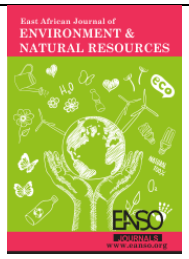

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Original Article

Waste Management Approaches and Environmental Conservation in Uganda: A Case of Kabale Municipal Council

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Recycling, Incineration, Waste water management, Environmental conservation.

ABSTRACT

The study focused on the influence of waste management approaches on environmental conservation in Kabale Municipal Council. Specifically, to examine different methods of waste management and their influence on environmental conservation, to assess the challenges faced in waste management and its effects on environmental conservation and to establish measures in place to promote waste management in environmental conservation in Kabale Municipal Council. A case study design was employed, using a qualitative approach. A purposive sampling technique was applied to select 17 respondents. Data collection methods included interviews and focus group discussions. The data was analysed using thematic analysis with the aid of NVIVO. The study established that Kabale Municipal Council has made some efforts to promote recycling by setting up plastic waste collection points and encouraging businesses to recycle materials. The study found that incineration, as a method of waste management, has not been widely implemented in the Kabale Municipal Council. The study also found that Kabale Municipal Council primarily utilises waste collection trucks for regular household and commercial waste collection. The study found that municipalities lack sufficient waste collection vehicles and waste disposal facilities to cover all areas, especially informal settlements and rural zones. The study found that Kabale Municipal Council has launched public awareness campaigns to educate residents about the importance of proper waste management, recycling, and the health risks of improper waste disposal. The study recommends that the Kabale Municipal Council should encourage households and businesses to separate their waste into categories. The study also recommends that the Kabale Municipal Council should launch continuous public education campaigns to inform the community about the importance of waste segregation, recycling, and proper disposal. Lastly, it was recommended that the Kabale Municipal Council should develop and implement a long-term waste management plan that includes waste minimisation, collection, recycling, disposal, and energy recovery.

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INTRODUCTION

Waste management is a critical challenge driven by population growth, resource depletion, and environmental pollution. Historically, waste posed little problem until increasing human settlements led to significant health crises like the Black Death, highlighting poor waste handling. Modern waste management laws began in the 19th century with measures in England and the USA, evolving into comprehensive policies worldwide, such as the European Union's Waste Framework Directive and Korea's Extended Producer Responsibility system, aimed at reducing waste and promoting recycling and circular economy principles (Pikirayi & Magoma, 2021; Kusumaningrum et al., 2020).

In Africa, waste generation is rapidly increasing; by 2050, the continent's waste volume is expected to triple, with most waste disposed of in uncontrolled dumpsites, often burnt openly, causing environmental harm (Ahen & Amankwah-Amoah, 2021; Muheirwe et al., 2022). Organic waste, which forms the majority, presents both challenges and economic opportunities. East African cities like Kampala generate large amounts of food and organic waste, but only a fraction is properly managed (Ssepuuya et al., 2023).

In Uganda, particularly in Kampala city, over 28,000 tons of waste are generated monthly, yet only about 40% is safely managed, with the remainder being indiscriminately dumped in unauthorised locations, leading to pollution, environmental degradation, and health risks (Komakech et al., 2023). The Constitution of the Republic of Uganda (1995) mandates the State to provide clean water and ensure a healthy environment, while Article 245 requires Parliament to enact laws protecting the environment from abuse, pollution, and degradation, as reflected in the National Environment Act (NEA), which codifies these duties (Kabale Municipal Report, 2021). Despite these legal frameworks, challenges persist due to industrial pollution, such as beverage factories dumping plastic waste into the River Rwabakazi, negatively impacting communities relying on this water source for agriculture and domestic use. Unsustainable consumption and production patterns continue to drive land degradation, air and water pollution, and resource depletion, posing significant ecological and social challenges across Uganda.

Problem Statement

Environment conservation is an essential part of waste management basin on SDG 11 -sustainable cities and communities which aims at making cities safe, inclusive, resilient and sustainable (United Nations Report, 2022), Many countries have tried to conserve the environment through waste management but in vain for example in Uganda, Kampala city generates around 2,300 tonnes of waste per day, amounting to 803,000 tonnes per year which is expected to increase to at least double this amount by 2030 (KCCA Audit Report, 2020). In 2021, Kawempe was generating

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and collecting around 30 tons of waste per day from beverage shops (Kawempe City Council Abstract, 2022). By the end of 2021, the amount of waste generated had skyrocketed to over 200 tons per day, which is a very significant increase (KCCA Audit Report, 2022). Though the most common methods used for municipal waste treatment are recycling, landfilling, mechanical biological treatment, incineration and sewage water treatment to prevent and minimise hazardous effects on mankind and the environment (KCCA Audit report, 2022).

Despite the budgetary allocation and hiring of private firms to support the collection, garbage has remained a challenge in Kabale Municipal, where, by the end of 2019, the amount of waste generated had skyrocketed to over 200 tons per day, which is a very significant increase (Nahamya, 2019). In 2021, the town was generating and collecting around 30 tons of waste per day from beverage shops (Kabale Municipal Council Public Health Departmental Report, 2021). Furthermore, the drainage system in Kabale Municipal Council is being blocked by plastic bottles from beverage shops, banana peels and fibres from hotels, plastic bags from central markets and leachate from the butcher (Kabale Municipal Council Public Health Departmental Progress Report, 2022). Many written reports have revealed that over 60 percent of the over 200 tons of waste generated in Kabale Municipal Council per day remains uncollected, unprocessed, or dumped in inappropriate places (Kushaba, 2022). This resulted in environmental pollution, health risks, habitat destruction, soil degradation and resource depletion, which affect the environment. It was from this backdrop that the study established the influence of waste management on environmental conservation in Kabale Municipal Council.

General Objective

To examine the influence of waste management approaches on environmental conservation in Kabale Municipal Council.

Specific Objectives

- To examine different methods of waste management and their influence on environmental conservation in Kabale Municipal Council.
- To assess the challenges faced in waste management and its effects on environmental conservation in Kabale Municipal Council.
- To establish measures in place to promote waste management in environmental conservation in Kabale Municipal Council

Research Questions

- What are the different methods of waste management and their influence on environmental conservation in Kabale Municipal Council?
- What are the challenges faced in waste management and its effects on environmental conservation in Kabale Municipal Council?
- What measures are in place to promote waste management in environmental conservation in Kabale Municipal Council?

METHODOLOGY

A cross-sectional survey design using a qualitative approach was employed to gather data from 17 purposively selected key stakeholders in waste management—namely the Mayor, Environmental Health Officer, Physical Planner, Health Inspector, and Town Clerk—through interviews and observations. Data collection instruments included an interview guide and observation checklist, with interviews structured to address aspects of recycling, incineration, and wastewater management. Validity of the instruments was established using the Content Validity Index (CVI), averaging 0.874, while reliability was confirmed with Cronbach's Alpha at 0.841. The researcher obtained ethical clearance from Bishop Stuart University, ensured informed consent, and upheld privacy and confidentiality throughout the study. Data analysis involved SPSS for quantitative data and

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thematic analysis for qualitative responses, enabling a comprehensive interpretation of findings aligned with the study objectives.

RESEARCH FINDINGS

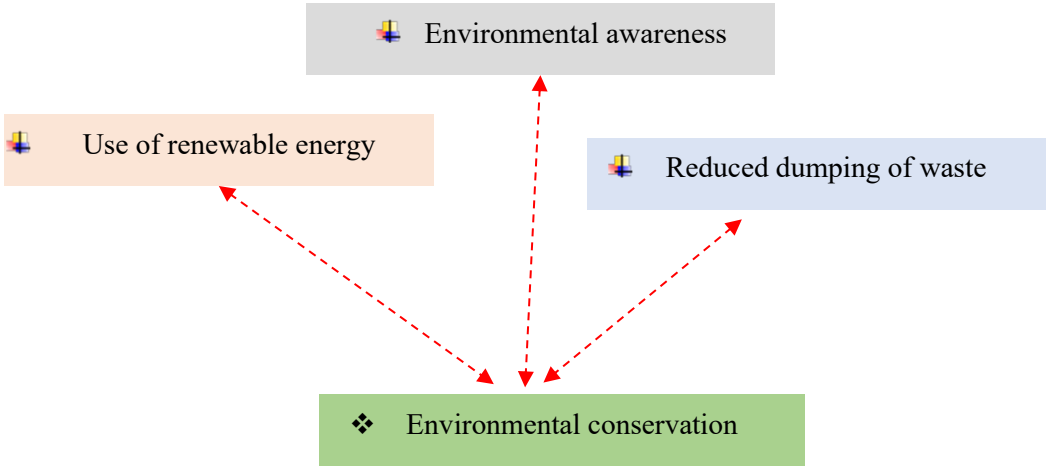
Qualitative Findings

This section of the study presented qualitative findings on waste management and environmental conservation based on the specific objectives of the study. It further presents the information (qualitative) from the interviews and answers the hypothesis statement.

Environmental Conservation

Qualitative findings on environmental conservation often focus on understanding the behaviours, attitudes, perceptions, and values of individuals or communities in relation to environmental protection. These findings are typically derived from methods such as interviews and observation.

Figure 1: Verbatim on Environmental Conservation



Key Informant D has this to say;

> *"Kabale Municipal Council carries out sensitisation about the rules that govern the municipality through stakeholder meetings, but most community members do not attend these meetings; invitations are most times selective and in some cases, the meetings are held with Local councils and councillors".*

This response seems to suggest that Kabale Municipal sensitises the community members about the rules governing environmental awareness. However, a few are not satisfied with the selection criteria used and the choice of the meeting places, thereby excluding many from these sessions.

Key Informant A noted that;

> *Conservation efforts emphasise proper disposal and treatment of hazardous waste, which includes chemicals, heavy metals, and e-waste. Improper disposal of such waste leads to contamination of ecosystems, wildlife, and human health. Environmental conservation influences regulations that ensure these materials are properly handled and recycled, reducing their toxic impact.*

Key Informant C said that;

> *Waste management practices influenced by environmental conservation prioritise recycling materials like paper, plastics, metals, and glass. Recycling helps conserve natural resources by reducing the need to extract raw materials from the environment. For example, recycling aluminium saves up to 95% of the energy required to produce new aluminium from raw bauxite. Environmental conservation encourages the implementation of circular economy principles, where waste is minimised, and products and materials are reused, refurbished, and recycled. This system reduces the demand for virgin materials and supports the sustainable use of*

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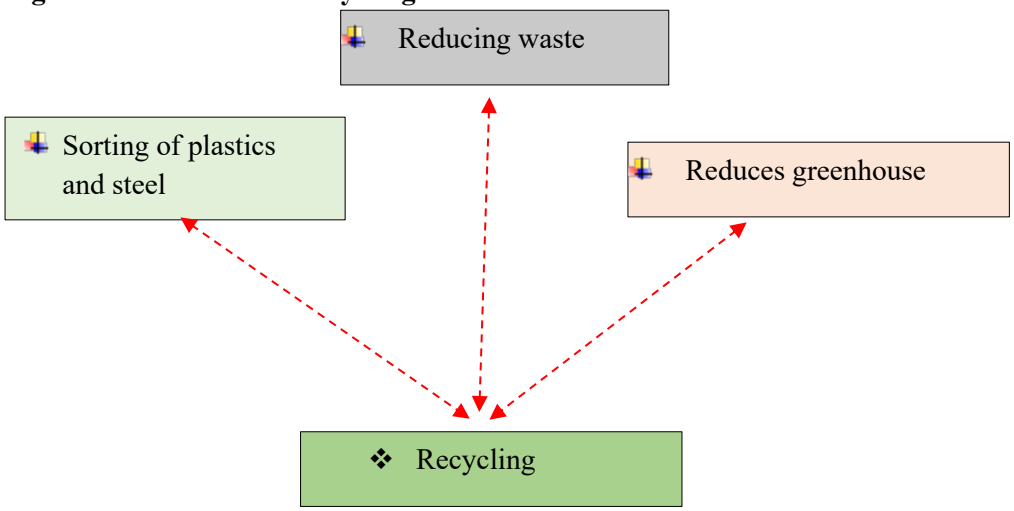
resources, thereby preserving ecosystems and reducing environmental degradation.

The influence of environmental conservation on waste management is essential for creating sustainable systems that reduce environmental harm, conserve resources, and promote healthier ecosystems. By focusing on waste reduction, recycling, resource recovery, and sustainable practices, minimise the negative environmental impacts of waste and protect both human health and biodiversity.

Influence of Recycling on Environmental Conservation

In Kabale Municipal Council, as in many other growing towns, the improper disposal of waste often leads to waste piling up in streets, open spaces, and landfills. Recycling helps divert a significant portion of waste from these areas, reducing the amount of waste that ends up in landfills. This, in turn, helps reduce land degradation, methane emissions (a potent greenhouse gas emitted from decomposing organic waste in landfills), and groundwater contamination as purported by the following quotations.

Figure 2: Verbatim on Recycling on Environmental Conservation



Key Informant A noted that;

Waste management plans/ programs are drawn they are not presented to the community to enable it to follow the activities to be done, thus there is a communication problem. It is so unfortunate that community members do not follow what has been planned, hence the reason for having heaps of waste in most collection places. For example, the Mayor procured 203 iron cans and placed them on every street of Kabale Municipal. The council takes 2-3 days to collect the garbage and community members are not bothered to remove it.

These findings are attributed to the fact that Kabale Municipal encourages key community participation where many of the stakeholders were encouraged to come, attend a number of set meetings and participate equally through sharing and exchanging of ideas in the development of the municipality, hence intended to better the effective management of sorting plastics and steel from the recycled waste.

Key respondent A stressed that,

We normally seek views from all villages and wards during our planning meetings in the months of May, June and July, but they were not well informed of what was expected of them, hence information flow seemed inadequate amongst the locals. They were supposed to be briefed on what they should have done present in the planning meetings in relation to waste management.

According to Key Informant C,

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> *Most women in Kabale Municipal town use disposable diapers instead of cloth, but after they place them into unrecycled polythene bags. They are littered in bins, which are then transported to dumping sites. As obvious as it is, it helps reduce odour and bacteria growth in town, but it just makes it difficult to be recycled.*

This was highlighted by Key informant E who noted that;

> *Waste collection and disposal was the responsibility of the NWSC and Kabale Municipal, whereby community members are not supposed to pay any fee for waste collection apart from established entities like hotels that pay for the removal of their waste, since they will be recycled to have more water in the municipality.*

This implies that community members wait for the municipality and if waste is not collected from their premises, it affects their environment.

According to Key Informant C has this to say

> *In Kabale Municipal, the average municipal stream is over 50% organic materials. However, it is a method that is just being introduced. It has negative effects on the environment and health also considered to be lower than the other methods. However, people living near composting sites and workers have symptoms of skin diseases and respiratory problems. Improperly operated composting facilities release offensive odours because they allow anaerobic conditions to develop. Composting can also have negative effects on natural resources due to the application of contaminated compost containing hazardous material, potential leachate, uncontrolled drainage, and improper storage. Uncontrolled dumping of composting residue, such as uncompostable and non-recyclable material, has negative effects on the environment.*

This explains the negative findings because recycling in Kabale Municipal is not yet on a large industrial scale. Therefore, recycling is not risk-free since it exposes populations and the environment to hazards.

Based on Key Informant E pointed out that;

> *Recycling initiatives in Kabale provide an opportunity to engage communities in environmental conservation. Public awareness campaigns and waste segregation programs can educate residents on the benefits of recycling and the role it plays in protecting their local environment. Training and involving residents in waste management practices can also create local job opportunities in recycling collection, sorting and processing. Establishing a robust recycling system in Kabale provides economic benefits. Recycling businesses emerge from local initiatives, providing income and employment for residents. In the long run, recycling reduces the cost of waste management and helps local authorities save resources, which are reinvested into other community development projects.*

This implies that Kabale Municipal Council offers substantial environmental, economic, and social benefits. Recycling as part of its waste management strategy, Kabale conserves natural resources, reduces pollution, improves public health, and creates job opportunities.

Influence of Incineration on Environmental Conservation

Qualitative findings on incineration and its impact on environmental conservation often delve into the perspectives, concerns, and values surrounding the practice. These findings are gathered through methods such as interviews, focus groups and community discussions. The key themes typically explore perceptions of incineration as a waste management solution, its environmental consequences, and its role in broader conservation efforts. People often view incineration as a potentially effective solution for waste disposal, particularly in areas where landfill space is limited or non-existent. Incinerators are seen as a way to reduce waste volume and

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generate energy (through waste-to-energy plants). However, this perception is tempered by concerns over the long-term environmental impacts.

Key Informant A says that;

> *Incineration is one of the oldest ways used to manage solid waste. It is easy to use, but also the least expensive way to burn municipal waste if properly used. The method, however, has its dangers and hazards. Incineration releases many pollutants into the atmosphere, including dioxins, polycyclic aromatic compounds, volatile organic compounds, carbon monoxide, hexachlorobenzene, and ash. All of these chemicals pose serious health and environmental hazards. The dioxins are capable of producing a multitude of health problems; they can have adverse effects on reproduction, development, disrupt the hormonal system or even cause cancer. The polycyclic aromatic compounds and the hexachlorobenzene are considered to be carcinogenic. The particulate matter can be harmful to people with respiratory problems such as asthma, bronchitis and carbon monoxide that can cause neurological symptoms.*

According to Key Informant B noted that;

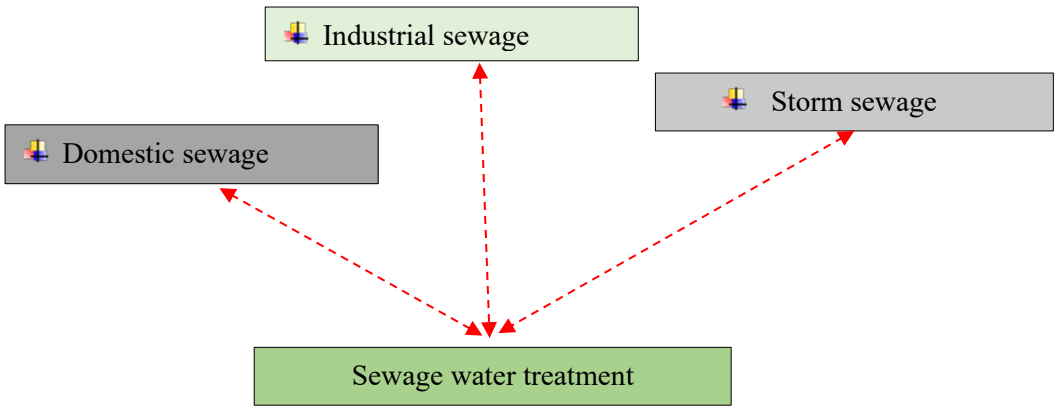
> *Incinerating waste can reduce its volume by up to 90%, thus minimising the need for extensive landfill space, which helps preserve land and reduces the environmental burden on landfill sites. Incineration helps divert a significant amount of waste from landfills, which, if left untreated, leads to environmental problems such as groundwater contamination and the release of methane gas (a potent greenhouse gas) as organic waste decomposes anaerobically in landfills.*

This implies that incineration contributes to environmental conservation in several ways, such as reducing landfill waste, recovering energy and minimising methane emissions. However, the negative environmental impacts, particularly air pollution, toxic emissions, and the loss of recyclable materials, highlight the need for careful management of this technology.

Influence of Sewage Water Treatment on Environmental Conservation

Qualitative findings on sewage water treatment and its relationship to environmental conservation typically explore the community's understanding, attitudes, and perceptions regarding sewage treatment technologies and their environmental impacts. These findings highlight how different stakeholders (local communities, policymakers, and environmental advocates) view the role of sewage treatment in promoting environmental sustainability. Many communities and individuals lack an in-depth understanding of how sewage treatment works and its potential benefits for environmental conservation. Public perception can often be influenced by limited exposure to the complexities of water treatment processes such as primary, secondary and tertiary treatment stages. These are reflected in the following verbatim.

Figure 3: Verbatim on Sewage Water Treatment on Environmental Conservation



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Key Informant B observed that;

> *Kabale Municipal does not encourage or force community members to have the culture of using domestic sewage and also to have specific days in which they participate in controlling the waste among households.*

Key Informant F pointed out that;

> *Untreated or poorly treated sewage can contaminate rivers, lakes, and oceans, leading to pollution that harms aquatic ecosystems. Sewage treatment removes harmful substances like pathogens, nutrients (nitrogen and phosphorus), and chemicals that would otherwise pollute water bodies. This prevents excessive nutrients in water, leading to oxygen depletion, which can cause algal blooms, fish kills, and destruction of aquatic habitats.*

According to Key Informant D,

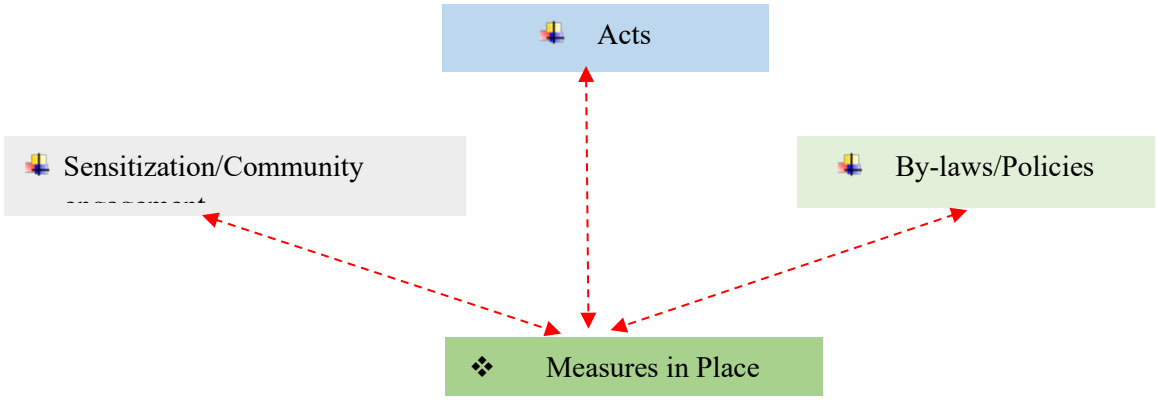
> *Sewage treatment processes remove harmful chemicals such as heavy metals, pharmaceuticals, and industrial chemicals that can contaminate water and harm ecosystems. Proper treatment ensures that these substances are removed before the wastewater is released back into the environment, reducing their impact on human health and the environment. For example, treated sludge can be used as fertiliser for agriculture or as a component in the production of biofuels. This reduces waste disposal to landfills and creates sustainable uses for what would otherwise be discarded.*

This implies that sewage water treatment plays a vital role in environmental conservation by preventing pollution, conserving water resources, and protecting human health. Proper treatment reduces the risk of contamination in water bodies, enhances the sustainability of agricultural practices, and supports the recovery of valuable resources.

Measures Out in Place to Promote Waste Management in Environmental Conservation in Kabale Municipal Council

In Kabale Municipal Council, there are several measures in place to promote waste management as part of broader environmental conservation efforts. These initiatives focus on improving waste collection, promoting recycling, and minimising the environmental impact of waste as reflected in the following verbatim.

Figure 4: Measures Out in Place to Promote Waste Management in Environmental Conservation.



Key Informant B narrated that;

> *A lack of coordinated policy frameworks and guidelines can result in the uneven implementation of waste management practices across regions or sectors, creating disparities in how waste is handled. Localised policies may conflict with national strategies or fail to address the broader environmental impact.*

Key Informant A pointed out that;

> *Policies from different levels of government may overlap, causing confusion. For*

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example, local municipalities may create waste diversion programs that don't align with national standards or lack consistency in their recycling guidelines. On the flip side, policy gaps can arise where certain waste streams (electronic waste, medical waste) are not adequately addressed at either level.

Key Informant D narrated that;

Bylaws can encourage collaboration with the private sector and non-governmental organisations (NGOs) for waste management solutions, including setting up recycling plants, waste collection services, or public awareness programs. Such partnerships can enhance efficiency and innovation in waste management.

Policies/By-laws

Key Informant B noted that;

Kabale Municipality introduced garbage collection fees to help fund the waste management system. The fees support the regular collection of waste from households and businesses, ensuring that waste is disposed of properly. This also helps reduce the amount of waste left to accumulate in public spaces, which can contribute to pollution. The fee system incentivises proper waste management by ensuring that the costs associated with waste collection are covered, encouraging more households and businesses to follow the guidelines for waste disposal.

Sensitisation/Community Engagement

Key Informant A pointed out that;

The local government encourages private companies to participate in waste collection and recycling programs, creating a collaborative effort to manage waste and reduce pollution. For example, Kabale Municipality has partnered with organisations such as Coca-Cola to create a plastic waste management plan. This includes setting up plastic collection centres where residents can drop off plastic waste for recycling. This initiative helps reduce plastic pollution in the environment and encourages recycling.

Key Informant D says that;

Kabale District collaborates with various NGOs and government bodies, including the Ministry of Water and Environment, to improve waste management practices. These partnerships facilitate the provision of technical expertise, funding, and training for local authorities and communities. Private businesses are encouraged to take an active role in waste management by supporting recycling programs and waste reduction initiatives. Through public-private partnerships, Kabale District has enhanced its waste management capacity.

Key Informant A noted that;

The municipality has worked to raise awareness about the negative environmental impact of plastic waste and the importance of recycling. Through such programs, Kabale aims to reduce plastic waste in landfills and water bodies. Kabale Municipality works closely with NGOs and the private sector to enhance waste management. NGOs play a key role in environmental conservation by supporting waste reduction projects, providing funding, and offering expertise in waste management. The local government encourages private companies to participate in waste collection and recycling programs, creating a collaborative effort to manage waste and reduce pollution.

Acts

Key Informant D noted that;

Kabale District Environment Action Plan (DEAP), which was created to guide environmental management strategies, includes provisions for waste management. The plan emphasises reducing environmental pollution by promoting sustainable waste disposal and waste reduction techniques. Kabale District aligns its local waste

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management strategies with national policies, such as the National Environment Management Policy (NEMP) and the National Solid Waste Management Strategy, which guide waste management practices at the national level. The district takes part in regional environmental conservation programs that promote sustainable waste management practices and the reduction of pollution.

DISCUSSION

Different Methods of Waste Management and Their Influence on Environmental Conservation in Kabale Municipal Council.

The research findings show that the council has made some efforts to promote recycling by setting up plastic waste collection points and encouraging businesses to recycle materials. However, the lack of a formal, large-scale recycling system limits the effectiveness of these initiatives. The study also found that incineration, as a method of waste management, has not been widely implemented in Kabale Municipal Council. The council primarily relies on traditional waste disposal methods such as landfilling, waste collection, and some community-based recycling efforts. However, there have been discussions about introducing incineration as part of a more comprehensive waste management strategy in the future.

This is in agreement with Jiao et al. (2020), who described that plastic wastes could be converted into C2 fuels over a photo catalyst under simulated natural environment conditions. Plastic waste was degraded into CO2 by a photo-oxidative C–C bond cleavage; then the produced CO2 was reduced into valuable C2 fuels by a photo-induced C–C bond coupling. Szarka et al. (2021) noted that PVC could be converted into oily products by a simple (and relatively low temperature) thermo-oxidative process. Adamczak et al. (2020) reported a direct method to selectively convert polyolefins to branched, liquid fuels, including diesel, jet, and gasoline-range hydrocarbons over nanomaterials in hydrogen. The process proceeds via tandem catalysis with the initial activation of the polymer, then subsequent cracking. Transforming plastic waste into fuel may help address the white pollution crisis and harvest highly valuable multi-carbon fuels.

This is in agreement with Adamczak et al. (2020), who synthesised an ultrafiltration membrane from polystyrene waste material. The synthesised membrane was used to treat the river surface water. The polystyrene waste ultrafiltration membrane was tested with different concentrations of waste polymer to determine the membrane with the most favourable properties. Kumari et al. (2020) converted waste plastic into activated carbon nanofibers through chemical activation and carbonisation processes. The synthesised activated carbon nanofibers treated the thymol blue dye in wastewater via adsorption. These applications offered a great avenue for recycling plastic waste regardless of modifications or technical work to fulfil the important objective of water and wastewater treatment (Yuan et al., 2020).

Challenges Faced in Waste Management and Its Effects on Environmental Conservation in Kabale Municipal Council.

The study found that the municipality lacks sufficient waste collection vehicles and waste disposal facilities to cover all areas, especially informal settlements and rural zones. The study further found that there is limited public awareness and education on the importance of proper waste management practices, particularly in terms of waste segregation and recycling.

The results are in line with Muchengetwa (2019), who noted that waste-related institutions, policies, and programs, for the most part, fail to include communities and assess gender perspectives in the implementation and evaluation of waste programs. Even if a community has sufficient facilities and infrastructure, people's perceptions and beliefs significantly shape Sewerage water Management (Brown, 2015). The results are also in agreement with Olukanmi et al. (2016), who found that most solid waste dumped in landfills in South Africa is recyclable. Godfrey and Oelofse (2017) argue that significant financial investment

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is required to reduce waste disposal in landfills. Despite the challenges of financing SWM, other researchers argue that low community participation hinders sustainable SWM efforts because single municipalities work with limited resources.

The results are in agreement with Tsheleza et al. (2019) report that approximately 90% of solid waste generated is recyclable and that household size, income status, awareness, and participation in recycling determine the rate of waste generation. This is consistent with the report on the solid waste situation in South Africa, which indicated that socio-economic status and household structure influence solid waste generation (DEA, 2018). The major problem is the lack of an effective solid waste management system. The results are in agreement with Naidoo (2009), who found that illegal practices occur due to a lack of awareness and the government's inability to monitor compliance with SWM policies and legislation. Community participation is the missing link to achieving sustainable SWM (Masood et al., 2014). This has led to ineffective SWM legislation and government policies.

The results are in agreement with Nyika et al. (2020), who argue that South African SWM is weakened by the absence of holistic planning and management at the governance level. Poor urban areas face problems with solid waste disposal (Rasmeni & Madyira, 2019). This has harmful consequences for the environment and the health of human populations, affecting the overall standard of living. The report states that poor solid waste management has adverse effects on human health and the environment.

The results are in agreement with Alzamora and Barros (2020), who noted that industrial effluents often contain hazardous substances that, if released into nature without treatment, can contaminate water resources and cause ecosystem damage. This water pollution has a direct impact on humans and animals that depend on the water for consumption or habitat, posing long-term health risks such as skin diseases, poisoning, or even cancer. Poor sanitation conditions, on the other hand, can lead to stress and discomfort, which in turn negatively impacts one's psychological state. Through investment and attention to environmental sanitation, communities can create a strong foundation for not only the physical but also the mental health of their citizens (Al-Hazmi et al., 2023).

The results are in agreement with Mazari et al. (2021), who found that a lack of public awareness and participation in effective waste management adds to the difficulties. Despite many initiatives and programs to educate the public on the importance of reducing, reusing, and recycling waste, there are still difficulties in changing behaviour on a wide scale. Low awareness of the environmental impacts of improper waste disposal and a lack of understanding of the direct benefits of responsible waste management often result in reluctance to adopt these practices. This is accompanied by consumption habits oriented towards single-use products, which further exacerbate the situation.

The results are in agreement with Fan et al. (2021), who narrated that unsafe waste handling affects not only workers in the relevant industries but also the surrounding communities, which shows the importance of a strict and effective waste handling system. Fatimah et al. (2020) pointed out that burning waste, especially those containing plastics and hazardous materials, can produce smoke containing dioxins and nuisance organic pollutants, which are extremely harmful to human health. Continuous respiration of air contaminated with waste smoke can increase the risk of cancer, reproductive problems, immune system disorders and also server the respiratory system.

Measures Out in Place to Promote Waste Management in Environmental Conservation in Kabale Municipal Council

The study found that Kabale Municipal Council has launched public awareness campaigns to educate residents about the importance of proper waste management, recycling, and the health risks of improper waste disposal. The study also found that Kabale Municipal Council has partnered with

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non-governmental organisations (NGOs) and private businesses to enhance waste management services. For example, some businesses collect plastic waste for recycling, while NGOs conduct community outreach programs on sustainable waste practices.

The findings are in agreement with Istrate et al. (2020), who noted that one of the early treatment technologies is the composting technique, which converts organic waste into compost with the help of microorganisms. This technique is environmentally friendly as it produces a useful product and reduces the volume of waste that has to be disposed of. Anaerobic digestion, on the other hand, is a biological process that breaks down organic waste in an oxygen-free environment to produce biogas that can be used as an energy source, as well as digestate that can be used as plant fertiliser (Jones et al., 2023).

The findings are in agreement with Kabirifar et al. (2020), who pointed out that waste incineration is a commonly used technology, especially in countries with limited landfill space. This technology burns waste at very high temperatures, effectively reducing its volume significantly and generating energy in the process. However, modern incinerators are now equipped with advanced emission filtration systems to capture harmful particles and prevent pollutants such as dioxins and nitrogen oxides from being released into the air. Kedzierski et al. (2020) noted that waste power plants (PLTSa), for example, are applications of this incineration technology that can process tonnes of waste while generating electricity that is then fed into the grid.

The findings are in agreement with Kurniawan et al. (2022), who noted that one effective method in community-based waste management is the establishment of waste banks. These waste banks act as collection centres where communities can deposit the recyclable waste they have collected from their homes. The waste is then sorted, processed, and sold to recycling factories. The revenue earned from the sale can be utilised for social activities or community development, thus creating an economic incentive for the community to continue participating in waste management activities. Such a model not only helps to reduce the volume of waste generated but also supports the local economy (Luttenberger, 2020).

The findings are in agreement with Kabirifar et al. (2020), who noted that community-based waste management can contribute to more sustainable waste management efforts nationally and globally. By assimilating waste management as part of everyday life, communities act as agents of change in the transition towards more responsible and environmentally friendly consumption patterns. Magwaza et al. (2020) found that the involvement of all these parties ensures that community-based waste management practices can continue to evolve and adapt according to emerging environmental challenges.

CONCLUSION

The research concluded that incineration, as a method of waste management, has not been widely implemented in Kabale Municipal Council. The council primarily relies on traditional waste disposal methods such as landfilling, waste collection, and some community-based recycling efforts. However, there have been discussions about introducing incineration as part of a more comprehensive waste management strategy in the future.

The research concluded that the municipality lacks sufficient waste collection vehicles and waste disposal facilities to cover all areas, especially informal settlements and rural zones. Inadequate infrastructure leads to improper waste disposal, including illegal dumping and littering, which contributes to environmental pollution, especially in water sources and urban spaces.

The research concluded that Kabale Municipal Council has launched public awareness campaigns to educate residents about the importance of proper waste management, recycling, and the health risks of improper waste disposal. The increased public awareness encourages better waste disposal practices, leading to a reduction in illegal dumping, littering,

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and the negative environmental impacts associated with these activities.

Recommendations

The study recommends that Kabale Municipal Council should encourage households and businesses to separate their waste into categories: organic, recyclable, and non-recyclable. Provide bins for each type of waste to facilitate segregation at the source. The proper segregation reduces contamination of recyclable materials and allows for more efficient recycling, reducing the overall waste sent to landfills.

The study also recommends that Kabale Municipal Council should launch continuous public education campaigns to inform the community about the importance of waste segregation, recycling, and proper disposal. Use local media, community meetings, and schools to spread information. The increased public awareness will lead to better waste management practices and greater public participation in recycling and waste reduction initiatives, reducing waste generation and environmental pollution.

The study also recommends that Kabale Municipal Council should develop and implement a long-term waste management plan that includes waste minimisation, collection, recycling, disposal, and energy recovery. This plan should involve all stakeholders, including local authorities, businesses, and residents. The comprehensive plan will ensure coordinated efforts in waste management, reducing environmental pollution and fostering a more sustainable approach to waste disposal.

REFERENCE

Adamczak, M., Kamińska, G., & Bohdziewicz, J. (2020). Application of waste polymers as basic material for ultrafiltration membranes preparation. *Water*, *12*(1), 179.

Ahen, F., & Amankwah-Amoah, J. (2021), Sustainable Waste Management Innovations in Africa: New Perspectives and Research Agenda for Improving Global Health. *Conservation*, *13*(12), 6646.

Jiao, X., Zheng, K., Chen, Q., Li, X., Li, Y., Shao, W., & Xie, Y. (2020), Photocatalytic conversion of waste plastics into C2 fuels under simulated natural environment conditions. *Angewandte Chemie International Edition*, *59*(36), 15497-15501.

Kabale Municipal Abstract (2019): *Kabale Municipal Statistical Abstract for 2018/2019*

Komakech, A. J., Rubagumya, I., Kizito, S. S., Zziwa, A., Kabenge, I., & Menya, E. (2023). Quantifying greenhouse gas emissions from three fruit and vegetable waste management technologies using the static chamber.

Kumari, M., Chaudhary, G. R., Chaudhary, S., & Umar, A. (2022). Transformation of solid plastic waste to activated carbon fibres for wastewater treatment. *Chemosphere*, *294*, 133692.

Kushaba (2017). *Kabale Traders, Municipal Bicker over Garbage Management*, Uganda Radio Network, Kampala, Uganda, 2017, https://ugandaradionetwork.com/a/story.php?s=97039.

Yuan, X., Cho, M. K., Lee, J. G., Choi, S. W., & Lee, K. B. (2020). Upcycling of waste polyethylene terephthalate plastic bottles into porous carbon for CF4 adsorption. *Environmental Pollution*, *265*, 114868.

