EFFECT OF LAND POLLUTION ON COMMUNITY SUSTAINABILITY IN NAKAWA DIVISION, KAMPALA, UGANDA
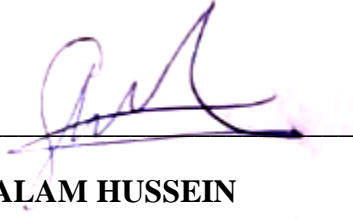

HAMZA ABDISALAM HUSSEIN

2021-08-04885

A DISSERTATION SUBMITTED TO THE SCHOOL OF NATURAL AND APPLIED SCIENCES IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD A DEGREE OF A MASTER OF SCIENCE IN ENVIRONMENTAL MANAGEMENT OF KAMPALA INTERNATIONAL UNIVERSITY
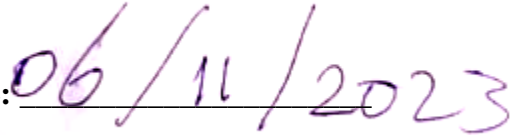
NOVEMBER, 2023

DECLARATION

This thesis is my original work and has not been presented for a Master's Degree or any other academic award in any university or institution of learning

SIGNATURE: _____ DATE: 06 / 11 / 2023

HAMZA ABDISALAM HUSSEIN

2021-08-04885

APPROVAL

I confirm that this thesis was carried out by the candidate under my supervision.

SIGNATURE: _____   DATE: ___7/11/2023___

DR. TIYO CHRISTOPHER EWAECHABO

SUPERVISOR

DEDICATION

I dedicate this work to my parents Avdo Abdullahi Ibrahim and Abdisalaam Hussein Baker, siblings and my friends. My love for all of you can never be quantified, God Bless you!!

ACKNOWLEDGEMENTS

I am grateful to almighty God for according me chance to finish my education.

I also personally wish to thank everyone who supported me in the research processes.

I wish to express my appreciation to my research supervisor Dr. Tiyo Christopher Ewaechabo for providing me positive suggestions that enabled me to accomplish my dissertation.

In addition, I would like to thank Prof. Dijji Chukuemeka and all of my Lecturers for their continued encouragement, motivation, and knowledge.

I also wish to specifically acknowledge my brothers and sisters, I also give due acknowledgement to my friends and relatives who supported me through the research process.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF PLATES

ABSTRACT

The was study to assess the effects of land pollution on community sustainability conducted in Nakawa Division, Kampala, Uganda to establish the causes of land pollution among the communities, determine the effect of land pollution on community sustainability, and to design mechanisms that can be employed to reduce land pollution and ensuring community sustainability. The data was collected from 182 respondents and 7 key informants. The study results indicated that, industrialization, institutional factors, limited institutional capacity to plant vegetation, low effectiveness in monitoring by NEMA, ineffective implementation of policy, environmental and socio-cultural systems were major causes of land pollution. The effect was generally more negative hence the assertion that land pollution is a key towards community sustainability. It was established that land pollution reduce bio-diversity, increased dangerous gases and generally the community health in terms of plants, animal and people health in the communities. Also, about 80.2% of the respondents said that there were no mechanisms for reduction of land pollution and enhancing community sustainability. The study concludes that the occurrence of land pollution has generally reduced the community sustainability therefore, there is need for industrialization to be effectively managed to incorporate the environmental controls, effective policy implementations, monitoring of land polluters and provision of general environmental controls.

CHAPTER ONE: INTRODUCTION

1.0 Introduction

This chapter presents and describes the background of the study, the problem of the research, purpose and objectives of this study, the research question, the scope of the study, significance of the study and the operational definition of key terms.

1.1 Background of the study

The background of the study is presented on four perspectives namely historical, theoretical, conceptual and contextual perspective.

1.1.1 Historical perspective

Land pollution presents a dangerous effect on the environmental sustainability in the communities (Remoundou & Koundouri, 2019). Environmental pollution is the deterioration of the environment through depletion of natural resources such as air, water and soil; the destruction of ecosystems and the extinction of wildlife. Environmental degradation may be defined as any change or disturbance to the environment perceived to be deleterious or undesirable. Land pollution is one of the ten threats officially cautioned by the High Level Threat Panel of the United Nations (United Nations, 2015). The United Nations International Strategy for Disaster Reduction defines environmental degradation as "The reduction of the capacity of the environment to meet social and ecological objectives, and needs" (UNEP, 2016). The primary cause of environmental degradation is human disturbance. The degree of the environmental impact varies with the cause, the habitat, and the plants and animals that inhabit it. Humans and their activities are a major source of environmental degradation (Remoundou & Koundouri, 2019).

Land pollution is a serious problem that impacts humans, animals, and the earth. Without taking measures now to reduce pollution levels, permanent changes to the land can occur. The adverse changes to the environment due to land pollution are subtle, but the problem is much bigger than

it appears. The basic definition of land pollution is the destruction and contamination of the land through the direct and indirect actions of humans. The pollution results in changes to the land, such as soil erosion. Some of the changes are irreversible, while others are not (Kaberi, 2022).

The addition to, and accumulation in, the environment of harmful or objectionable material with the environment in sufficient quantities that will adversely influence the functioning, quality or aesthetic value of the environment.

Land is the solid part of the earth's surface or any part thereof. A tract of land is defined "geographically or a specific area of the earth surface. Its characteristics include all stable or predictably cyclic attributes of the biosphere vertically above and below the area, including those of the atmosphere, soil and underlying geology, hydrology, plants, and animal population, and results of past and present human activity, to the extent that these attributes exert a significant influence on the present and future uses of land by human.

Worldwide, the greatest effects on land pollution on the community sustainability are in health of individuals and populations result from environmental degradation and social injustice. The two operate in consort (Martin, 2013). Causes include overpopulation, air and water pollution, deforestation, global warming due to fossil fuels, unsustainable agricultural and poor fishing practices, over consumption, maldistribution of wealth, the rise of the corporation, the Third World debt crisis, and militarization and wars. Mining is also a destructive development activity where ecology suffers (Singh & Chauhan, 2018).

The UN Global Agenda for 2030 includes a goal for "inclusive, safe, resilient, and sustainable" cities, since they occupy 3–4 percent of the world's land surface, use 80 percent of resources, discharge most global waste (Girardet, 2015) and will be host to two-thirds of the world's population by 2050 (UN DESA, 2018). Urban areas are increasingly vulnerable to climate change and health challenges, and are linked to increased costs to the economy and the environment (Kanuri *et al*., 2017). The growing awareness that achieving sustainability requires societal change through collaborative decision-making and community engagement has brought SCD to the foreground (Clarke, 2022).

In Africa, consequences include increased poverty, overcrowding, famine, weather extremes, and species loss, acute and chronic medical illnesses, war and human rights abuses, and an increasingly unstable global situation that leads to chaos and disaster. Unfortunately, most of the world's governments, guided by self-interest (or self-preservation) have adapted too slowly to environmental changes and as such face decreasing internal stability, their health care systems in crisis (Thomson and Newman, 2018). The report also estimates that 24% of the global disease burden (healthy life years lost) and 23% of all deaths (premature mortality) are attributable to environmental factors, with the environmental burden of diseases being fifteen times higher in developing countries than in developed countries, due to differences in exposure to environmental risks and access to health care. The major causes of the environmental pollution are modern urbanization, industrialization, over-population growth, deforestation and much more. Different kinds of human activities are the main reasons of environmental degradation (Alter *et al.,* 2017). These have led to environment changes that have become harmful to all living beings (Raleigh & Clionadh, 2017).

In Uganda, Nakawa Division has undergone rapid urbanization due to population growth, industrialization, and urban development. This has led to increased waste generation, inadequate waste management infrastructure, and a lack of proper land use planning. In addition, historically Nakawa was an agricultural area, urbanization led to a shift from agrarian practices to residential and commercial land use. This transition brought changes in waste disposal methods and land management, contributing to pollution (Smith, J., & Johnson, A., 2010).

1.1.2 Theoretical Perspective

Bronfenbrenner's Ecological Systems Theory of 1979 provides a framework to understand how the environmental factors, like land pollution, affect various levels of the community. This perspective, proposed by Urie Bronfenbrenner, views individuals within a broader social context. Applying this theory to the effects of land pollution on Nakawa Division involved analyzing the multi-level impacts. It considered the interplay between the individuals, their immediate community, institutions, and larger societal structures affected by land pollution. The theory

helped understand how changes in the environment (in this case, land pollution) can influence the well-being and sustainability of the community.

1.1.3 Conceptual Perspective

The study independent variable according to Galeazzo, *et al.* (2014), Land pollution while community sustainability is the dependent variable. Land Pollution means degradation or destruction of the earth's surface and soil, directly or indirectly as a result of human activities. Anthropogenic activities conducted include development, and pollution. Moreover, the extension of cities and towns due to the increasing population is leading to further exploitation of the land. Another definition of pollution refers to the release of harmful substances into the environment. When these substances are released into the land, the health of those living around there becomes a concern (Kampa and Castanas, 2018).

According to Kampa and Castanas (2018). Pollution is an undesirable change in the physical, chemical, or biological characteristics of the national environment, brought about by human activities. It may be harmful to human or non-human life. There are two main classes of pollutants.

The dependent variable is community sustainability. Bajocco, *et al*. (2022) contend that community sustainability is the state of the community that is prevailing with a series of activities intended to generate coherence and the perspective of efficiency and wellness in the communities. Tsai (2016) contend that sustainable community consists of a long-term integrated and systems approach to developing and achieving a healthy community by addressing economic, environmental and social issues. Fostering a strong sense of community and building partnerships among key stakeholders are also important elements of such efforts. Such approaches have been applied to issues as varied as urban sprawl, inner-city and Brownfield redevelopment, new economic development, a strong local economy, environmental justice, ecosystem management, agriculture, biodiversity, green buildings, energy conservation, watershed management, and pollution prevention. Environmental sustainability "is a set of constraints on the four major activities regulating the scale of human economic subsystem: the use of renewable and nonrenewable resources on the source side, and pollution and waste

assimilation on the sink side" (Goodland, 2015). Environmental sustainability is often associated with the reduction of waste, pollution and emission as well as the efficient use of energy. Furthermore it aims at a reduced consumption of materials that are hazardous, harmful or toxic. (Gimenez *et al*., 2022)

1.1.4 Contextual Perspective

Uganda developed and adopted a Green Growth Development Strategy (2017/18 – 2029/30) intended to operationalize the broad green growth principles highlighted in the Uganda Vision 2040 and the National Development Plan to support Uganda's accelerated transition to a middle-income status. It has been observed that if the identified green growth interventions were fully implemented, they could provide a boost to economic activity, worth around 10% of GDP by 2040, deliver employment of up to 4 million jobs and reduce future Greenhouse Gas Emissions (GGE) by 28% (Kaggwa & Namanya, 2018).

According to the 2019 Water and Environment Sector Community sustainability Report, Uganda has lost a large stock of its natural resources. For instance, the forest cover reduced from 24% in 1990 to 12.4% in 2015, implying an average annual loss of natural forest of 2% per annum. In 2014, wetland coverage on the surface area of Uganda was 15.6% however, over time this had been gradually reducing and is currently at 8.9%. The 2019 sector Community sustainability report further observes that inadequate financing to the sector remains a major challenge and affects the fulfillment of core functions. As a result, the targets under the Strategic Sector Investment Plan (2018-2030) including the second National Development Plan are yet to be achieved (MoE, 2019).

1.2 Statement of the problem

Garbage disposal and collection is ineffective with a few residents affording to pay for disposal off of garbage. A lot of garbage is often thrown anywhere that the residents feel is convenient for them such as at the back yard, by the road side, in the trenches and in the open. There are many undesignated dumping sites in the city which gradually eventually develop into a dumping site. This dumpsites have become so many and can be seen everywhere in the city streets with the

worst region being Nakawa stretching from rural suburbs to Lake Victoria (NEMA Report, 2019). Land Pollution of urban water supplies is very high in Kampala and is highest during rainy seasons where surface runoffs sweep through none controlled water channels and ends up in Nakawa drainage channel. Nakawa drainage channel being the city's open drainage channel system collects both non-point source pollution and point source pollution. The content collected includes surface runoff, factory discharges, and residential discharges in form of both liquid and solid waste (MoWE, 2019).   All this mixture runs down to lake Victoria without treatment but only passes through Wakiso Kinawataka wetland system of which is also encroached by the Luzira prison and some residents of Nakawa. This study therefore, sought to determine the effect of land pollution on community sustainability in Nakawa division, Kampala, Uganda.

1.3 Purpose of the study

The purpose of the study was to assess the effect of land pollution on community sustainability in Nakawa division, Kampala, Uganda.

1.4 Specific objectives

The specific objectives were to:

1) Establish the causes of land pollution among the communities in Nakawa division, Kampala.
2) Find out the effects of land pollution on community sustainability in Nakawa division, Kampala.
3) Identify the mechanisms that can be employed to reduce land pollution and ensure community sustainability in Nakawa division, Kampala.

1.5 Research questions

1) What are the causes of land pollution among the communities in Nakawa division?
2) What is the effect of land pollution on community sustainability in Nakawa division?
3) What are the mechanisms that can be employed to reduce land pollution and ensure community sustainability in Nakawa division?

1.6 Scope of the study

1.6.1 Geographical scope

The study was conducted in Nakawa Division one of the five administrative divisions of the city of Kampala, the capital and largest city of Uganda. The town of Nakawa is the site of the division headquarters. The division was chosen because it has experienced high degree of pollution arising from industrial and land related activities such as construction and reconstruction.

1.6.2 Content scope

The study assessed the causes of land pollution among the communities, the effects of land pollution on community sustainability and to identify mechanisms that can be employed to reduce land pollution and ensure community sustainability in Nakawa division, Kampala.

1.6.3 Time scope

The study had a time scope of 6 months which ran from January to August 2022. The time chosen was sufficient and enabled the researcher to collect and analyze reliable information for the study.

1.7 Significance of the study

The study unearthed the likely occurrence and the factors affiliated to the land pollution and environmental sustainability in the community.

The study revealed the prevalence of the environmental constraints and challenges to environmental sustainability where the focus for the community's sustainability is key. The study came up with present strategies to address land pollution challenges in Nakawa Division.

The study supported the policy makers in understanding the land pollution and its impact on community livelihood abilities and help them in making better policies.

1.8 Conceptual Framework

Independent Variable   **Dependent Variable**

```
┌─────────────────────────────┐          ┌─────────────────────────────┐
│  • waste dumping            │          │  • Maintained or improved   │
│  • industrial pollution     │   ──────▶│    their quality of life    │
│  • Deforestation            │    ▲     │  • social cohesion          │
│  • soil contamination       │    │     │  • economic stability       │
│                             │    │     │  • environmental health     │
└─────────────────────────────┘    │     └─────────────────────────────┘
                    ┌──────────────┴──────────────┐
                    │  • Health Impact            │
                    │  • Economic Impact          │
                    │  • Environmental Quality    │
                    │  • Community Awareness and  │
                    │    Participation            │
                    └─────────────────────────────┘
```

Intervening Variables
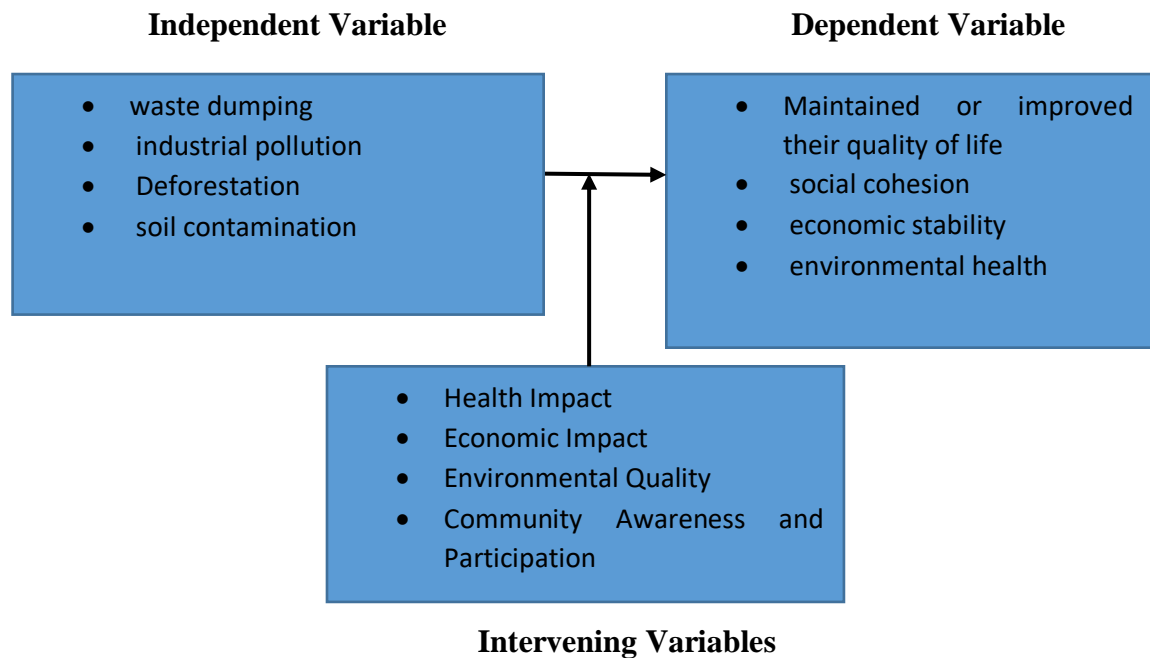
Figure 1.1: Conceptual Framework

Source: Researcher, 2023

Land Pollution (Independent variable) is the primary factor that is manipulated or controlled. It includes various forms of land degradation such as waste dumping, industrial pollution, deforestation, and soil contamination while Community Sustainability (Dependent Variable) is the outcome or variable that is influenced by the independent variable. It refers to the capacity of the community in Nakawa Division to maintain or improve their quality of life, social cohesion, economic stability, and environmental health despite the impact of land pollution.

On the other hand the Intervening Variables includes the health consequences on the community due to land pollution, such as respiratory issues, skin diseases, and other ailments. In addition the financial implications of land pollution on the community, including decreased property values, increased healthcare costs, and reduced economic activities also affect community sustainability. The state of the environment in Nakawa Division influenced by land pollution, encompassing soil quality, water contamination, and biodiversity loss plus the level of awareness, education, and community involvement in initiatives to reduce land pollution and promote sustainable practices too affect the community sustainability in Nakawa division.

CHAPTER TWO: LITERATURE REVIEW

2.0 Introduction

This chapter is concerned with review of information that different authors have advanced on the topic in regard to study objectives, it therefore looks at the theoretical review, conceptual framework, related literature.

2.1 Theoretical review

The theoretical perspective for the impact of land pollution on community sustainability in Nakawa Division, Kampala, Uganda, was approached through several lenses. Here are some theoretical frameworks that were considered in this study;

2.1.1 Ecological systems theory

Bronfenbrenner's Ecological Systems Theory of 1979 provides a framework to understand how the environmental factors, like land pollution, affect various levels of the community. This perspective, proposed by Urie Bronfenbrenner, views individuals within a broader social context. Applying this theory to the effects of land pollution on Nakawa Division involved analyzing the multi-level impacts. It considered the interplay between the individuals, their immediate community, institutions, and larger societal structures affected by land pollution. The theory helped understand how changes in the environment (in this case, land pollution) can influence the well-being and sustainability of the community.

2.1.2 Social-ecological model

The Social-Ecological Model of 2006 explores the interplay between environmental factors and community structures, influencing behaviors and sustainable practices. This model focuses on the dynamic interplay between individuals and their social and physical environments. It's especially relevant in understanding how land pollution affects different layers of society within Nakawa Division. The model explores how individual behavior, relationships, community structures, and societal norms are influenced by and, in turn, influence the environment affected by land pollution.

2.1.3 Sustainable development theory

The Sustainable Development Theory of 2015 helped to evaluate the impact of land pollution on the community's ability to sustain its development without depleting natural resources. Applying sustainable development theory helped in evaluating the impact of land pollution on the community's ability to sustain its development without depleting natural resources. It examined how land pollution affects various aspects of sustainability, such as environmental, economic, and social dimensions in Nakawa Division.

2.1.4 Resilience theory

Resilience theory of 2006 assesses the community's ability to adapt and recover from the effects of land pollution, examining its capacity to withstand and rebound from environmental stressors. Resilience theory assesses the community's ability to adapt and recover from the impacts of land pollution. It examines how the community copes with and responds to these challenges, identifying strengths and weaknesses in its capacity to endure and bounce back from environmental stressors.

Each of these theoretical perspectives offered a unique lens to examine the effects of land pollution on community sustainability in Nakawa Division, allowing for a comprehensive understanding of the interplay between environmental factors and social systems. The choice of theory or model was dependent upon on the specific research focus and the aspects of community sustainability impacted by land pollution.

2.2 The causes of land pollution

2.2.1 Industrial activities and waste

According to Kumar and Agarwal (2020), industrial processes produce a significant portion of land pollutants through the release of toxic chemicals, heavy metals, and untreated waste into soil, leading to contamination. Also, Brown and Matlock (2011) stated that industrial activities, including manufacturing processes and improper disposal of industrial waste, contribute to soil contamination with heavy metals, organic pollutants, and hazardous chemicals. In addition,

improper disposal of solid waste, particularly in urban areas, contributes significantly to land pollution. Research by Wilson and Velis (2015) discusses the challenges of municipal solid waste management, emphasizing the impacts of uncontrolled dumping and the presence of plastics and non-biodegradable materials in landfills. In Uganda, inadequate waste disposal systems are a major cause of land pollution. Kyomuhendo *et al.* (2017) pointed out the lack of effective waste management infrastructure, leading to indiscriminate dumping and pollution.

2.2.2 Agricultural practices

Land degradation and pollution due to agricultural activities, such as excessive use of pesticides and chemical fertilizers, have been extensively documented (Mati *et al.,* 2011). Soil erosion and nutrient depletion contribute to land pollution globally. The excessive use of pesticides, herbicides, and chemical fertilizers contaminates soil and water resources. A study by Aktar, *et al.* (2009) highlights the adverse effects of pesticides on soil quality and biodiversity. Agricultural activities contribute significantly to land pollution in Africa due to the excessive use of pesticides and chemical fertilizers. Langat *et al.* (2019) discuss the impact of agricultural chemicals on soil quality in the region. The reliance on chemical pesticides and fertilizers in Uganda's agriculture contributes to soil and land pollution. The study by Nabanoga *et al.* (2018) discusses the impact of agricultural activities on land degradation and pollution in the country. Intensive agricultural activities in Uganda involve the use of chemical fertilizers and pesticides, contributing to soil contamination and land degradation.

2.2.3 Mining and resource extraction

Mining activities lead to soil erosion, alteration of landscapes, and the release of heavy metals and toxic substances into the soil. The study by Lottermoser (2010) elaborates on the environmental impact of mining on land pollution. In Africa as well the mining industry's environmental impact is significant. Studies by Hilson (2012) note the adverse effects of mining activities on land through soil erosion, contamination with heavy metals, and alteration of landscapes. Industrial and mining activities in East Africa contribute to soil contamination and land degradation. Kabogo *et al.* (2016) discuss the environmental impact of mining on soil quality in the region. Mining operations in Uganda lead to soil erosion, alteration of landscapes,

and the release of heavy metals and toxic substances, contributing to land pollution. Studies by Sekamatte *et al.* (2019) focus on the environmental impact of mining activities on soil quality in Uganda.

2.2.4 Urbanization and land development

Urban expansion and construction activities alter land use patterns and increase impervious surfaces, leading to soil compaction, reduced infiltration, and disruption of natural ecosystems. A study by Lal (2004) discusses the impact of urbanization on soil degradation and land pollution. In Africa it has been reported that rapid urbanization often outpaces waste management infrastructure, resulting in increased land pollution. Research by Odeyemi *et al.* (2018) highlights the challenges African cities face in waste management, leading to land pollution. Urbanization in East African cities leads to increased waste generation, overwhelming waste management systems, and causing land pollution. A study by Njoka *et al.* (2017) examines the challenges of waste management in rapidly growing urban areas. Similarly, rapid urbanization in Uganda results in increased waste generation, straining waste management systems and leading to improper disposal, which contributes to land pollution. Kyomuhendo *et al.* (2017) discuss the challenges of solid waste management and its impacts on land pollution in Ugandan urban areas.

2.2.5 Land use change and deforestation

Land use change, particularly deforestation for agriculture or development purposes, contributes to soil erosion and degradation. Nkem et al. (2019) examine the impact of land use change on soil quality and biodiversity in Africa. Deforestation for agricultural expansion and urban development in East Africa leads to soil erosion, loss of soil fertility, and contributes to land pollution. Research by Otieno et al. (2018) explores the impact of land use changes on soil quality in the region. Deforestation for agriculture, timber, and infrastructure development in Uganda leads to soil erosion, loss of soil fertility, and contributes to land pollution.

2.2.6 Inadequate environmental policies and regulations

Weak environmental policies and regulations exacerbate land pollution issues in many African countries. Chigbu (2018) highlights the need for stronger environmental governance and the implementation of effective policies to address land pollution challenges. Weak environmental policies and governance structures exacerbate land pollution challenges in East Africa. A study by Wasonga and Nyariki (2017) emphasizes the need for improved environmental governance and policy implementation. Weak enforcement of environmental policies and inadequate governance structures contribute to land pollution issues in Uganda. Ntale *et al.* (2016) highlight the need for improved policy implementation and stronger environmental governance.

2.3 The effects of land pollution to communities

2.3.1 Health impacts on communities

Land pollution leads to various health issues in communities. Exposure to contaminated soil and water sources can result in illnesses, including respiratory problems, skin diseases, and gastrointestinal issues (Aneja, 2006). Land pollution in African communities poses significant health risks. Studies have shown that exposure to contaminated soil and water sources leads to various health issues, including respiratory problems, skin diseases, and gastrointestinal illnesses (UNEP, 2019). Land pollution in Uganda poses significant health risks to communities. Exposure to contaminated soil and water sources leads to various health issues, including respiratory problems, skin diseases, and gastrointestinal illnesses (Kyomuhendo *et al.,* 2017).

2.3.2 Economic consequences for communities

Land pollution affects livelihoods and economies. Contaminated soil reduces agricultural productivity, impacting food security and income generation for communities (Kaza *et al.,* 2018). Land pollution affects agricultural productivity in African communities, impacting food security and livelihoods. Contaminated soil reduces crop yield and can lead to economic losses (FAO, 2017). Land pollution affects agricultural productivity in Uganda, impacting food security and livelihoods. Contaminated soil reduces crop yield, contributing to economic losses and food insecurity (Nabanoga *et al.,* 2018).

2.3.3 Social disruption and displacement

Land pollution can lead to social disruption and displacement of communities. Pollution from industrial activities or mining can force communities to relocate, affecting their social fabric and cultural ties (Pichler *et al.,* 2019). Land pollution can disrupt the social fabric and cultural ties within African communities. Industrial pollution or mining activities may force communities to relocate, leading to displacement and affecting their traditional way of life (Nyari, 2015). Land pollution can disrupt the social fabric and cultural ties within Ugandan communities. Industrial pollution or mining activities may force communities to relocate, affecting their traditional way of life and cultural practices (Sekamatte *et al.,* 2019).

2.3.4 Ecosystem and biodiversity degradation

Land pollution affects local ecosystems, leading to a decline in biodiversity. Contaminants in soil and water harm plant and animal life, disrupting ecological balance (EPA, 2020). Land pollution in African regions impacts local ecosystems and biodiversity. Contaminants in soil and water negatively affect plant and animal life, disrupting the delicate balance of the environment (IUCN, 2018). Land pollution in Uganda impacts local ecosystems and biodiversity. Contaminants in soil and water negatively affect plant and animal life, disrupting the ecological balance (UNEP, 2019).

2.3.5 Psychological and social well-being

Land pollution can have psychological impacts on communities. Studies have shown that degraded environments and contaminated land can affect the mental well-being and social cohesion of communities (UNEP, 2016). The degraded environment due to land pollution can have psychological impacts on African communities. Degradation of their living environment affects mental health and social well-being (WHO, 2016).

2.3.6 Water contamination and scarcity

Land pollution affects water resources, leading to water contamination and scarcity for communities. Pollutants from land can seep into water sources, impacting drinking water quality

(WWAP, 2018). Land pollution contributes to water contamination and scarcity in African communities. Pollutants seeping into water sources affect access to clean drinking water, leading to health risks and water shortages (UN Water, 2020).

2.4 Mechanisms to reduce the effects of land pollution on communities

2.4.1 Waste management and recycling programs

Effective waste management strategies, including recycling and waste-to-energy initiatives, can significantly reduce the amount of waste ending up in landfills, thereby mitigating land pollution and its impact on communities (UNEP, 2019). Strengthening waste management systems and infrastructure in African nations is crucial. Implementing proper waste disposal methods and recycling programs helps mitigate land pollution and its impact on local communities (UNEP, 2019). Enhancing waste management systems and promoting recycling initiatives in Uganda can effectively reduce land pollution. Implementing proper waste disposal methods and encouraging recycling efforts can help mitigate the impact of pollution on local communities (NEMA, 2019).

2.4.2 Environmental policies and regulations

Stringent implementation of environmental regulations and policies is crucial in controlling industrial and agricultural pollution. Enforcing strict guidelines for waste disposal and pollution control measures helps minimize the impact of land pollution on communities (World Bank, 2018). Strengthening environmental policies and governance structures in African countries is crucial. Implementation and enforcement of regulations for pollution control and waste management can significantly mitigate the impact of land pollution on communities (UNEP, 2017). Strengthening environmental regulations and their enforcement is critical in Uganda. Effective implementation of policies for pollution control and waste management significantly reduces the impact of land pollution on communities (NEMA, 2017).

2.4.3 Adoption of sustainable agricultural practices

Promoting sustainable agriculture by encouraging organic farming and reduced use of agrochemicals is essential. These practices can prevent soil contamination and land degradation,

safeguarding African communities from the adverse effects of land pollution (FAO, 2019). Encouraging sustainable farming practices, such as organic agriculture and reduced reliance on chemical inputs, is vital. This helps prevent soil contamination and degradation, thereby safeguarding Ugandan communities from the adverse effects of land pollution (MAAIF, 2018).

2.4.4 Community education and awareness programs

Educating and raising awareness among communities regarding the proper disposal of waste, the importance of recycling, and the adverse effects of land pollution can lead to behavioral changes and active community participation in pollution reduction efforts (EPA, 2020). Community involvement and awareness through educational programs play a pivotal role in pollution reduction. Educating communities about proper waste management and the consequences of land pollution is crucial to reducing its impact on Ugandan communities (UNCST, 2020).

2.4.5 Investment in green technologies

Investing in green technologies and innovation, such as eco-friendly industrial processes and renewable energy sources, can significantly reduce pollution and its impact on communities (European Commission, 2021). Encouraging the adoption of green technologies and innovation can significantly reduce pollution. Investing in eco-friendly industrial processes and renewable energy sources helps minimize pollution and its effect on communities (AU, 2021). Advocating for green technologies and innovations is essential. Encouraging eco-friendly industrial practices and renewable energy sources helps minimize pollution and its effects on Ugandan communities (MoWT, 2021).

2.4.6 Rapid response and remediation strategies

Developing rapid response and remediation strategies for contaminated sites and polluted areas can help mitigate the immediate impact of land pollution on communities, preventing further environmental degradation (UNEP, 2020). Developing strategies for rapid response and remediation of contaminated sites is crucial. This aids in mitigating the immediate impact of land pollution on communities in Uganda (NEMA, 2020).

2.4.7 Community participation and education programs

Engaging communities through educational programs and promoting awareness about the proper management of waste and the consequences of land pollution is vital. Community involvement and education play a key role in reducing the impact of pollution on communities (AfDB, 2020).

CHAPTER THREE: RESEARCH METHODOLOGY

3.0 Introduction

This chapter outlines the study area, study design used in the research, the area of study, the population sampled from, the sample size, sampling procedure, sources of data, data collection tools, validity and reliability of study, ethical issues and data analysis.

3.1 Location and history

Located East of Kampala, Nakawa Division is one of the five Urban Councils that make up Kampala City. Administratively, the division is comprised of 22 parishes in which there are 6 informal settlements namely; Banda, Bukoto I, Butabika, Kinawataka, Mambo Bado Kisenyi Luzira and Naguru. The earliest settlement is said to have been established as early as 1880 while the most recent settlements were established in 1986 and 1990. Nakawa Division lies in the eastern part of the city, bordering Kira Town to the east, Wakiso District to the north, Kawempe Division to the north-west, Kampala Central Division to the west, Makindye Division across Murchison Bay to the south-west and Lake Victoria to the south. The coordinates of the division are 0° 20' 00" N, 32° 37' 00" E (Latitude:0.333333; Longitude:32.616667).
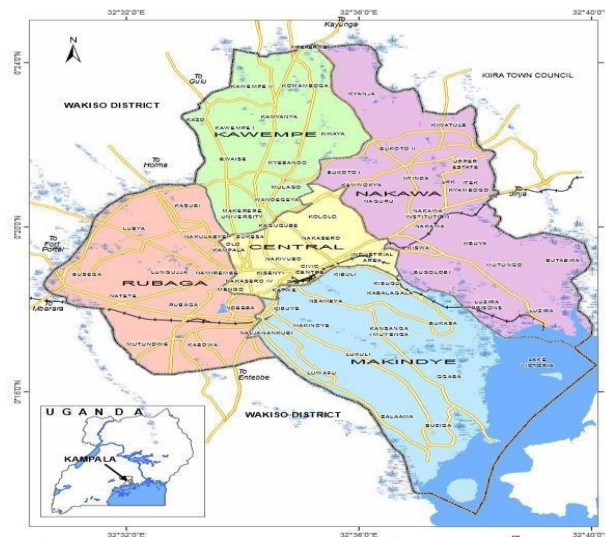
Figure 3.1: Map showing location of Nakawa Division

Source: (Matovu, 2021)

3.1.1 Geography

Kampala is located in Uganda, East Africa and lies along the following coordinates: 0°18′ 49″ N, 32° 34′ 52″ E. The City borders Lake Victoria, Africa's largest fresh water lake in the East and surrounded by Wakiso District in the West and North. Kampala is the Capital City and Seat of Government-with the assorted arms of central government. Kampala has about 23% of its area as fully urbanized, a significant portion (60%) semi-urbanized and the rest considered as rural settlements. Its architecture is a mixture of the modern, colonial and Indian styles (Kopnina, 2015).

Land in Uganda is held under four forms of tenure namely; Mailo, Customary, Freehold and Leasehold tenure systems. Majority of the land on which the slum settlements in Nakawa sit is owned by Private owners (60%) under Freehold tenure. The rest of the land is owned Nakawa Municipal council (28.3%), Buganda Kingdom (6.7%) and the Church (5%). All the slums in Nakawa Division have experienced eviction threats in the recent past. It is only in Naguru where there's currently no eviction threat. In geographical size, Nakawa 6% division extends to occupy 13,128 acres of land. However, this rather small section of the division's land is also the most densely populated.

3.1.2 Topography

The topography of the division is characterized by flat-topped hills of uniform height divided by shallow valleys forming papyrus swamps. Most of the streams flow into Lake Victoria. The streams are characterized by low gradient and comparatively broad valley floors. Owing to alluvial aggregation, low gradient, and frequent local silting, many valley floors have become seasonal or permanent swamps (Elvis & Robert, 2017).

The division is characterized by comparatively small seasonal variations in temperature. Due to a high rate of evaporation from the lake surface and to regular winds, which drift across the lake from east to west all seasons, the average annual rainfall is high; 1,558 millimetres (61.3 in). There is a tendency of the rainfall to decrease as one moves northwards from the lake shores.

The rain falls in 160 to 170 days each year, with two peaks from March to May and from October to November (Wandera, 2016).

Only a small proportion of the division vegetation can be considered as natural. The vegetation of the hills, which was originally shrubs and forests, has been modified to a greater extent as a result of clearing to give way for settlement (high income residential neighborhoods on the hills) and the papyrus swamps have been encroached on, in the valleys, by illegal developers (Oluka, 2023).

3.1.3 Demographics

The 1991 national census estimated the division's population at 135,519. The 2002 census put the figure at 246,781, with 122,249 (49.5 percent) females and 124,532 (50.5 percent) males. In 2002, the division had 20.3 percent of the total Kampala District population. Children below five years of age were 20 percent of the division population. Youth aged 10 to 24 were 30 percent of the population, and 26.7 percent of the population were women of child-bearing age. The population growth rate in 2002 was 4.8 percent and the total fertility rate was 5.1 percent. The average family size was 4 and the maternal mortality rate was 265 per 100,000 live births (Defunct Kampala City Council Data, 2022).

3.1.4 Population

There are approximately 2,229,001 people in the informal settlements of Nakawa division (UBOS, 2019). The different demographic aspects like; the number of households, household size and total population per settlement in Nakawa. From the table 3.1, it is clear that Kinawataka has the highest number of people living there. However, there are more households in Banda and Bukoto I slums. The average household in the slums in Nakawa comprises between 5 and 6 people (Elvis & Robert, 2017).

Table 3.1: Showing the average household in the slums Nakawa comprises between 5 and 6 people.

Parishes	Households	Household Size	Total Population
Banda	10,000	5	50,000
Bukoto	18,000	6	60,000
Butabika	3,500	5	17,500
Kinawataka	4,000	6	80,000
Mambo Bado Kisenyi Luzira	900	6	5,000
Naguru	2,080	5	10,400
	28,480		**222,900**

Source: Nakawa municipality – Settlements profile (2022)

3.2 Research design

The study adopted a mixed methods research design approach where both quantitative and qualitative approaches were adopted. The collection and analysis of data made use of quantitative and qualitative approaches. The quantitative analysis helped to determine the effect between the study variables while the qualitative analysis provided a more comprehensive understanding of the way the relationships manifest (Fassinger & Morrow, 2023). Qualitative approach enabled the researcher capture the respondents' attitudes, behaviours and experiences regarding the phenomenon under study (Katamba & Nsubuga, 2014). Quantitative approach such as survey enabled the researcher gather large scale data, in a relatively shorter time frame (Hancock & Algozzine, 2015).

This mixed-methods approach allows for a comprehensive understanding of the issue. Qualitative methods capture the nuanced experiences and perceptions of the community, while quantitative methods offer statistical support and broader generalization of the findings. By involving community members in interviews and discussions, the research can tap into local knowledge and context-specific insights. This helps in understanding the unique challenges, concerns, and strengths of Nakawa Division in dealing with land pollution and sustainability.

Combining qualitative and quantitative data will provide robust evidence to inform policymakers, local authorities, and stakeholders, aiding in the development of targeted interventions and policies to address land pollution and enhance community sustainability in Nakawa Division. The integration of qualitative and quantitative data allows for cross-validation of findings, strengthening the overall credibility and reliability of the research outcomes. By employing this mixed-methods research design, the study can offer a comprehensive understanding of the impact of land pollution on community sustainability in Nakawa Division, Kampala City, Uganda, enabling informed strategies for mitigating land pollution and fostering sustainable practices within the community.

3.3 Research population

Target population is the specific population about which information is desired. Mugenda and Mugenda, (2013), explain that the target population should have some observable characteristics, to which the researcher intends to generalize the results of the study. The study population was environmental officers, political leaders and civil servants from Nakawa division Kampala. The study targets the population which is 420 in the categories of the populations. The reason of selecting these categories of respondents is due to the fact that the researcher realized that they have a good understanding of the affairs of land pollution and community sustainability.

3.3.2 Sample Size

The sample size was calculated using the Slovene's Formula (Slovin,1960).

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

n = sampled population sample size

N = total population

e = Margin of error at 0.05 level of significance

$$n = \frac{420}{1+420\,(0.05)^2}$$

$$n = \frac{420}{1+420\,(0.0025)}$$

$$n = \frac{420}{2.05}$$

$$n = \frac{420}{2.05}$$

$$n = 205$$

Table 3.2: Population and Sample Size

Category	Population	Sample
Environmental officers, local leaders	018 185	9 90
Civil servants	217	106
Households		
Total	**420**	**205**

Source: Self-generated, 2022

3.4 Sampling Techniques

Simple random sampling technique to collect quantitative data from the respondents. Random Sampling is a sample obtained from the population in which ways that samples of the same size have equal chance of being selected. This ensures that respondents will be selected represented in the study and all had equal chances of being selected to be respondents in this study. Simple random sampling was used to elicit data from the different categories of the respondents to attain the number needed.

3.5 Data Collection instruments

3.5.1 Questionnaires

The main instrument of data collection was collected by use of a questionnaire. According to Sarantakos (2017) a questionnaire is a method of survey data collection in which information was gathered through oral or written questionnaires. The questions involved the feelings of respondent groups regarding the study on the study. The questionnaire also aimed at getting responses from the respondents about their views from the study. The questionnaire was dimensioned on three parts with the first part based on demography of respondents; second part was done based on the bases of objectives of the study. The questionnaire was used to collect data from all the respondents.

3.5.2 Interviews

The study conducted face to face interactions in making an intervention for the interviewee and the researcher with the aim of attaining information from the field. The study employed formal interviews with the respondents that enabled the generation of data reducing resistance and attaining the information for the respondents in the study. This method allowed further probing and clarification of questions that tend to be difficult and not clear to the respondents. It also enhanced responses for questions which were regarded as sensitive. Interviews were important since they help in getting information that has not been asked in the questionnaires. Interviews were done with the environmentalists from Nakawa division.

3.6. Data Quality Control

3.6.1 Validity

Validity refers to how accurately the instruments capture data that gives meaningful inferences (Mugenda & Mugenda, 2013). Instrument validity was ascertained in the following ways; discussing the questionnaire with the colleagues, there after adjustments were done before submission to the supervisor who assessed the face validity. The instruments were pre-tested, after which the content validity was measured. This helped to assess the appropriateness of

sentence construction, comprehensiveness of instruments and language clarity. Comments were received on the acceptability of the instrument in terms of; length and the privacy of respondents. These comments were helpful in designing the final instrument that was used to generate data. To measure the validity of the tool was carried out using Content Validity Index (CVI) prior to the administration of the research instruments.

According to Amin (2015) validity of instrument is determined by the formula:

$$CVI = \frac{RQ}{TQ}$$

Legends: CVI = Content Validity Index

RQ = Relevant Questions

TQ = Total number of Questions

The attainment of the figure of 0.7 indicated that the instrument is valid.

Table 3.3: Determination of validity of instruments

Variable	Content validity index
Land pollution	0.832
Community sustainability	0.809

Source: Researcher, 2022

According to the results in Table 3.3 above, land pollution has content Validity Index of 0.832 and community sustainability had 0.809. This shows that the values were high, hence valid.

These results validated the data collection instruments and are supported by Rodrigues *et al.* (2017) who state that CVI of 0.70 or higher is considered excellent.

3.6.2 Reliability

Gall (1996), defines reliability as the degree of consistency of the measuring instrument. This agrees with Mugenda and Mugenda (2013) who stated that reliability is a measure of the degree to which a research instrument yields consistent results or data after repeated trials. The social sciences research accepts variables scoring a coefficient above 0.70. Reliability was ensured through test-retest procedure of both the questionnaire and the interview guide. The supervisors also reviewed the questionnaire. The questionnaires were pilot tested on 10 respondents and the result subjected to Cronbach alpha method, which is a test of internal consistency according to Amin (2015). The Cronbach's Alpha reliability Coefficient (α) was calculated by running a statistical test using Statistical Package for Social Scientists (SPSS) computer program.

The coefficient ranges between $\alpha = 0.00$ for no reliability, $\alpha = 1.00$ for perfect reliability. The closer alpha gets to 1.0 the better. According to Amin (2015), all the measurements in the instrument that show adequate levels of internal consistency of Cronbach's alpha of 0.7 and above are acceptable as reliable.

Table 3.4: Cronbach Alpha Coefficient Model Results Table

Variable	Cronbach Alpha Coefficient
Land pollution	0.844
Community sustainability	0. 861

Source: Researcher, 2022

According to the results in Table 3.4 above, Land pollution has a Cronbach Coefficient of ($\alpha = 0.844$); and Community sustainability has ($\alpha = 0.861$). All alpha coefficients were above 0.7 implying that the data collection instrument were reliable. This is supported by Daud et al.

(2018) who state that Alpha Cronbach values ranging 0.6-0.8 are considered moderate but acceptable.

3.7 Data analysis

3.7.1 Quantitative analysis

Different statistical techniques were used namely: Simple frequency counts and percentage distributions was used to analyze data on profile of respondents. Data from the field was compiled, sorted, edited and coded to have the required quality, accuracy and completeness. The researcher used Statistical Package for Social Sciences (SPSS version 21) to analyze the data gathered, to analyze quantitative data based on frequency and percentages on the state of land pollution and community sustainability.

3.7.2 Qualitative data Analysis

Processing of qualitative data involved familiarization with the data through review, reading, identification of themes, re-coding and exploration of relationships between categories after data has been collected. Analysis of qualitative data was done through thematic and content analysis. Thematic analysis was ensured that clusters of text with similar meaning were presented together. Content analysis was involved in interpretation of the underlying context. Qualitative analyses were used to enable the making of statistical inferences for generalization and carrying out of in-depth analysis.

3.8 Ethical Considerations

The entire research process was conducted with due respect to ethical considerations in research. The researcher obtained the consent of the respondents to participate in the study. The researcher minded about treating the respondents' views with utmost confidentiality. In general, a high degree of openness regarding the purpose and the nature of the research was observed by the researcher.

The researcher ensured that respect for the respondents is applied. Respect was encompassed by respecting the opinion of the respondents including the opinion to terminate the interview whenever they felt uncomfortable to continue, questioning style especially for very personal and sensitive questions.

Also the researcher promised the respondents that their identities were not disclosed as there was no writing of names on the questionnaires and that every information given by them were confidential. The researcher gave the respondents the true facts about the research in order to make informed decisions about participating or not.

CHAPTER FOUR: DATA PRESENTATION, INTERPRETATION AND ANALYSIS

4.0 Introduction

The purpose of the study was to assess the effect of land pollution on community sustainability in Nakawa division, Kampala, Uganda. The objectives of the study were to establish the causes of land pollution among the communities in Nakawa division, Kampala; secondly to determine the effect of land pollution on community sustainability; and thirdly, to design mechanisms that can be employed to reduce land pollution and ensuring community sustainability in the study area. The study results are based on the findings from the field data. The data was presented in the quantitative and qualitative manner; the responses from the field are presented based on the information attained. The findings for the study are presented on response rate, demographic analysis of the responses and descriptive analysis to provide answers to the objectives of the study.

4.1 Response rate

Here the researcher attained information from the interviews and questionnaires. The total of 196 questionnaires was sent for the collection of information and only 182 were collected back giving a response of 92.8% of the study respondents.

Table 4.1: Response rate

	Response	Sample	Response rate	Percent
	Questionnaire	196	182	92.8
	Interview	09	07	77.8
	Total	**205**		

Source: Field data, 2022

The study results indicate that the information was attained from 92.8% respondents for the questionnaires while attained 77.8% for the interview responses. The findings for the study

indicate that information was attained from sufficient number of the respondents for that data to be used for reliable conclusions.

4.2 Demographic characteristics of the respondents

The demography of the respondents featured gender, age, education, marital status and time of stay in the community in Nakawa division, Kampala.

Table 4.2: Gender of the respondents

Gender	Frequency	Percent
Male	109	59.9
Female	73	40.1
Age		
20-29 years	34	18.7
30-39 years	43	23.6
40-49 years	70	38.5
50 years above	35	19.2
Time of staying in the community		
Less than 1 year	24	13.2
5-9 years	29	15.9
10-15 years	16	8.8
16 years above	113	62.1
Education		
Secondary	20	11.0
Post secondary certificate	41	22.5
Diploma	33	18.1
Degree	67	36.8
Post graduate	21	11.5
Marital Status		
Single	36	19.8
Married	137	75.3
Separated	9	4.9
Total	**182**	**100.0**

Source: Field data, 2022

The gender of the respondents indicates that 109(59.9%) respondents were male while 73(40.1%) were female. The results showed that the majority respondents were male and that the data was obtained from both male and females and the findings can't be doubted on gender grounds.

Data on age for the respondents indicate that majority of respondents were between 40-49 years, followed by 70(38.5%), then came 30-39 years were 43(23.6%), 50 years and above 35(19.2%) and finally 34(18.7%) in the age of 20-29 years and above. The majority of the respondents are mature hence the information obtained from them can be trusted.

The results indicate that the majority of the respondents had been in Nakawa division for a period of more than 16 years 113(62.1%), then followed by those of 5-9 years 29(15.9%), and those of less than 1 year 24(13.2%) and finally 16(8.8%) respondents were in 10-15 years. The findings show that the majority of respondents have interacted with the people in community in Nakawa division for long time and therefore the information was got from reliable and informed respondents with significant understanding of the study area, information attained is deemed adequate for the study.

Results on the education of the respondents show that degree holders were majority 21(11.5%), diploma holders 33(18.1%), secondary certificate 41(22.5%) respondents, post graduate were 21(11.5%) and secondary certificate holders 20(11%) of the study. Data was attained from literate respondents to provide information.

Results on the marital Status revealed that, married respondents were 137(75.3%), single respondents 36(19.8%) and separated were 9(4.9%). The findings indicate that majority respondents had responsibility for the study.

4.3 Causes of land pollution among the communities in Nakawa division

The study first objective was to establish the causes of land pollution among the communities in Nakawa division, Kampala. The results attained from the field are presented.

4.3.1 Awareness of the Causes of land pollution among the communities in Nakawa division

The study analyzed causes of land pollution amongst the communities in the study area. Results indicate that n = 180 (98.9%) were aware of pollution and its causes; while n = 2 (1.1%) were not.

Table 4.3: Awareness of the Causes of land pollution in Nakawa

Awareness	Frequency	Percent
Yes	180	98.9
No	2	1.1
Total	**182**	**100.0**

Source: Field data, 2022

The results indicate that a very large portion (n=180; 98.9%) were aware of the causes of land pollution in Nakawa division. Therefore the population will do what it takes to address this challenge in consultation with stakeholders this agrees with the finding of J *et al.,* 2015 who stated that Environmental Engineers and other related Engineering professional bodies have a vital role to pay in mobilizing the public for action aimed at improving the quality of man's physical environment. This can be achieved by organizing relevant programmers, seminars, workshops, public debates, etc. on environmental issues. The role of the media profession cannot by over emphasized here. There is the need for a better understanding of issues of the environment by media Practioners, news editors, features editors, news producers etc. in print and electronic media, to enable them improve on their unique roles in the global efforts on sustainable development.

4.3.2 Economic causes of land pollution among the communities in Nakawa division

An analysis of the economic causes of land pollution (table 4.4) was analyzed. The study revealed that n = 102 (56%) reported industrialization, n = 28 (15.4%) indicated livestock

keeping; n = 21 (11.5%) stated farming; while n = 16 (18.8%) and n = 15 (8.2%) represented charcoal burning and business firewood respectively. The results show that industrialization was the leading cause of land pollution followed by livestock farming (n=28; 15.4%) and the least was firewood (n=15; 8.2%). The results show that industrialization is taking a toll on the quality of the soil and efforts need to be directed towards this challenge this agrees with Kumar and Agarwal (2020) that industrial processes produce a significant portion of land pollutants through the release of toxic chemicals, heavy metals, and untreated waste into soil, leading to contamination. Also, Brown and Matlock (2011) stated that industrial activities, including manufacturing processes and improper disposal of industrial waste, contribute to soil contamination with heavy metals, organic pollutants, and hazardous chemicals.
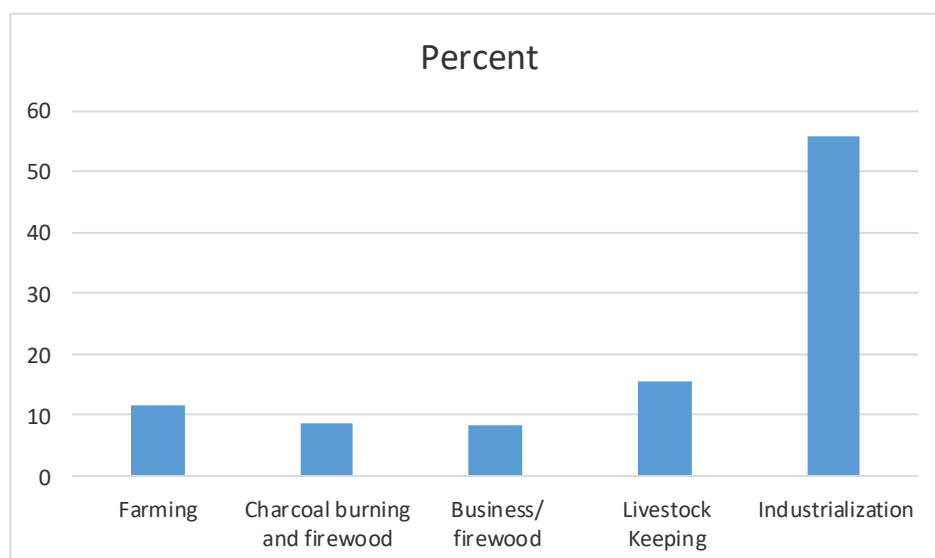
Figure 4.**1**: Economic causes of land pollution in Nakawa

Source: Field data, 2022

4.3.3 Institutional factors that cause land pollution among the communities in Nakawa division

Analysis of institutional factors (table 4.5 and figure 4.2) that cause land pollution was done; n = 59 (32.4%) reported low effectiveness in environmental monitoring by NEMA; n = 56 (80.8%) stated limited institutional capacity to plant vegetation; n = 38 (20.9%); asserted that there is

limited institutional development for vegetation, and small proportion (n = 29; 15.9%) said poor institutional monitoring are factors causing land pollution in the study area. This are drivers not causes of pollution. However they exacerbate already precarious situation. The findings of this study are in agreement with Ntale *et al.* (2016) that Weak enforcement of environmental policies and inadequate governance structures contribute to land pollution issues in Uganda and they also highlight the need for improved policy implementation and stronger environmental governance.
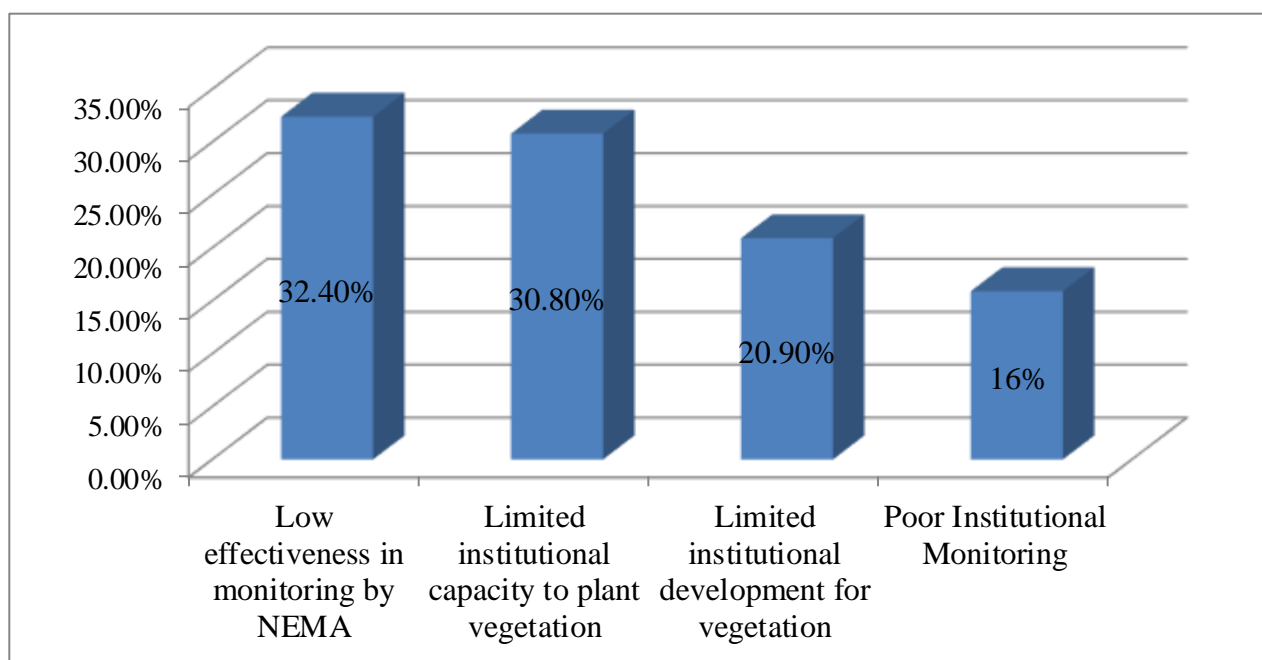
Figure 4.2: Institutional factors that cause land pollution among the communities in Nakawa division

Source: Field data, 2022

Results in figure 4.2 show the institutional factors that cause land pollution among the communities in Nakawa division low effectiveness monitoring by NEMA 59(32.4%) limited institutional capacity to plant vegetation 56(30.8%) limited institutional development for vegetation had 38(20.9%) respondents and poor institutional monitoring 29(15.9%)

respondents. The research findings indicate that the institution factors are playing a key role in abating land pollution, there is less of the institutional environmental interventions provided by the environmental regulator the NEMA. NEMA needs to fulfill its mandate.

4.3.4 Policy factors are responsible for land pollution among the communities in Nakawa division

Analysis of policy factors (table 4.4) being responsible for land pollution was done. A large proportion (n = 78; 42.9%) reported that there is ineffective implementation of policy; n = 44 (24.2%) indicated low level of advocacy; n = 42 (23.1%) stated that, it's the ineffective implementation of policy, while a small proportion (n = 18, 9.9%) did state, ineffective policy on land management as policy factors responsible for land pollution in Nakawa Division, Kampala.

Table **4.4**: Policy factors are responsible for land pollution among the communities in Nakawa division

Policy factors/ variables	Frequency	Percentage
Ineffective implementation of policy	78	42.9
Poor policy administration & management	42	23.1
Ineffective policy on Land management	18	9.9
Low level of policy advocacy	44	24.2
Total	**182**	**100.0**

Source: Field data, 2022

The results indicate that policy factors to a large extent exacerbate land pollution challenges in Nakawa division for instance in effective implementation of the policy ender mine pollution mitigation strategies.

4.3.5 Environmental factors that are responsible for land pollution among the communities in Nakawa division

Analysis of environmental factors (figure 4.3) responsible for land pollution in the Nakawa division revealed that a big proportion (n = 95, 52.2%) indicate heavy rainfall; smaller proportions (n = 48, 26.4%) and n = 39, 21.4%) for pests and diseases and drought respectively a environmental factors for land pollution is in the study area.
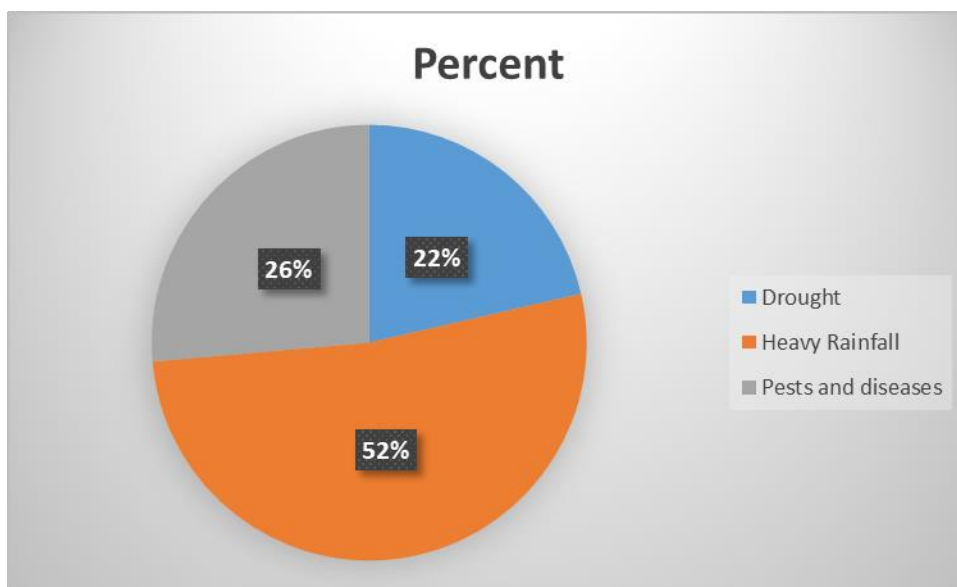
Figure 4.3: Environmental factors that are responsible for land pollution

Source: Field data, 2022

4.3.6 Social cultural factors responsible for land pollution among the communities in Nakawa division

Analysis of social cultural factors (table 4.8) responsible for land pollution in Nakawa division revealed that a big proportion (n = 54; 29.7%) indicate social disability (n = 47; 25.8%) social inequality (n = 43; 23.6%) indicate that cultural bush burning and lastly (n = 38; 20.9%) indicated social inequality as social cultural factors for land pollution in the study area.

Table 4.5: Social cultural factors responsible for land pollution among the communities in Nakawa division

Social Cultural/ Variables	Frequency	Percent
Cultural bush burning	43	23.6
Cultural farming	47	25.8
Social inequality	38	20.9
Social disability	54	29.7
Total	**182**	**100.0**

Source: Field data, 2022

4.4 Effect of land pollution on community sustainability in Nakawa division

Second objective of the study was to determine the effect of land pollution on community sustainability in Nakawa division, Kampala. To fulfill this objective, the researcher attained responses from the field concerning the subject and information attained is presented in Tabulations provided here under.

4.4.1 Whether land pollution affect the community sustainability in Nakawa division

Analysis of land pollution effects on communities was done; a huge proportion (n = 152; 83.5%) reported that land pollution affected countries; while a small proportion (n = 30; 16.5%) indicated that it did not. Land Pollution therefore is hypothesized to have a negative impact on Environmental Quality, leading to adverse effects on Community Health and Economic Stability, which consequently affect Community Sustainability.

Table 4.6: Show whether land pollution affects the community sustainability in Nakawa division

Responses	Frequency	Percent
Yes	152	83.5
No	30	16.5
Total	**182**	**100.0**

Source: Field data, 2022

4.4.2 Nature of effect of land pollution on community sustainability in Nakawa division

Analysis of the effects of land pollution on community sustainability done indicated that a large proportion (n = 52; 83.5%) reported negative effects, while n = 30; 16.5% positive effects this agrees with findings of Ileanwa et al., 2020 that discovered that the perception of the respondents regarding to land pollution was crucial as it gives a clue to their awareness of the fact that the land is being polluted. The results revealed that 65% of the respondents perceive that the land was being polluted while 24% of the respondents did not perceive any problem of land pollution in their neighborhoods and 11% did not know if the land was being polluted at all

Table 4.7: Nature of effect of Land Pollution on community sustainability in Nakawa division

Responses		Frequency	Percent
	Positively	30	16.5
	Negative	152	83.5
	Total	**182**	**100.0**

Source: Field data, 2022

4.4.3 Effect of Land Pollution on community sustainability in Nakawa division

Analysis of effect of land Pollution on community sustainability done indicated that a large proportion (n = 68; 37.4%) reported land pollution negatively affect biodiversity, while the lesser proportion (n = 55; 30.2%, n = 46; 25.3%, n = 13; 7.1) with land pollution affect rainfall for food production, land pollution leads to soil erosion and land pollution create increase in dangerous gases respectively this agrees with findings of Ileanwa *et al.,* 2020 to some extent where Ileanwa *et al* reported that the greatest threat of land pollution to the residents in Minna Metropolis was the outbreak of diseases which was as a result of the indiscriminate disposal of waste because the waste so disposed served as breeding ground for disease carrying organism like Mosquitoes which is known for causing Malaria. Most of the respondents testified to the fact that they have suffered from Mosquito bites that has resulted to Malaria in addition, they revealed that 28% of outbreak of diseases was caused by land pollution, less attractive environment 19 and 17% of respondents are disturbed because of how land pollution would affect their children, 13% indicated that land pollution contaminates water sources. Others are, 8% of residents wanted to move from their environment as a result the effects, 8% revealed that soil fertility was loss to land pollution while 4% landscape disturbance and 3% obstruction of free flow of traffic were all effects of land pollution in Minna metropolis (Ileanwa et al., 2020).
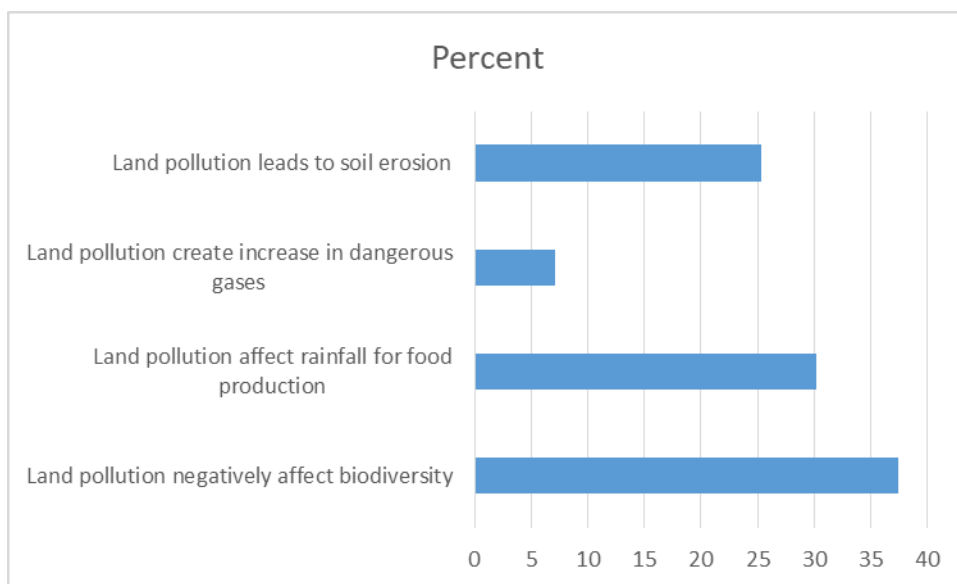
Figure 4.4 Effect of Land Pollution on Community Sustainability in Nakawa

Source: Field data, 2022

Plate 4.1: Construction debris dumped everywhere

Sources: field 2022

4.4.4 Effect of Pollution on community health in Nakawa division

Analysis of effect of pollution on community health done indicated that a large proportion (n = 70; 38.5%) reported land pollution has affected people's health through clearing bushes, while the lesser proportion (n = 40; 22.0%, n = 38; 20.9%, n = 34; 18.7) with land Pollution reduce the people' quality of living, land pollution reduces personal hygiene and there is creation of harboring ground for diseases respectively this agrees Aneja, 2006 with Land pollution leads to various health issues in communities. Exposure to contaminated soil and water sources can result in illnesses, including respiratory problems, skin diseases, and gastrointestinal issues.

Table **4.6**: Effect of Pollution on community health in Nakawa division

Responses	Frequency	Percent
Land pollution has affected people's health through clearing bushes	70	38.5
There is creation of harboring ground for diseases	34	18.7
Land pollution reduces personal hygiene and sanitation	38	20.9
Land Pollution reduce the people' quality of living	40	22.0
Total	**182**	**100.0**

Source: Field data, 2022

Plate 4.2: The wastes dumped in the open

Source: field 2022

4.4.5 How does land pollution affect biodiversity in Nakawa division

Analysis on how does land pollution affect biodiversity indicated that a large proportion (n = 70; 38.5%) reported there is loss of green cover, while a smaller proportion (n = 69; 37.9%, n = 43; 23.6%) there is loss of plant cover, and leads to loss of animals respectively. This findings are in line with findings such as Land pollution affects local ecosystems, leading to a decline in biodiversity. Contaminants in soil and water harm plant and animal life, disrupting ecological balance (EPA, 2020). Land pollution in African regions impacts local ecosystems and biodiversity. Contaminants in soil and water negatively affect plant and animal life, disrupting the delicate balance of the environment (IUCN, 2018).

Table 4.7: How does land pollution affect biodiversity in Nakawa division

Responses	Frequency	Percent
Leads to loss of animals	43	23.6
There is loss of plant cover	69	37.9
There is loss of green cover	70	38.5
Total	**182**	**100.0**

Source: Field data, 2022

4.5 Mechanisms that can be employed to reduce land pollution

The study third objective was to establish the mechanisms which can be employed to reduce land pollution and ensuring community sustainability Nakawa division, Kampala. The study results attained based on the responses which sought to attain responses on the mechanisms employed in reduction of land pollution and ensuring community sustainability as enumerated under.

4.5.1 Presence of mechanisms for reducing land pollution

Analysis of mechanisms for reducing land pollution and ensuring community sustainability was done; a huge proportion (n = 146; 80.2%) reported that there are no mechanisms for reducing land pollution and ensuring community sustainability; while a small proportion (n = 36; 19.8%) indicated that there is.
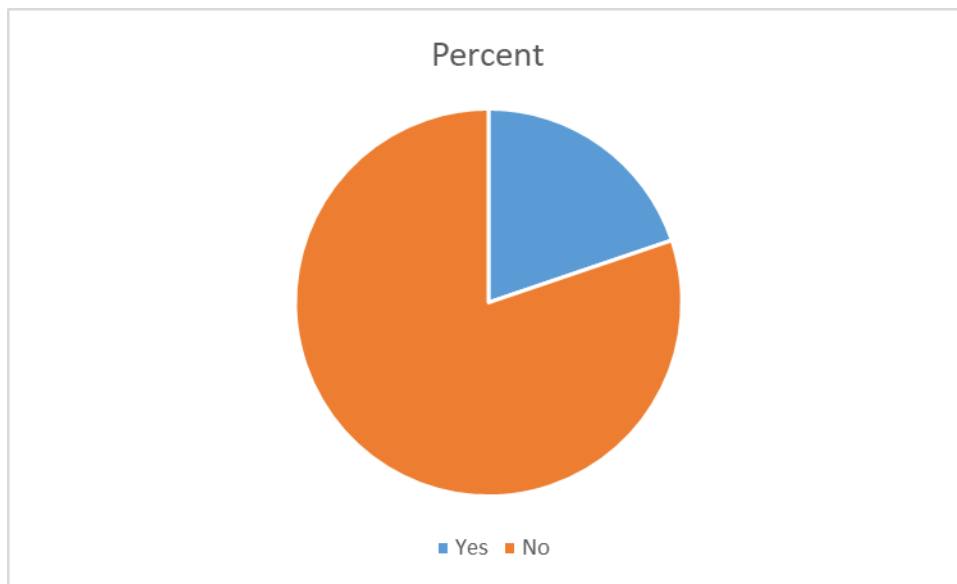
Figure 4.4: Presence of mechanisms for reducing land pollution and ensuring community sustainability

Source: Field data, 2022

4.5.2 Government mechanism is in place to reduce land pollution

An analysis of the government mechanism is in place to reduce land pollution and ensuring community sustainability table 4.8 was analyzed. The study revealed that n = 59 (32.4%) reported enhanced legal framework for land, n = 53 (29.1%) indicated instituted strict forest monitoring; n = 39 (21.4%) stated community sensitization on effective land usage; while n = 31 (17.0%) represented Community sensitization on effective land usage.

Table 4.8: Government mechanism is in place to reduce land pollution

Responses	Frequency	Percent
Instituted strict forest monitoring	53	29.1
Providing security on land usage	39	21.4
Community sensitization on effective land usage	31	17.0
Enhanced legal framework for land	59	32.4
Total	**182**	**100.0**

Source: Field data, 2022

4.5.3 Are there community induced mechanisms for reducing land pollution

Analysis of whether are there community induced mechanisms for reducing land pollution and ensuring community sustainability mechanisms for reducing land pollution and ensuring community sustainability was done; a huge proportion (n = 64.8%) reported that there are no community induced mechanisms for reducing land pollution and ensuring community sustainability; while a small proportion (n = 35.2%) indicated that there is.
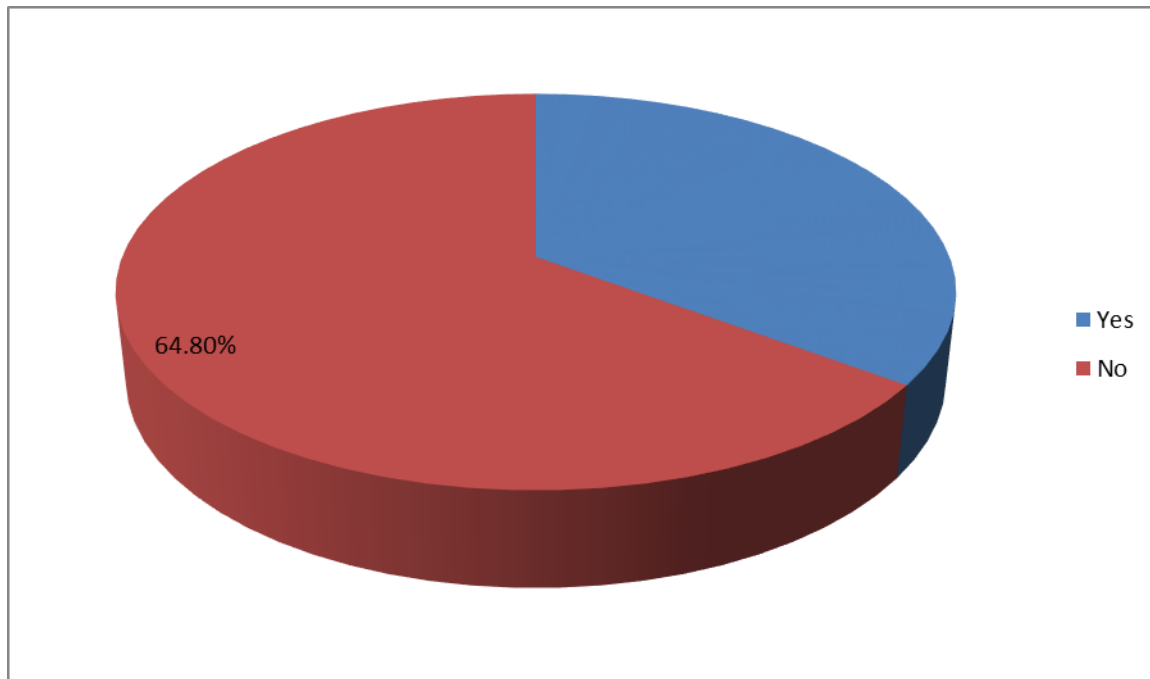
Figure 4.5: Are there community induced mechanisms for reducing land pollution?

Source: Field data, 2022

4.5.4 Avenues developed by community in addressing land pollution

An analysis of the avenues developed by the community in addressing land pollution and ensuring community sustainability figure 4.6 was analyzed. The study revealed that n = 60 (33.0%) reported reducing deforestation, whereas both reporting those cutting trees and industrial waste control reported n = 50 (27.5%); while n = 22 (12.1%) represented trenches to avoid land erosion.
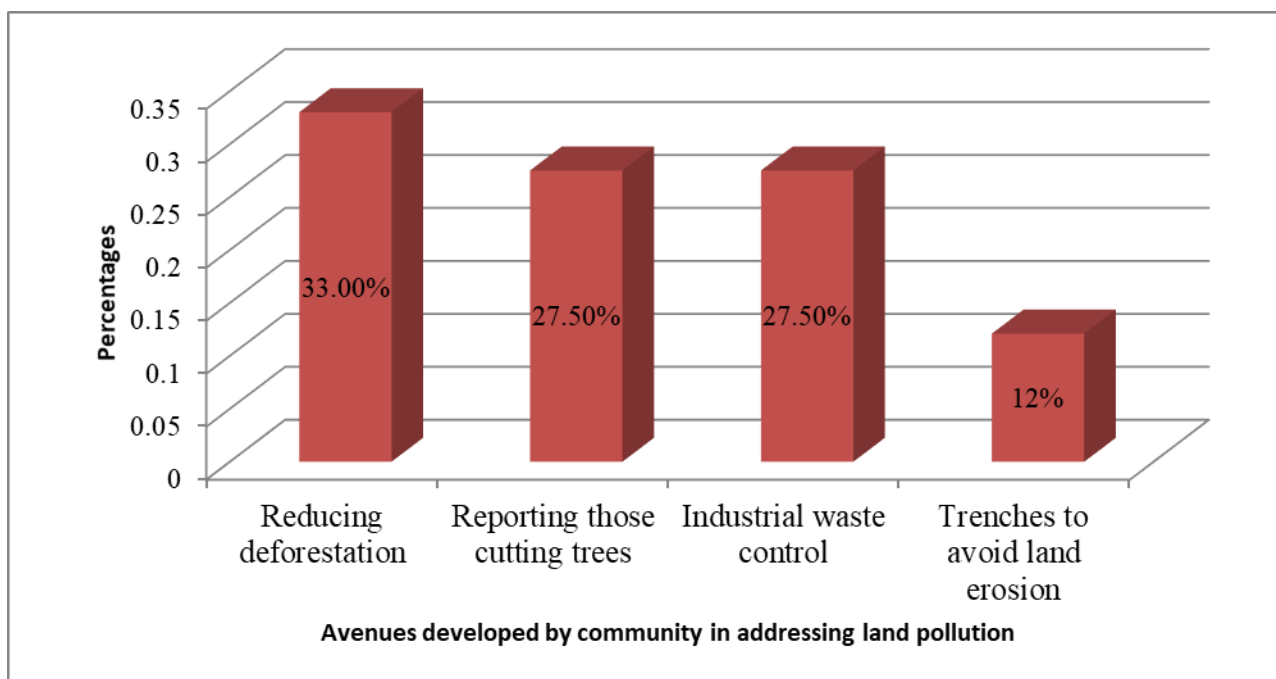
Figure 4.6: Avenues developed by community in addressing land pollution

Source: Field data, 2022

4.5.5 Guidance to locals on addressing land pollution

Analysis of guidance to locals on addressing land pollution and ensuring community sustainability was done; a huge proportion (n = 102; 56.0%) reported that the Nakawa division does not provide guidance to locals on addressing land pollution and ensuring community sustainability; while a small proportion (n = 80; 44.0%) indicated that the division does.
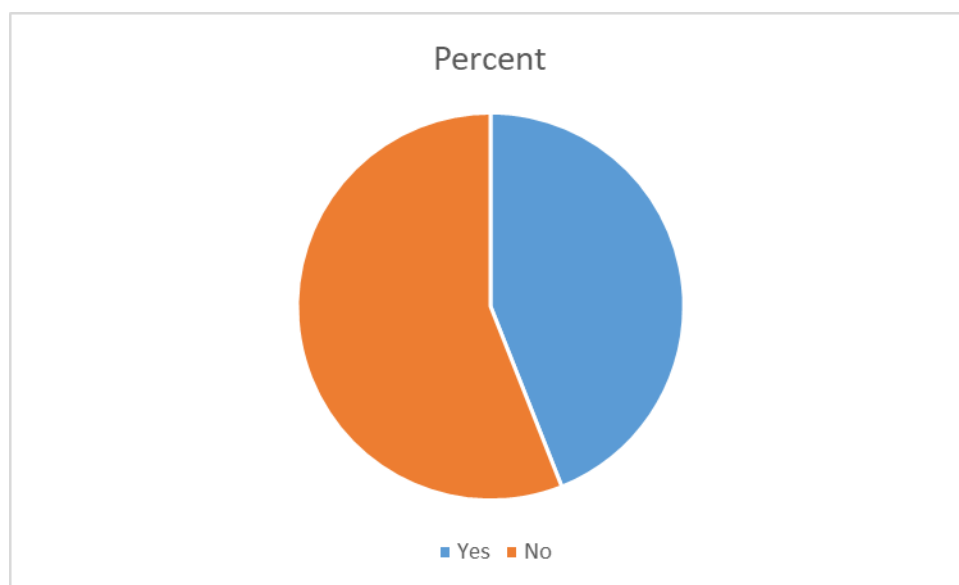
Figure 4.7: Does Nakawa division provide guidance to locals on addressing land pollution

Source: Field data, 2022

4.5.6 Guidance Nakawa division provided on addressing land pollution

An analysis of the guidance Nakawa division provided on addressing land pollution and ensuring community sustainability table 4.18 was analysed. The study revealed that n = 54 (29.7%) reported community awareness campaigns on land usage, n = 47 (25.8%) indicated by both establishment of bi-laws on land usage and enhanced the development of skills for proper land; while n = 34 (18.7%) represented maintenance of drainage channels.

Table 4.11: Guidance Nakawa division provide on addressing land pollution

Responses	Frequency	Percent
Establishment of bi-laws on land usage	47	25.8
Community awareness campaigns on land usage	54	29.7
Enhanced the development of skills for proper land usage	47	25.8
maintenance of drainage channels	34	18.7
Total	**182**	**100.0**

Source: Field data, 2022

CHAPTER FIVE: DISCUSSION, CONCLUSION AND RECOMMENDATIONS

5.0 Introduction

This chapter presents the results attained from the field alongside with the previous authors in literature review, it further provide the conclusions and recommendations based on the implied results for the conclusions in the study.

5.1 Discussion of findings

5.1.1 Causes of land pollution among the communities in Nakawa division, Kampala

Results in Table 4.7, 4.8, 4.9 and 4.10 on the economic causes are Industrialization with Institutional factors that cause land pollution had Limited institutional capacity to plant vegetation, low effectiveness in monitoring by NEMA, Ineffective implementation of policy, environmentally heavy rainfall cause pollution and social-cultural systems are poorly developed in the reduction of land pollution. The results are in agreement with those of Thomson and Newman (2018) who contends that deforestation and soil erosion, deforestation carried out to create dry lands is one of the major concerns. Land that is once converted into dry or barren land, can never be made fertile again, whatever the magnitude of measures to redeem it. The results agree with those of Razavi (2018) with overcrowded landfills; each household produces tons of garbage each year. Garbage like aluminum, plastic, paper, cloth, wood is collected and sent to the local recycling unit. Items that cannot be recycled become a part of the landfills that hampers the beauty of the city and cause land pollution. The findings are in agreement with those of Kanuri, *et al.,* (2017) who argued that human sewage through untreated human waste can produce toxic gases that can seep into the ground. As with air pollution, the soil quality is negatively impacted, and land nearby can be contaminated. In addition to this, the probability of human illnesses occurring increases. The findings agree with Moser (2015) who provided that chemicals damage the composition of the soil and make it easier to erode by water and air. Plants

absorb many of these pesticides and when they decompose, they cause soil pollution since they become a part of the land.

5.1.2 Effect of land pollution on community sustainability in Nakawa division, Kampala

The land pollution reduced bio-diversity, increase dangerous gases and generally reduces the community health in terms of plants, animal and people health in the communities were the people are living. The findings are in agreement with those of Roseland and Spiliotopoulou (2017) provided that considering how soil is the reason we are able to sustain ourselves, the contamination of it has major consequences on our health. Crops and plants grown on polluted soil absorb much of the pollutants and then pass these on to us. This has the effect of bioaccumulation the findings agree with Spiliotopoulou (2019) who provided that Huge piles of refuse and garbage being open dumped and littered over an area spoils the serenity of the landscape. The emission of toxic and foul gases from landfills pollutes the environment and causes serious effects on health of some people. The unpleasant smell causes inconvenience to other people. The findings agree with those of Thomson and Newman (2018) who stated that death of many soil organisms (earthworms, insects and microbes) in the soil can lead to alteration in soil structure. Apart from that, it could also force their predators to move to other places in search of food. Soil pollution can lead to the lack of biodiversity in an ecosystem. The life of bird, insect, mammal and reptile species that live in the soil can get affected by pollution. The findings agree with those of Kampa and Castanas (2018) who contend that when the land is polluted through contamination by some harmful chemicals, the air picks up some of the deposits that are in smaller particles that at times get stuck on human body resulting in some skin diseases and even obstruction of human breathing organs. So, many diseases and infections are attributed to indiscriminate waste disposal through their closeness to crops planted on land for human consumption or by direct effect on human.

5.1.3 Mechanisms that can be employed to reduce land pollution and ensuring community sustainability Nakawa division, Kampala.

It was found amongst many respondents who provided that no mechanisms for reduction of land pollution and enhancing community sustainability. The mechanisms to reduce land pollution are through enhanced legal framework for the land, Instituted strict forest monitoring and provision of security on land usage. The mechanisms for land pollution reduction are reducing of deforestation, reporting those cutting trees and Industrial waste controls needed in ensuring community sustainability in Nakawa division Kampala. The findings agree with those of Craig & Allen (2017) who provided that putting forward a reasonable environmental method to ensure the environmental regulation is more rigid than before. After the implementation of the environmental regulation, many enterprises are afraid of related systems, and lost the entrepreneurial motivation and enthusiasm. In addition, the scale of employment is declining year by year. The findings agree with Hill & Lee (2017) who suggested ways to minimize the soil acidification process, the use of less acidifying farming practices: Retain crop residue, no nitrate residue, less tillage etc. Applications of agricultural lime: The addition of lime raises the soil pH to some prescribed value.

The findings for the study indicate that avenues for the management of land pollution are prevailing although limited in scope, there is need for the reduction of community engagement amongst the people, the management for pollution have been developed and the mechanisms are insignificant indicating that the existence of the mechanism are not significant to reduce land pollution.

5.2 Conclusion

The purpose of the study was to assess the effect of land pollution on community sustainability in Nakawa division, Kampala, Uganda.

In regard to the causes of land pollution among the communities in Nakawa division, Kampala, the study concludes that industrialization, institutional capacity, monitoring on land usage and environmental heavy rainfall cause land pollution. Based on the results the study provide that the

institution of different mechanisms are significant directors to the cause of land pollution, poor institutions, environmental vagaries, poor policy orientation significantly caused land pollution among the people in Kampala.

Secondly, it was found that the nature of the effect of land pollution on community sustainability is generally negative hence the assertion that land pollution reduces the community sustainability. The land pollution reduced bio-diversity, increase dangerous gases and generally reduced the community health in terms of plants, animal and people health in the communities were the people are living. The study concludes that the occurrence of land pollution has generally reduced the community sustainability with bio-diversity, environment conditions and animal healthy generally declined in value.

Thirdly, respondents provided that there is no mechanism for reduction of land pollution and enhancing community sustainability. The mechanisms to reduce land pollution are enhanced legal framework for the land; instituted strict forest monitoring and provision of security on land usage. The study concludes that mechanisms for land pollution reduction are reducing of deforestation, reporting those cutting trees and industrial waste controls. Further the presence of mechanisms are not effective in understanding the state of the reduction, the mechanisms by the government and community are generally poor in ensuring community sustainability.

5.3 Recommendations

The study recommend that industrialization need to be effectively managed and regulated to generate the environmental controls, there is need for effective policy implementations, instituting the monitoring mechanisms for land polluters and provision of environmental protectors such as rainfall controls aimed at improving the stakes of the environmental controls in the country.

Secondly, the nature of the effect is generally more negative hence the assertion that land is polluted. Land pollution reduced bio-diversity, increase dangerous gases, reduced the community health in terms of plants, animal and people's health in the communities. There is need for the

52

controls aimed at ensuring environmental sustainability. The policy mechanisms need to be developed to guide the presence and existence of the environmental controls, appropriate avenues need to be designed to guide conservation and enhancement of the environment in the country.

Thirdly, the study recommends that mechanisms suitable for the management, handling and effective policy guides aimed at enhancing the management of land systems, control mechanisms for the land to avoid land misuse, controls to enable housing and construction aimed at ensuring effectiveness in the land usage in the country. There is need for development of effective institutional development necessary of increasing the capacity of the institutions in generating community wellness. People should be encouraged to plant trees at home. Most importantly, direct awareness campaigns that involve different relevant stakeholders should be raised in Nakawa communities on the impacts of deforestation by following the community education model process.

5.4 Areas for further research

The study provides the following as areas for future research that need to be focused on in future studies.

- Community involvement in environmental sustainability
- Community management and controls for pollution

REFERENCES

African Development Bank. (2020). Community Participation in Environmental Protection. Retrieved from [AfDB Community Participation Website].

African Union. (2021). Green Technology for Environmental Sustainability. Retrieved from [AU Green Technology Website].

Agyeman, J., Bullard, R. D., & Evans, B. (Eds.). (2003). Just Sustainabilities: Development in an Unequal World. London: Earthscan.

Aktar, W., Sengupta, D., & Chowdhury, A. (2009). Impact of Pesticides Use in Agriculture: Their Benefits and Hazards. Interdisciplinary Toxicology, 2(1), 1-12.

Alter, T., Driver, A., Frumento, P., Howard, T., Shuffstall, B., Thompson, L., & Whitmer, W. (2017). Community engagement for collective action: a handbook for practitioner. Invasive Animals CRC, Australia, 1–51.

Amin, M. E. (2015). *Social science research: Conception, methodology & analysis*. Makerere University Printery, Kampala Uganda.

Aneja, V. P. (2006). Health Effects of Pesticide Usage in Developing Countries. In Advances in Agronomy (Vol. 89, pp. 163-226). Academic Press.

Bajocco, S., De Angelis, A., Perini, L., Ferrara, A., Salvati, L. (2022). The impact of land use/land cover changes on land degradation dynamics: a Mediterranean case study. *Environ. Manag.*, **49**(5), 980-989. https://doi.org/10.1007/s00267-012-9831-8

Bronfenbrenner, U. (1979). The Ecology of Human Development: Experiments by Nature and Design. Cambridge, MA: Harvard University Press.

Brown, L., & Matlock, M. (2011). A Review of Water Quality Concerns in Urban Watersheds: The Role of Storm water Runoff and its Impacts. Chemosphere, 2(5), 210-221.

Chigbu, U. E. (2018). Challenges in Environmental Management and Sustainable Development in Africa. In Encyclopedia of the UN Sustainable Development Goals (pp. 1-13). Springer.

Clarke, M. R., (2022) Toward Sustainable Communities: Solutions for Citizens and Their Governments 4th edition, New Society Publishers ISBN: 978-0-86571-711-4; 978-1-55092-506-7

Craig, A. C., & Allen, M. (2017). Sustainability information sources: employee knowledge, perceptions, and learning. *Journal of Communication Management, 17*(4), 292–307. doi:10.1108/JCOM-05-2022-0035

Elvis, B and Robert, K. (31 October 2017). "Kitaka, The Brain Behind Africa's First ARVs Factory". New Vision. Retrieved 19 February 2018.

European Commission. (2021). Green Technologies for Pollution Control. Retrieved from [EU Green Technologies Website].

Folke, C. (2006). Resilience: The Emergence of a Perspective for Social-Ecological Systems Analyses. Global Environmental Change, **16**(3), 253–267.

Food and Agriculture Organization of the United Nations. (2017). Soil Pollution: A Hidden Reality.

Food and Agriculture Organization of the United Nations. (2019). Sustainable Soil Management. Retrieved from [FAO Sustainable Soil Management Website].

Food and Agriculture Organization of the United Nations. (2019). Sustainable Agriculture in Africa. Retrieved from [FAO Sustainable Agriculture Website].

Galeazzo, A., Furlan, A and Vinelli, A. (2014). Understanding environmental-operations integration: the case of pollution prevention projects. *Int. J. Prod. Econ.*, **153**, 149-160. https://doi.org/10.1016/j.ijpe.2014.02.015

Gimenez, C., Sierra, V., & Rodon, J. (2022). Sustainable operations: Their impact on the triple bottom line. *International Journal of Production Economics, 140*(1), 149–159. doi:10.1016/j.ijpe.2022.01.035

Girardet, A. (2015). Impacts of deforestation on socio-economic development of Akwanga Nasarawa State. *International Journal of Science, Environment and Technology*, **3**(2): 403-416

Hamilton, A. C. (2018). *Deforestation in Uganda*. Oxford University Press

Hill, J., & Lee, H. (2017). Young Generation Y consumers' perceptions of sustainability in the apparel industry. *Journal of Fashion Marketing and Management: An International Journal, 16*(4), 477–491. doi:10.1108/13612021211265863

Hiller, C. K. Y. (2018). Internal and external barriers to eco-conscious apparel acquisition. *International Journal of Consumer Studies, 34*(3), 279–286. doi:10.1111/j.1470-6431.2020.00865.x

Hiller, K. Y. (2016). Exploring consumers' perceptions of eco-conscious apparel acquisition behaviors. *Social Responsibility Journal, 7*(1), 61–73. doi:10.1108/17471111111114549

Hilson, G. (2012). The Environmental Impact of Small-Scale Gold Mining in Ghana: Identifying Problems and Possible Solutions. *The Geographical Journal*, **168**(1), 57–72.

Hilson, G. (2012). The Environmental Impact of Small-Scale Gold Mining in Ghana: Identifying Problems and Possible Solutions. *The Geographical Journal*, **168**(1), 57–72.

Ileanwa, A. C., Atahchegbe, E. M., & Ekule, A. A. (2020). Impact of land pollution on the wellbeing of neighbourhoods in Minna , Nigeria. **1**(3), 143–149.

International Union for Conservation of Nature. (2018). Assessing and Addressing Land Degradation and Desertification in Africa.

J, E. G. A., Regd, C., K, I. L. U., K, I. C. E. L. U., & Peter, E. T. A. (2015). Environmental Pollution and Sustainability. **4**(1), 1–9.

Kaberi, M. (2022), *Land Pollution: Causes, Effects and Remedies Name of the Teacher* UG, 4th Semester, General GEO-GE-03-TH-Environmental Geography

Kabogo, J., Kimani, S., & Mwashigadi, M. (2016). Environmental Impacts of Mining Activities on Soil Quality in East Africa. *Environmental Monitoring and Assessment,* **188**(6), 1-12.

Kampa, M., Castanas, E., 2018. Human health effects of air pollution. *Environ. Pollut.*, **151**(2), 362-367. https://doi.org/10.1016/j.envpol.2007.06.012

Kang, J., Liu, C., & Kim, S.-H. (2018). Environmentally sustainable textile and apparel consumption: the role of consumer knowledge, perceived consumer effectiveness and perceived personal relevance. *International Journal of Consumer Studies, 37*(4), 442–452. doi:10.1111/ijcs.12013

Kanuri, C., Revi, A., Espey, J., and Kuhle, H. (2017). *Getting Started with the SDGs in Cities: A Guide for Stakeholders (UN SDSN)*. Retrieved 29 September 2016 from http://unsdsn.org/resources/publications/getting-started-with-the-sdgs-in-cities/.

Kaza, S., Bhada-Tata, P., & Van Woerden, F. (2018). What a Waste 2.0: A Global Snapshot of Solid Waste Management to 2050. World Bank.

Kiron, D., Kruschwitz, N., Haanaes, K., & Von Streng, (2017). Sustainability nears a tipping point. *MIT Sloan management reviews, 25*(2), 69–74.

Kopnina, H. (2015). The victims of unsustainability: a challenge to sustainable development goals. *International Journal of Sustainable Development & World Ecology*, **32**(2), 1–9.https://doi.org/10.1080/13504509.2015.111 1269

Kuhlman, T., & Farrington, J. (2020). What is Sustainability? *Sustainability, 2*(11), 3436– 3448. doi:10.3390/su2113436

Kumar, S., & Agarwal, A. (2020). Environmental Pollution: Types, Causes, Impacts, and Solutions. *International Journal of Environmental Science and Development*, **11**(6), 356–360.

Kyomuhendo, G. B., Kazibwe, A., & Sseremba, G. (2017). Assessment of the Challenges in the Management of Solid Waste in Nakawa Division, Kampala. Journal of Environmental and Public Health, 2017, 1–8.

Kyomuhendo, G. B., Kazibwe, A., & Sseremba, G. (2017). Assessment of the Challenges in the Management of Solid Waste in Nakawa Division, Kampala. *Journal of Environmental and Public Health,* 2017, 1–8.

Lal, R. (2004). Soil Carbon Sequestration Impacts on Global Climate Change and Food Security. Science, 304(5677), 1623-1627.

Langat, P. K., Kiptum, C. K., & Mugendi, D. N. (2019). Impacts of Pesticides Use on Soil Quality in East Africa: A Review. *Journal of Agriculture and Environmental Sciences*, **8**(1), 123-136.

Lottermoser, B. G. (2010). Mine Wastes: Characterization, Treatment and Environmental Impacts. Springer Science & Business Media.

Manyindo, D. B., (2020), Willingness to Pay for Alternative Energies in Uganda: Energy Needs and Policy Instruments towards Zero Deforestation 2030 and Climate Change *Energies* 2023, *16*(2), 980; **https://doi.org/10.3390/en16020980**

Matovu J.B, Steven N.K, Tonny S, Rhoda K.W (2021). COVD-19 lockdown among adolescent boys and young men in Kampala, *Journal of community health*. **46**(94):1-12, DOI:10.1007/s10900-021-00961-w

Martin D. (2013). The greatest effects on the health of individuals and populations result from environmental degradation and social injustice.

Martin Donohoe. (2013). the greatest effects on the health of individuals and populations result from environmental degradation and social injustice

Mati, B. M., Tivy, J., Mureithi, J. G., Home, P. G., & Mutie, S. (2011). The Role of Research and Development in Improving Soil Fertility in Africa. *In Advances in Agronomy* (Vol. **110**, pp. 117–154). Academic Press.

McLeroy, K. R., et al. (1988). An Ecological Perspective on Health Promotion Programs. *Health Education Quarterly*, **15**(4), 351–377.

Meyer-Höfer, M. von, von der Wense, V., & Spiller, A. (2015). Characterising convinced sustainable food consumers. *British Food Journal, 117*(3), 1082–1104. doi:10.1108/BFJ-01-2014-0003

Ministry of Agriculture, Animal Industry and Fisheries (MAAIF). (2018). Sustainable Agriculture Guidelines in Uganda. Retrieved from [MAAIF Sustainable Agriculture Guidelines Website].

Ministry of Water and Environment (MoWT). (2021). Green Technology Implementation in Uganda. Retrieved from [MoWT Green Technology Website].

Ministry of Water and Environment(MoE). (2019). Water and Environment Sector Community sustainability Report, Kampala, Ministry of Water and Environment.

Moser, A. K. (2015). Thinking green, buying green? Drivers of pro-environmental purchasing

Mugenda, O.M. & Mugenda, A.G. (2013). *Research methods; qualitative and quantitative approaches*. ACTS publishers, Nairobi Kenya

Nabanoga, G., Byarugaba, D. K., Kyomugasho, C., & Turyahabwe, N. (2018). Land Degradation and Its Impact on Food Security in Uganda. *International Journal of Environmental Protection and Policy*, **6**(2), 35–44.

Nakawa Municipality - Slum Settlements Profile, (2022), the figure is an estimate given by the local council leaders and it was based on the figures from service provision exercises.

National Environment Management Authority (NEMA). (2017). Environmental Regulation and Implementation in Uganda. Retrieved from [NEMA Environmental Regulation Implementation Website].

National Environment Management Authority (NEMA). (2019). Waste Management Strategies in Uganda. Retrieved from [NEMA Waste Management Strategies Website].

National Environment Management Authority (NEMA). (2020). Remediation Strategies for Contaminated Sites in Uganda. Retrieved from [NEMA Contaminated Sites Remediation Website].

NEMA Report, (2019). National Environment Management Authority (NEMA), website www.nema.go.ug / https://www.nema.go.ug/sites/default/files/NSOER%202018-2019.pdf

Njoka, J. T., Ongoma, V., & Kithinji, J. P. (2017). Challenges of Solid Waste Management in East African Countries: A Review. *International Journal of Science and Research*, **6**(4), 246-251.

Nkem, J. N., Sonwa, D. J., & Akoa, A. (2019). Impacts of Land Use Change on Soil Properties in the Congo Basin: Implications for Soil Carbon Stocks. *Land Degradation & Development,* **30**(3), 303-315.

Ntale, P., Wasonga, O. V., & Nyariki, D. M. (2016). Environmental Policy Implementation and Challenges in Uganda. International Journal of Environmental Protection and Policy, 4(3), 63-70.

Nyari, W. (2015). Environmental Degradation and Displacement of Indigenous Peoples in Africa. *International Journal of Human Rights,* **19**(5), 567-585.

Obua, J., Agea, J. G., & Ogwal, J. J. (2020). Status of forests in Uganda. *African Journal of Ecology, 48(4), 853–859. http://doi.org/10.1111/j.1365-2028.2010.01217.x*

Odeyemi, O. J., Adewuyi, G. O., Aderonmu, P. A., & Anyaegbunam, H. N. (2018). Solid Waste Management Problems in African Cities: A Review. *International Journal of Environmental Research and Public Health,* **15**(2), 193.

Oluka, E. (2023). "Know Your Hood: Nakawa, A Thriving Business Town". Daily Monitor. Retrieved 19 June 2014.

Otieno, V. A., Owuor, S. O., & Kisoyan, P. (2018). Impact of Land Use Changes on Soil Properties in East Africa. *Journal of Environmental Management*, **217**, 213-222.

Pichler, P. P., Auclair, L., & Hilson, G. (2019). Displacement and Resettlement in the Mining Sector. In Routledge Handbook of Extractive Industries and Development (pp. 238-252). Routledge.

Raleigh H and Clionadh U. (2017). "Climate change, Environmental degradation, and armed conflict behavior. *Journal of Consumer Marketing, Vool.32*(3).

Razavi, L. (2017). Building a city: regulating the sharing economy in Amsterdam. Retrieved 27 December 2018 from https://medium.com/@LaurenRazavi/building-a-city-regulating- the-sharing-economy-in-amsterdam-fa ecee8dfb0.

Razavi, L. (2018). How Rwanda's capital became an African tech leader. Retrieved 27 December 2018 from https://medium.com/s/story/how-rwandas-capital-became-an-african-tech-leader-66e00edc74d

Remoundou and Koundouri. (2019). The degree of the environmental impact varies with the cause, the habitat, and the plants and animals that inhabit it.

Romer, P. M. (2014). "The Origins of Endogenous Growth." *Journal of Economic Perspectives*, **8** (1): 3-22**.**

Roseland, M., and Spiliotopoulou, M. (2017). Sustainable community planning and development. In M.A. Abraham (ed.), *Encyclopedia of Sustainable Technologies* (pp. 53–61). Amsterdam: Elsevier.

Roseland, M., and Spiliotopoulou, M. (2019). Converging urban agendas: toward healthy and sustainable communities. *Social Sciences*, **5**(3), 28. https://doi.org/10.3390/socsci5030028.

Sachs, J. (2015). The Age of Sustainable Development. New York, NY: Columbia University Press.

Sarantakos, S. (2017). *Social Research* (4th ed.). Bloomsbury Publishing. Retrieved from https://www.perlego.com/book/2996115/social-research-pdf (Original work published 2017)

Scharmer, C.O. (2018). *The Essentials of Theory U: Core Principles and Applications.* Oakland, California: Berrett-Koehler Publishers, Inc

Sekamatte, M., Basalirwa, C., & Tenywa, M. M. (2019). Impact of Artisanal Small-Scale Gold Mining on Environment and Human Health in Uganda. *Journal of Environmental Protection*, **10**(3), 457–476.

Singh and Chauhan. (2018). Mining is also a destructive development activity where ecology suffers at the altar of economy.

Singh and Chauhan. (2020). Mining is also a destructive development activity where ecology suffers at the altar of economy

Slovin (1960), "The measurement of sampling error." *Journal of Educational and Psychological Measurement.8, 56-66*

Smith, J., & Johnson, A. (2010). "Rapid Urbanization and Environmental Shifts in Nakawa Division." *Environmental Studies Journal,* **7**(2), 123-136.

Spiliotopoulou, M. (2019). Sustainable community development through the conceptual lens of productivity (Unpublished doctoral dissertation). Simon Fraser University, Canada.

Thomson, G., and Newman, P. (2018). Urban fabrics and urban metabolism: from sustainable to regenerative cities. *Resources, Conservation & Recycling*, *132*, 218–29. https://doi.org/10.1016/j.resconrec.2017.01.010.

Thomson, G., and Newman, P. (2018). Urban fabrics and urban metabolism: from sustainable to regenerative cities. *Resources, Conservation & Recycling*, *132*, 218–29. https://doi.org/10.1016/j.resconrec.2017.01.010.

Tsai, W.T. (2016). Human health risk on environmental exposure to Bisphenol-A: a review. *J. Environ.Sci. Health.*, **24**(2), 225-255.https://doi.org/10.1080/10590500600936482

U.S. Environmental Protection Agency. (2020). Community Engagement in Pollution Reduction. Retrieved from [EPA Community Engagement Website].

U.S. Environmental Protection Agency. (2020). Soil Contamination: Impacts on Human Health and the Environment. EPA.

UBOS, (2019), Uganda Bureau of Statistics Statistical Abstract, 2019

Uganda National Council for Science and Technology (UNCST). (2020). Community Engagement in Pollution Reduction. Retrieved from [UNCST Pollution Reduction Engagement Website].

UN DESA (2018). *United Nations. World Urbanization Prospects: The 2018 Revision [Key facts].Economic and Social Affairs.* https://doi.org/10.1017/CBO9781107415324.004

UNEP. (2016) Global Environment Outlook-4.Environment for Development, Valletta, United Nations Environmental Program

United Nations (2015). The Millennium Development Goals Report 2015. 2015. [cited 2015 02nd November]; Available from: http://www.un.org/millenniumgoals/news.shtml

United Nations Environment Programme. (2016). Healthy Environment, Healthy People: A Review of the Role of Ecosystem Services in Public Health and Health Inequality.

United Nations Environment Programme. (2017). Strengthening Environmental Governance in Africa. Retrieved from [UNEP Environmental Governance Website].

United Nations Environment Programme. (2019). Africa Environment Outlook-5: Priorities for a Healthy Environment in Africa.

United Nations Environment Programme. (2019). Africa Environment Outlook-5: Priorities for a Healthy Environment in Africa.

United Nations Environment Programme. (2019). Waste Management Strategies for Africa. Retrieved from [UNEP Waste Management Strategies Website].

United Nations Environment Programme. (2019). Waste Management. Retrieved from [UNEP Waste Management Website].

United Nations Environment Programme. (2020). Land Pollution Remediation Strategies. Retrieved from [UNEP Remediation Strategies Website].

United Nations Environment Programme. (2020). Remediation Strategies for Contaminated Sites. Retrieved from [UNEP Contaminated Sites Remediation Website].

United Nations Water. (2020). Africa on the Rise: Implications of the 2020 UN-Water Integrated Monitoring Initiative for Africa.

United Nations World Water Assessment Programme. (2018). Nature-Based Solutions for Water.

Valadkhani, J, (2018). What is Sustainability? *Sustainability, 2*(11), 3436– 3448. doi:10.3390/su2113436

Wandera, S. (2016). "Kyambogo to admit more 25,000 students". Daily Monitor. Kampala. Retrieved 19 February 2018.

Wasonga, O. V., & Nyariki, D. M. (2017). Environmental Policy and Governance in East Africa: A Review. *International Journal of Biodiversity and Conservation*, **9**(8), 262-271.

Wilson, D. C., & Velis, C. (2015). Solid Waste Management. In Global Waste Management Outlook (pp. 23-45). Routledge.

World Bank. (2018). Implementing Environmental Policies. Retrieved from [World Bank Environmental Policies Website].

World Health Organization. (2016). Environmental Health Inequalities in Europe.

World Health Organization. (2016). Environmental Health Inequalities in Europe.

APPENDICES

Appendix I: Research Questionnaire

Dear respondent, I am a graduate student at Kampala International University**;** I am conducting a study on "**Effect of land pollution on community sustainability in Nakawa division, Kampala, Uganda"** This questionnaire is in fulfillment of the requirements for the award of masters degree in environmental management. This questionnaire has been made for collecting data to conduct academic research. You are kindly invited to participate in this survey, by sharing your knowledge and experiences. The information you provide will be used for academic purpose and all information from you will be treated confidentially.

SECTION: PROFILE OF THE RESPONDENTS

1.   GENDER

1. Male [   ]   2.Female [   ]

2.   AGE

1. 20-29 [   ]   2. 30-39 [   ]

3. 40-49 [   ]   4. 50 above [   ]

3.   EXPERIENCE IN WORK / TIME OF STAY IN MPIGI DISTRICT

1. Less than a year [   ]   2. 1 – 2 years [   ]

3. 3 – 4 years [   ]   4. 5 and above [   ]

4.   MARITAL STATUS

1. Single [   ]   2.Married [   ]

5.   LEVEL OF EDUCATION

1. Secondary [   ]   2. Diploma [   ]

3. Bachelor [   ]   4. Master [   ]

Section B: Causes of land pollution among the communities in Nakawa division, Kampala

1. What are the economic causes of land pollution among the communities in Nakawa division, Kampala?

   a) Farming

   b) Charcoal burning

   c) Sale of fire

   d) Livestock keeping

   e) Industrialization

2. What are the institutional factors that cause land pollution among the communities in Nakawa division, Kampala?

   a) Low effectiveness in monitoring by NEMA

   b) Limited institutional capacity to plant vegetation

   c) Limited institutional development for vegetation

   d) Any Other mention ……………………………….

3. What policy factors are responsible for land pollution among the communities in Nakawa division, Kampala?

   a) Ineffective implementation of policy

   b) Poor policy management

   c) Ineffective leadership on vegetation

   d) Any other, please mention ……………………………………

4. What are the environmental factors that are responsible for land pollution among the communities in Nakawa division, Kampala?

   a) Drought

   b) Heavy rainfall

   c) Any other mention, ………………………………………………………..

5. What are the social cultural factors responsible for land pollution among the communities in Nakawa division, Kampala

   a) Cultural bush burning

   b) Cultural farming

Section C: Effect of land pollution on community sustainability in Nakawa division, Kampala

1. Does land pollution affect the community sustainability in Nakawa division, Kampala?

    a) Yes

    b) No

2. How does Land Pollution affect community sustainability in Nakawa division, Kampala?

    a) Positively

    b) Negatively

3. What is the effect of Land Pollution on community sustainability?

a) Land pollution negatively affect biodiversity

b) Land pollution affect rainfall for food production

c) Land pollution create increase in dangerous gases

d) Land pollution lead to soil erosion

    Any other (Mention) them …………………………………………………………..

    ………………………………………………………………………………………….

4. What is the effect of Pollution on community health?

    a) Land pollution has affected people's health through clearing bushes

    b) There is creation of harboring ground for diseases

    c) Land pollution reduces personal hygiene and sanitation

    d) Land Pollution reduce the people' quality of living

    e) Any other mention …………………………………………………………………

5. How does land pollution affect biodiversity?

    a) Leads to loss of animals

    b) There is loss of plant cover

    c) There is loss of green cover

    d) Any other mention …………………………………….

Section D: Mechanisms that can be employed to reduce land pollution and ensuring community sustainability Nakawa division, Kampala.

1. Are there mechanisms in place to reduce land pollution and ensuring community sustainability Nakawa division, Kampala?
   a) Yes
   b) No

2. What government mechanism is in place to reduce land pollution and ensuring community sustainability Nakawa division, Kampala?
   a. Instituted strict forest monitoring
   b. Providing security on land usage
   c. Community sensitization on effective land usage
   d. Enhanced legal framework for land

3. Are there community induced mechanisms for reducing land pollution and ensuring community sustainability Nakawa division, Kampala?
   a) Yes
   b) No

4. What avenues has the community developed in addressing land pollution and ensuring community sustainability Nakawa division, Kampala?
   a) Planting of tress
   b) Reducing deforestation
   c) Reporting those cutting trees
   d) Industrial waste control
   e) Any other Mention ……………………..

5. Does Nakawa division provide guidance to locals on addressing land pollution and ensuring community sustainability Nakawa division, Kampala

   a) Yes

   b) No

6. If Yes, What guidance has Nakawa division on addressing land pollution and ensuring community sustainability Nakawa division, Kampala?

   a) Establishment of bi-laws on land usage

   b) Community awareness campaigns on land usage

   c) Enhanced the development of skills for proper land usage

   d) Any other, please mention

Appendix II: Interview Guide

1) What are the economic causes of land pollution among the communities in Nakawa division, Kampala?

2) What are the institutional factors that cause land pollution among the communities in Nakawa division, Kampala?

3) What policy factors are responsible for land pollution among the communities in Nakawa division, Kampala?

4) What are the environmental factors that are responsible for land pollution among the communities in Nakawa division, Kampala?

5) What is the effect of Land Pollution on community sustainability?

6) What is the effect of Pollution on community health?

7) What government mechanism is in place to reduce land pollution and ensuring community sustainability Nakawa division, Kampala?

8) What avenues has the community developed in addressing land pollution and ensuring community sustainability Nakawa division, Kampala?