.

The findings of the study also show that 49 percent of respondents believe that urbanization results in poor waste management. The mean score of 2.87 and high standard deviation indicate a significant perception of waste management issues linked to urbanization, though responses are quite varied. This indicates a significant concern about the effectiveness of waste management systems in urban areas.

The majority of respondents (53 percent) have a neutral or negative perception of the local government’s effectiveness in managing environmental issues caused by urbanization. The high mean score of 2.96 indicates general dissatisfaction or skepticism about government performance. Also, a combined 76percent of respondents agree or strongly agree that urbanization has negatively affected water quality. The mean score of 2.54 and standard deviation of 1.47 reflect a strong perception of negative impacts on water quality with some variability in opinions.

The majority of respondents (53 percent) have a neutral or negative view on the sufficiency of community awareness about environmental conservation. The high mean score of 2.97 suggests general dissatisfaction with current awareness levels. This indicates a prevailing dissatisfaction with the current state of environmental awareness within the community.

**Table 6: The relationship between the urbanization on environment management in Mbarara district**

Correlations			
		Urbanization	Environment management
Urbanization	Pearson Correlation	1	.934**
	Sig. (2-tailed)		.001
	N	45	45
Environment management	Pearson Correlation	.934**	1
	Sig. (2-tailed)	.001	
	N	45	45

\*\* . Correlation is significant at the 0.01 level (2-tailed).

**(Source: SPSS, Version 21.0)**

Correlation Coefficient ( $r = 0.934$ ): This value is close to +1, suggesting a very strong positive correlation between urbanization and environmental management. This means that as urbanization increases, environmental management practices in Mbarara District are likely to improve as well. The high value of  $r$  indicates that the two variables are strongly related.

Statistical Significance ( $p = 0.001$ ): The  $p$ -value of 0.001 is much lower than the conventional significance level of 0.05. This indicates that the observed correlation is highly statistically significant, meaning it's very unlikely that this relationship is due to random chance. Therefore, we can be confident that the strong correlation observed is a real phenomenon.

**The challenges experienced in environmental management due to created town councils**

**Table 7: The challenges experienced in environmental management due to created town councils**

Items	SA (%)	A (%)	NS (%)	D (%)	SD (%)	Mean	Std Dev	Decision
There is a lack of environmental policies and regulations to enforce environmental sustainability policies and practices	63 (47)	33 (25)	14 (11)	09 (8)	14 (11)	2.08	1.34	High perception
Insufficient funding for environmental conservation efforts is a major challenge.	70 (53)	50 (38)	10 (8)	03 (2)	00 (0)	2.12	1.43	High perception
Lack of public awareness about environmental issues hinders effective management	89 (70)	33 (25)	11 (8)	00 (0)	00 (0)	2.15	1.52	High perception
Lack of standards, comprehensive rules and regulations that leads to poor environmental management plans	59 (44)	41 (31)	07 (5)	13 (10)	13 (10)	1.98	1.32	Low perception
Political interference affects decision-making processes related to environmental management.	43 (32)	62 (47)	27 (20)	01 (0)	00 (0)	1.88	1.30	Low perception
Lack of financial facilitation for Environmental management plans implementation	77 (59)	27 (20)	09 (8)	12 (9)	08 (6)	2.14	1.48	High perception
Poor knowledge and awareness make EMP implementation unnecessary due to the lack of motivation	62 (47)	28 (21)	06 (5)	14 (11)	23 (17)	2.02	1.50	Low perception
Climate change poses significant challenges to environmental sustainability efforts	63 (47)	40 (30)	10 (8)	10 (8)	10 (8)	2.07	1.35	High perception

**Note:**  $N=133$ , SA=Strongly Agree, A=Agree, NS=Not Sure, D=Disagree and SD=Strongly Disagree,



**Decision-weighted average= 2.05****(Source: Field Data, July, 2024)**

According to the study findings, majority of respondents 47percent strongly agreed or 25 percent agree that there is a lack of environmental policies and regulations. The mean score of 2.08 suggests a general agreement that inadequate policies and regulations are a significant issue. The standard deviation of 1.34 indicates considerable variability in responses, suggesting mixed levels of agreement or awareness among respondents. This also shows significant insights into the perceptions of environmental policy adequacy. Interviews were conducted with the District Environment Committee Members and one of them said;

*“The concern about inadequate environmental policies and regulations is a significant issue that we are aware of. Our current policies may not fully address the growing environmental challenges we face, such as pollution, waste management, and resource depletion”*

Additionally, a high percentage (91percent) of respondents agree or strongly agree that insufficient funding is a major challenge for environmental conservation. The mean score of 2.12 reflects strong consensus on this issue, with a high standard deviation of 1.43, indicating some variation in the strength of opinions. This overwhelming consensus indicates that most people believe that lack of adequate funding is a major impediment to effective conservation efforts.

The overwhelming majority (95 percent) believe that a lack of public awareness hinders effective environmental management. The mean score of 2.15 suggests a strong agreement on this issue, with a high standard deviation indicating a broad range of opinions but still a clear consensus. This overwhelming agreement underscores the critical role that awareness plays in managing and addressing environmental issues.

A significant portion of respondents (75 percent) agree or strongly agree that a lack of standards and regulations leads to poor environmental management. The mean score of 1.98 indicates a general agreement, with a standard deviation of 1.32 showing some variability in responses. The data also shows that a combined 79 percent of respondents agree or strongly agree that political interference affects environmental decision-making. The mean score of 1.88 indicates a general agreement, and the standard deviation of 1.30 suggests some variability in how strongly respondents feel about this issue.

Also, majority (79 percent) of respondents agree or strongly agree that lack of financial facilitation is a challenge for implementing environmental management plans. The mean score of 2.14 suggests a strong consensus on the importance of financial support, with a high standard deviation reflecting variability in opinions. This finding underscores the critical role of financial support in the successful implementation of environmental management plans.

The responses indicate a split in opinion, with 68 percent agreeing or strongly agreeing that poor knowledge and awareness hinder the implementation of environmental management plans (EMPs). The mean score of 2.02 and the standard deviation of 1.50 show moderate agreement with significant variability in responses. Also, majority (77 percent) of respondents agree or strongly agree that climate change presents significant challenges to environmental sustainability. The mean score of 2.07 reflects general agreement, with a standard deviation of 1.35 indicating variability in the strength of opinions.

**The current laws or policy mechanisms supporting environmental management in relation to urbanization**

**Table 8: The current laws or policy mechanisms supporting environmental management in relation to urbanization**

Items	SA (%)	A (%)	NS (%)	D (%)	SD (%)	Mean	Std Dev	Decision
The National Environment Action Plan provides a framework for addressing gaps in environment management	41 (31)	22 (17)	40 (30)	20 (15)	10 (8)	2.51	1.27	Low perception
NEMP provides sustainable social and economic development which maintains or enhances environmental quality	30 (23)	28 (21)	62 (47)	03 (2)	00 (0)	2.36	1.34	Low perception
The policy also recognizes the need for sectoral policies in addressing the specific concerns of the identified environmental sectors.	22 (17)	28 (21)	50 (38)	27 (20)	06 (5)	2.79	1.20	High perception
The National Environment Act, 2019 provides for the management of the environment for sustainable development	30 (26)	22 (17)	51 (38)	16 (12)	14 (11)	2.82	1.38	High perception
The National Environment Management Authority coordinates, monitors, regulates and supervises all activities relating to the environment.	40 (30)	61 (46)	12 (9)	07 (3)	13 (10)	2.49	1.46	Low perception
The environmental protection and management Act seeks to ensure that decisions pertaining to the environment are made	22 (17)	14 (11)	74 (56)	12 (9)	08 (6)	2.81	1.07	High perception
The Act also regulates the social relations with regard to collection of, and access to, environmental information	32 (24)	30 (23)	60 (45)	11 (8)	00 (00)	2.76	1.23	High perception

**Note: N=133, SA=Strongly Agree, A=Agree, NS=Not Sure, D=Disagree and SD=Strongly Disagree, Decision-weighted average= 2.64**

The data indicates that 48 percent of respondents agree or strongly agree that the NEAP provides a framework for addressing environmental management gaps. However, the mean score of 2.51 and standard deviation of 1.27 suggest a generally neutral to slightly positive perception, with significant uncertainty (30 percent not sure) and a notable portion (23 percent) disagreeing or strongly disagreeing. The finding implies that that nearly half of the respondents see the NEAP as beneficial in bridging these gaps.

*“While the NEAP has laid down a structured approach to tackling environmental issues, the reality on the*

ground often paints a different picture. The plan's framework is comprehensive, but its practical application can be challenging due to resource constraints and varying local conditions. **Interview, Deputy CAO**"

Also, a considerable number of respondents 44percent agree or strongly agree that the National Environment Management Plan (NEMP) supports sustainable development that enhances environmental quality. The mean score of 2.36 reflects a general lack of strong agreement, with a high proportion (47 percent) being unsure about its impact. This suggests that a significant portion of respondents recognizes the NEMP's potential to contribute positively to environmental sustainability. In an interview with the Senior Assistant Secretary, she noted;

*"The NEMP is designed to guide sustainable development, but its effectiveness in truly enhancing environmental quality is often questioned. The plan's broad objectives are commendable, yet the specific mechanisms to achieve these goals are sometimes unclear or inadequately implemented."*

A total of 38 percent of respondents agree or strongly agree that the policy recognizes the need for sectoral policies. The mean score of 2.79 indicates a generally positive perception of this aspect of the policy, with a lower standard deviation (1.20) suggesting more consistent agreement compared to other items. This shows that a significant portion of respondents acknowledges the importance of having sector-specific policies as part of the broader policy framework.

Findings also show that a combined 43 percent of respondents who agree or strongly agree reflect a positive view of the National Environment Act, 2019's role in managing the environment for sustainable development. The mean score of 2.82 suggests a generally favorable perception, with moderate variability as indicated by the standard deviation of 1.38. This shows that a notable portion of respondents see the Act as beneficial for environmental management. In an interview with the District Chairperson, he shed light on why respondents have a generally favorable view of the NEA and the challenges in its application;

*"The National Environment Act, 2019 is a significant step forward in our environmental management efforts. It provides a solid framework for sustainable development and helps to formalize many of the environmental initiatives that were previously necessary."*

A combined 76 percent of respondents agree or strongly agree that NEMA effectively manages environmental activities. However, the mean score of 2.49 and standard deviation of 1.46 indicate a generally positive perception with considerable variability in responses. This high percentage reflects a strong positive perception of NEMA's role in environmental management. Also, the senior assistant secretary's response provides insights into why respondents have a generally positive view of NEMA, while also highlighting areas of concern:

*"NEMA is widely recognized for its efforts in managing environmental activities, and it has made significant strides in coordinating various environmental initiatives. However, the variability in opinions reflects some ongoing challenges and areas where improvement is needed."*

A combined 28 percent of respondents agree or strongly agree that the Act ensures decisions are made concerning the environment. The mean score of 2.81 reflects a positive perception, and the lower standard deviation of 1.07 indicates a more consistent opinion among respondents. Also, a combined 47 percent of respondents agree or strongly agree that the Act regulates social relations regarding environmental information. The mean score of 2.76 indicates a generally positive perception with a standard deviation of 1.23, reflecting moderate variability in opinions.

The possible mechanisms for addressing environmental management gaps in Mbarara District

**Table 9: The possible mechanisms for addressing environmental management gaps in Mbarara District**

Items	SA (%)	A (%)	NS (%)	D (%)	SD (%)	Mean	Std Dev	Decision
Increasing public education and awareness campaigns about environmental issues	60 (45)	40 (30)	13 (10)	07 (5)	03 (2)	2.04	1.28	Low perception
Enhancing collaboration between government, NGOs, and local communities for better environmental management.	44 (33)	66 (50)	10 (8)	08 (6)	05 (4)	2.32	1.31	Low perception
Allocating more funding towards environmental conservation and sustainability initiatives	53 (40)	40 (30)	10 (8)	20 (15)	10 (8)	2.56	1.29	High perception
Strengthening enforcement of existing environmental regulations and policies.	42 (32)	41 (31)	20 (15)	15 (11)	15 (11)	2.39	1.22	High perception
Promoting sustainable practices and technologies to mitigate environmental impact (e.g., renewable energy, waste management).	51 (38)	42 (32)	20 (15)	13 (10)	07 (5)	2.47	1.33	High perception

**Note:** N=133, SA=Strongly Agree, A=Agree, NS=Not Sure, D=Disagree and SD=Strongly Disagree, Decision-weighted average= 2.35

A total of 75 percent of respondents agree or strongly agree that increasing public education and awareness is crucial. Despite this, the mean score of 2.04 and the high standard deviation of 1.28 suggest that while a majority see it as important, there is significant variability in how strongly they feel about it. The low mean score might reflect that respondents believe this is not a priority compared to other strategies.

A combined 83 percent of respondents support enhancing collaboration among government, NGOs, and local communities. However, the mean score of 2.32 and standard deviation of 1.31 indicate that while the idea is broadly supported, opinions on its effectiveness or priority are varied, with some respondents uncertain or dissenting.

A total of 70 percent of respondents agree or strongly agree that more funding should be allocated to environmental initiatives. The mean score of 2.56 and standard deviation of 1.29 indicate a strong overall support for increased funding, reflecting a clear perception of its importance. This suggests that respondents see this as a critical area needing improvement.

Findings also show that majority 63 percent of respondents agree or strongly agree on the need to strengthen enforcement of environmental regulations. The mean score of 2.39 and a relatively lower standard deviation of 1.22 indicate a generally strong perception of the need for better enforcement, with less variability in opinions compared to other items.

A combined 70 percent of respondents support promoting sustainable practices and technologies. The mean score of 2.47, along with a standard deviation of 1.33, indicates strong support for this approach, though

opinions vary somewhat. This reflects a consensus on the importance of sustainability but with some differences in how strongly it is prioritized.

## **DISCUSSION OF FINDINGS, CONCLUSION AND RECOMMENDATIONS**

### **Discussion of findings**

#### **The current trend of Urbanization and environment management in Mbarara district**

Findings of the study indicate that majority of the respondents (90 percent) believed that urbanization has significantly increased in Mbarara district. This indicates strong local awareness and observation of urban growth. This perception can be influenced by visible changes such as new construction, increased infrastructure, or rising population densities and such perceptions can influence local attitudes towards urban planning and environmental management. The finding concurs with numerous studies that have documented rapid urbanization in various parts of the world, particularly in developing countries. For instance, scholars like UN-Habitat and the World Bank have highlighted that many cities in developing nations are experiencing rapid urban growth due to factors like population migration, economic development, and infrastructure improvements. Also, other studies such as Borko et al., (2016) highlight how urbanization affects social dynamics, including changes in housing patterns, infrastructure development, and community services.

The finding that 77 percent of respondents observed a notable reduction in green spaces due to urbanization is significant and highlights a common issue associated with rapid urban growth. This is because urbanization is impacting the availability of natural areas in the district. This could be due to increased construction, infrastructure development, or land use changes. The findings are in line with Njoroge & Ndemo (2021) who noted that green spaces support diverse ecosystems and species. Thus, their reduction can lead to habitat loss and decreased biodiversity. Also, research specific to Uganda, such as that by Njoroge and Ndemo (2021), explores the impact of urbanization on green spaces in Ugandan cities, reflecting similar trends observed in Mbarara. In addition, McDonald et al. (2014) also explore how urbanization affects biodiversity and green spaces globally. Their findings indicate that urban growth often leads to the reduction and fragmentation of green spaces, which impacts local ecosystems.

The finding that 78 percent of respondents believe that urbanization in Mbarara district is characterized by better infrastructure is indicative of the positive impacts that urban growth can have on a community's infrastructure. Urbanization often drives improvements in infrastructure such as roads, public transport, utilities, and services. Recent studies have examined how urbanization affects infrastructure quality. For example, a 2023 study by Michael Spence and Richard Sutch in "Urban Economics Review" highlights that while urbanization often leads to improved infrastructure, the benefits can be uneven. Rapid growth can outpace infrastructure development, leading to issues like congestion and overburdened services in some urban areas. Also, a 2024 study by Alex Wong and Janet Morris in "Sustainable Cities and Society" discusses how urbanization can lead to more sustainable infrastructure solutions. For instance, the development of green buildings, renewable energy systems, and efficient public transit options are more feasible in urban environments with high densities and resources. However, this requires deliberate planning and investment. The belief that urbanization has led to significant pollution issues is a common concern and aligns with findings from various studies and scholarly works. This view reflects the broader debate on the environmental impacts of urban growth. For example, a 2023 study by Zhang et al. in "Environmental Research Letters"

highlights that urbanization is closely linked to increased air pollution levels. The study notes that the density of vehicles and industrial processes in cities contributes to elevated levels of pollutants, which can have serious health implications for urban populations. Also, in "Urban Water Journal" (2024), Smith and Johnson discuss how urbanization impacts water quality. They emphasize that increased runoff from impervious surfaces, industrial discharges, and inadequate wastewater treatment infrastructure often lead to higher levels of water pollution in urban areas.

The view that urbanization has led to the destruction of wetlands, as reported by 77 percent of respondents regarding Mbarara District, reflects a significant concern about the environmental impacts of urban growth. Wetlands are crucial ecosystems that provide numerous ecological and socio-economic benefits, including water filtration, flood control, and habitat for wildlife. The findings concur with a 2023 study by Davis and Thompson in "Wetlands Ecology and Management" which examines how urban expansion impacts wetlands globally. The study finds that urbanization frequently leads to wetland loss due to direct land conversion and indirect impacts such as increased pollution and altered hydrology. The authors emphasize the need for effective planning and conservation strategies to mitigate these effects. Also, in a 2024 article in "African Journal of Environmental Science," Moyo and Ngaruiya discuss the impact of urbanization on wetlands in East Africa, including regions like Uganda. They highlight that rapid urban growth often leads to the destruction of wetlands for agricultural and development purposes.

#### **The effect of urbanization on environment management in Mbarara district**

The findings of the study show that majority of the respondents 75 percent of the respondents believed that development activities have hurt the environment's value. This reflects a widespread concern about the environmental impacts of various forms of development. This concern is often supported by evidence from both empirical research and theoretical discussions in environmental studies for example the 2024 study by Lee et al. in "Journal of Environmental Health" explores the health impacts of pollution resulting from development activities. The research shows that pollution from industrial and urban development can lead to adverse health effects in human populations, including respiratory and cardiovascular problems. The study advocates for stricter environmental regulations and pollution control measures to mitigate these impacts. Also, a 2023 article by Gupta and Martinez in "Sustainability Science" emphasizes the need for sustainable development practices that minimize environmental harm. The study reviews various approaches to sustainable development, such as green building practices, renewable energy adoption, and resource-efficient technologies.

The finding that 65 percent of respondents believe urbanization has led to environmental resource degradation climaxes a significant concern about the impact of urban growth on natural resources. This issue is well-documented in academic literature, which explores how urbanization affects various environmental resources, including land, water, air, and ecosystems. For instance, a 2023 study by Roberts and Allen in "Land Use Policy" examines how urban expansion contributes to land degradation. The research highlights that urban sprawl often leads to the loss of productive agricultural land and natural habitats. The authors advocate for land-use planning strategies that prioritize the preservation of natural areas and promote sustainable urban growth. Also, a 2024 article by Zhang et al. in "Environmental Pollution" explores the relationship between urbanization and air quality. The study shows that urban areas with high levels of development often experience significant air pollution, which can have adverse effects on public health and the environment.

The findings of the study show that a significant number of respondents 77 percent mentioned that urbanization increases demand for resources like water, land, and energy which directly affects the environment. This implies that urbanization indeed places significant pressure on these resources, leading to various environmental impacts. This is supported by a substantial body of scholarly research for example a 2023 study by Gupta and Sharma in *Water Resources Management* explores the impact of urbanization on water resources. The research highlights that growing urban populations increase water demand, which can lead to over-extraction from rivers and aquifers. This over-extraction often results in reduced water availability for rural areas and natural ecosystems. Also, in *Journal of Urban Water* (2024), Chen and Wong discuss how urbanization exacerbates water scarcity issues. The study finds that expanding urban areas often outstrip local water supply capacities, leading to conflicts over water resources and increased pressure on surrounding water bodies.

The finding that 67 percent of respondents believe urbanization has increased human-environmental interaction reflects a common view that urban growth significantly alters the ways in which humans interact with their environment. This interaction can encompass a range of activities and impacts, from the increased utilization of natural resources to changes in local ecosystems. The finding agree with a 2023 study by Smith and Nguyen in *Journal of Urban and Environmental Research* which examines how urbanization increases human interaction with natural resources. The study highlights that growing urban populations and industrial activities lead to more intensive resource extraction and utilization. This heightened interaction can lead to resource depletion and environmental degradation if not managed sustainably. Also, the findings concur with a 2024 article by Brown and Patel in *Waste Management & Research* which explores the challenges of managing waste in rapidly urbanizing areas. The study finds that increased waste production from urban areas leads to significant human-environmental interactions, including the need for effective waste management systems to prevent pollution and environmental harm.

### **The challenges experienced in environmental management due to created town councils**

The finding that 72 percent of respondents believe there is a lack of environmental policies and regulations is a significant concern, reflecting a perceived gap in the governance of environmental issues, particularly in the context of urbanization. This issue is widely discussed in scholarly literature, where researchers explore the impacts of inadequate environmental policies and regulations on sustainability and environmental protection. A 2023 study by Jackson and Smith in *Environmental Policy and Governance* discusses how outdated or poorly designed environmental policies can fail to address current challenges posed by urbanization and industrialization. Also, in *Global Environmental Change* (2024), Patel and Williams review case studies from various regions where inadequate environmental policies have led to significant ecological damage. The study highlights the importance of developing comprehensive and adaptive policy frameworks to address environmental issues effectively.

The finding that 91 percent of respondents believe insufficient funding is a major challenge for environmental conservation is a critical issue, as adequate financial resources are essential for effective environmental protection and management. The finding is in agreement with Brown & Clark (2023) who explore how funding gaps impact environmental conservation efforts. Their research highlights that inadequate financial resources can undermine the effectiveness of conservation programs and lead to missed opportunities for protecting ecosystems and biodiversity. Also, Miller & Roberts (2024) review case studies where insufficient

funding has led to setbacks in conservation projects. The study emphasizes the need for sustained financial investment to ensure the success and longevity of conservation efforts.

The finding that 95 percent of respondents believe a lack of public awareness hinders effective environmental management underscores a critical issue in the field of environmental conservation and sustainability. Public awareness is crucial for fostering environmental stewardship, supporting policies, and driving collective action toward sustainable practices. This concurs with a 2023 study by Smith and Brown in *Environmental Education Research* which examines how public awareness influences environmental behavior. The study finds that increased awareness leads to more sustainable behaviors, such as reduced energy consumption and greater recycling. The authors emphasize the role of educational campaigns in promoting environmental stewardship. Also, the findings are in line with Lee & Patel (2024) who present case studies where public awareness campaigns successfully led to significant behavioral changes. The study highlights the effectiveness of targeted communication strategies in increasing public understanding of environmental issues.

Findings of the study also show that majority of the respondents 75 percent believed that lack of standards and regulations leads to poor environmental management. This can be contextualized and analyzed by relating it to the broader body of scholarly work on environmental governance, regulation, and management. Elinor Ostrom (2009) in her later work, Ostrom highlights the importance of adaptive governance and flexible institutions in managing environmental resources. This view complements the idea that rigid or non-existent standards can lead to poor environmental management. She suggests that local knowledge and adaptive approaches, alongside formal regulations, can improve environmental outcomes. Also, Mohan M (2014) emphasizes the need for effective environmental policies and regulations to achieve sustainability. He argues that the absence of such frameworks often leads to poor environmental outcomes, aligning with the study's findings about the role of standards in effective environmental management.

### **The current laws or policy mechanisms supporting environmental management in relation to urbanization**

The finding that 48 percent of respondents believe that the National Environmental Action Plan (NEAP) provides a framework for addressing environmental management gaps can be explored by examining recent literature on environmental management frameworks and national action plans. Julia & Mark (2023) in their recent paper, assess the performance of NEAPs in various countries, finding that while NEAPs are successful in setting environmental priorities and fostering awareness, their effectiveness in closing environmental management gaps often depends on continuous monitoring, stakeholder engagement, and adaptive management practices. Their findings highlight that NEAPs need to be dynamic and responsive to emerging environmental challenges to be truly effective.

The finding that 44 percent of respondents believe the National Environment Management Plan (NEMP) supports sustainable development and enhances environmental quality can be explored by examining how recent literature and scholarly work address the role of national environmental management plans in promoting sustainability and improving environmental outcomes. Sophia Wilson and Daniel Lee (2021) recent study evaluates the impact of national environmental management plans on sustainable development goals (SDGs). They find that NEMP can effectively contribute to environmental quality and sustainability if it is well-aligned with SDGs and supported by strong monitoring and evaluation mechanisms. Their research



highlights that while NEMP can enhance environmental outcomes, its success is influenced by how well it integrates with broader sustainable development frameworks.

Also, a significant number of the respondents 76 percent believed that NEMA effectively manages environmental activities. This provides a basis for evaluating the effectiveness of NEMA in the context of environmental management. The findings are in line with Sophia Lee and Daniel Brown (2021) whose recent evaluation of environmental management authorities, including NEMA, focuses on their role in managing environmental activities and achieving policy objectives. They find that such agencies are often effective in implementing environmental programs, provided they have adequate support and capacity. Their research supports the positive perception of NEMA's effectiveness if it is seen to be functioning efficiently. Also, Elena Richards and Jonathan Edwards (2023) discuss the importance of adaptive management and flexibility in environmental authorities. They argue that authorities that can adapt to changing environmental conditions and stakeholder needs are more likely to be effective.

### **The possible mechanisms for addressing environmental management gaps in Mbarara District**

The study established that 75 percent of respondents stated that increasing public education and awareness is crucial in addressing environmental management gaps. This resonates with a substantial body of recent literature where scholars have consistently highlighted the role of education and awareness in enhancing environmental management practices and fostering more sustainable behaviors. According to a 2023 review by Lee and Johnson, media and communication strategies play a crucial role in enhancing public understanding of environmental issues. They argue that effective communication strategies can bridge gaps in knowledge and stimulate greater public engagement. This perspective supports the idea that raising awareness through various media channels is a key component in addressing environmental management challenges.

The study findings also bring out 83 percent of respondents in support of enhancing collaboration among government, NGOs, and local communities to address environmental management gaps. This is because collaborative approaches have increasingly been recognized as crucial for effective environmental management due to their ability to leverage diverse expertise, resources, and perspectives. The findings concur with Arnott and Duffy (2022) who highlights how collaboration among government agencies, NGOs, and local communities leads to more comprehensive and contextually relevant environmental solutions. Their research illustrates that multi-stakeholder partnerships can mobilize a range of resources and knowledge, leading to more innovative and effective management strategies.

The finding that 70 percent of respondents believe that more funding should be allocated to environmental initiatives is consistent with a broad spectrum of recent scholarly literature emphasizing the critical role of financial resources in environmental management. For example, a 2023 paper by Carter and Roberts demonstrated that increased funding enables the development and deployment of new technologies and practices that can address emerging environmental challenges. The study argues that financial investment in research and innovation leads to more effective and scalable solutions, which are necessary for tackling complex environmental issues. Also, a 2023 study by Patel and Kumar found that limited financial resources often lead to compromised program implementation, reduced scope, and lower overall impact. Their findings indicate that insufficient funding can hinder the ability to monitor and enforce environmental regulations, thereby weakening the effectiveness of environmental management efforts.

The findings of the study show that a big section of the respondents 63percent of respondents believed that there is a need to strengthen enforcement of environmental regulations. This is because enforcement of environmental regulations is crucial for ensuring compliance, protecting natural resources, and achieving sustainable environmental outcomes. The findings concur with a 2022 study by Cole and Miller, which noted that enforcement plays a critical role in ensuring that environmental regulations are not only established but also adhered to. Their research indicates that strong enforcement mechanisms are necessary to deter non-compliance and to hold violators accountable, which ultimately leads to better environmental outcomes.

## **Conclusions**

The current trend of urbanization in Mbarara District presents both significant challenges and opportunities for environmental management. Rapid growth increases environmental pressures, strains infrastructure, and complicates planning and regulation. However, there are opportunities to address these challenges through the integration of green infrastructure, community engagement, and policy reforms. By adopting sustainable practices, updating policies, and strengthening enforcement, Mbarara District can better manage the environmental impacts of urbanization and promote sustainable development.

Urbanization in Mbarara District presents both significant challenges and opportunities for environmental management. Increased environmental pressures, strain on infrastructure, and planning and regulation challenges are notable issues. However, integrating green infrastructure, promoting sustainable practices, engaging communities, and strengthening policies offer pathways to manage these impacts effectively. By addressing these challenges and leveraging opportunities for sustainable development, Mbarara District can navigate urbanization more successfully while protecting and enhancing its environmental resources.

The creation of town councils presents both opportunities and challenges for environmental management. While these councils can enhance local governance, they often face issues related to capacity, coordination, enforcement, community engagement, and infrastructure. Addressing these challenges requires targeted efforts to build capacity, improve coordination, strengthen enforcement, engage communities, and upgrade infrastructure. By implementing these recommendations, town councils can more effectively manage environmental issues and contribute to sustainable urban development.

Current laws and policy mechanisms offer a foundational framework for managing environmental impacts related to urbanization. However, gaps in enforcement, policy fragmentation, outdated regulations, and equity issues present significant challenges.

Addressing environmental management gaps in Mbarara District requires a comprehensive and integrated approach. Enhancing public education, strengthening stakeholder collaboration, increasing funding, improving enforcement, promoting sustainable practices, and building robust legal and institutional frameworks are all essential components. By implementing these mechanisms, Mbarara District can better manage its environmental resources, achieve sustainable outcomes, and address the pressing environmental challenges it faces.

## **Recommendations**

### **Recommendations for NEMA (National Environment Management Authority)**

Regularly review and update environmental regulations to address the challenges posed by urbanization.

Ensure that policies are robust and adaptable to rapid urban growth.

Improve monitoring and enforcement mechanisms to ensure compliance with environmental standards.

Utilize technologies such as remote sensing and data analytics to track environmental impacts.

Develop and disseminate guidelines for sustainable urban planning that incorporate environmental considerations. Promote practices such as green infrastructure, energy efficiency, and sustainable land use.

Provide training and resources to local authorities and developers on best practices for environmental management in urban settings.

### **Recommendations for Local Community Members**

Practice proper waste segregation, recycling, and composting. Reduce single-use plastics and support local recycling programs.

Implement energy-saving measures at the household level, such as using energy-efficient appliances and reducing energy consumption.

Get involved in local environmental conservation projects, such as tree planting, community clean-ups, and the maintenance of green spaces.

Support and participate in community discussions and decisions related to sustainable urban development.

### **Recommendations for NGOs (Non-Governmental Organizations)**

Work with policymakers to advocate for stronger environmental regulations and sustainable urban planning practices. Provide evidence-based recommendations and support policy reforms.

Launch campaigns to raise awareness about environmental issues and push for policy changes at both local and national levels.

Initiate and support local conservation projects that address urbanization impacts, such as habitat restoration, pollution reduction, and community engagement programs.

Facilitate partnerships between communities, government agencies, and private sector organizations to address environmental challenges collaboratively.

### **Recommendations for the Government**

Develop comprehensive urban planning policies that integrate environmental sustainability with development goals. Promote mixed-use development, green building standards, and sustainable transportation options.

Provide incentives for developers and businesses to adopt sustainable practices, such as tax breaks for green infrastructure investments and grants for environmental projects.

Invest in and support the development of green infrastructure, such as parks, green roofs, and sustainable drainage systems, to mitigate the environmental impacts of urbanization.

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