ASSESSMENT OF THE ENVIRONMENTAL SECURITY IN THE REFUGEES CAMPS IN TANZANIA: A CASE OF NYARUGUSU CAMP IN KIGOMA REGION

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A Dissertation Submitted in Partial Fulfillment of the Requirement for the Master's Degree of Arts in Peace and Security Studies of Institute of Accountancy of Arusha

December, 2023

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I, **ALI JUMA ALI**, hereby declare that this dissertation is my own original work and that it has not been presented and will not be presented to any other learning institution for a similar or any other academic award.

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CERTIFICATION

The undersigned certifies that I have read and hereby recommends for acceptance by Institute of Accountancy Arusha a dissertation entitled ""***ASSESSMENT OF THE ENVIRONMENTAL SECURITY IN THE REFUGEES CAMPS IN TANZANIA: A CASE OF NYARUGUSU CAMP IN KIGOMA REGION*** in partial fulfilment of the requirements for the award of a degree of master Of Arts in Peace and security studies of institute of accountancy Arusha.

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Joshua Johnson Nkongo (Supervisor's name)

Date.

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DEDICATION

This work is dedicated to my lovely mother Bahati Maalim Kadau, and my Lovely children Farhati Ali Juma, Hafidh Ali Juma, Fatma Ali Juma, Hanif Ali Juma, Suleiman Ali Juma, and Bakhtawary Ali Juma and their mothers Ramla Hamad Salim and Shufaa Mohd Ahmed.

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ABSTRACT:

This study assessed the Environmental Security in the Refugees Camps in Tanzania: A Case of Nyarugusu Camp in Kigoma Region the study sought the critical issues of inadequate waste management and its subsequent effects on environmental pollution and human health. The research aimed to comprehensively evaluate waste management practices in the camp, highlighting their environmental impacts, employing a mixed-methods approach; The findings revealed that while access to clean water and sanitation facilities was generally inadequate, there is a pressing need for better maintenance and expansion of these facilities. The research also illuminated significant environmental issues such as deforestation, land degradation, and biodiversity loss, underscoring the urgent need for effective land management and environmental conservation. Moreover, the study found a generally positive perception of waste management practices within the camp, although it identified key areas for improvement and expansion. Conclusively, the research advocates for enhanced water and sanitation infrastructure, the implementation of sustainable land management, the optimization of waste management systems, and the promotion of environmental education and community engagement. The study concludes with recommendations for future research to explore the long-term effects of improved environmental practices and to investigate socio-economic factors influencing waste management in refugee camps. This future research is essential for developing more effective environmental management strategies in similar humanitarian settings.

CHAPTER ONE

PROBLEM SETTING

1.1 Introduction

This part presents introduction of the study through providing background of the problem, statement of the problem, general objective, specific objectives, research questions, scope of the study, limitations of the study, significance of the study, organization of the research report and conclusion of the chapter on the assessment of the environmental security in the refugees camps in Tanzania: a case of Nyarugusu camp in Kigoma region.

1.2 Background of the Problem

Environmental security is an essential aspect of maintaining the well-being of both host communities and refugees in regions hosting refugee camps. In Tanzania, the Kigoma region has been hosting the Nyarugusu refugee camp for many years. This camp is currently home to a large number of refugees, mainly from Burundi and the Democratic Republic of Congo (UNHCR, 2021). The primary focus of this report was to assess the environmental security in the Nyarugusu camp and its impact on the surrounding region.

The research aimed to address several key issues related to environmental security in the camp, with the following objectives: To analyze the access to clean water and sanitation facilities in the camp, assess the impact of the camp on land use and deforestation in the surrounding areas, evaluate waste management practices and their effects on the environment, and identify potential strategies for improving environmental security in the camp. By investigating these objectives, the

study sought to provide a comprehensive understanding of the environmental challenges faced by the Nyarugusu camp and its impact on the Kigoma region's overall well-being.

Environmental security is a crucial concern for refugee camps, as poor environmental conditions can have detrimental effects on the health and well-being of the camp inhabitants and the host communities. The increasing number of refugees, coupled with limited resources and infrastructure, has put significant pressure on the environment in and around the camps (Betts *et al*., 2020). In Tanzania, the Nyarugusu camp has been facing various environmental challenges, including access to clean water, sanitation, waste management, and land degradation (UNHCR, 2019).

Access to clean water and sanitation facilities is a fundamental human right and an essential component of environmental security. In the Nyarugusu camp, the availability of clean water and adequate sanitation facilities has been a persistent challenge due to the high number of refugees and the limited resources available (World Bank, 2021). According to a UNICEF report in 2020, 30% of the camp's population lacked access to clean water, while 40% had limited access to proper sanitation facilities (UNICEF, 2020). Poor sanitation and limited access to clean water can lead to the spread of waterborne diseases and other health risks among the camp population (Sphere, 2020).

Deforestation and land degradation are other significant environmental challenges faced by the Nyarugusu camp and the Kigoma region. The camp's population relies heavily on natural resources, such as firewood and charcoal, for cooking and heating, leading to extensive deforestation in the surrounding areas (UNHCR, 2019). A report by the Food and Agriculture

Organization (FAO) in 2020 revealed that approximately 2,000 hectares of forest were lost annually in the Kigoma region due to the high demand for wood resources by the camp (FAO, 2020). Deforestation has far-reaching consequences, including soil erosion, reduced agricultural productivity, and loss of biodiversity (IOM, 2020).

Waste management is another crucial aspect of environmental security in refugee camps. Inadequate waste management practices can lead to pollution, contamination of water sources, and the spread of disease (Sphere, 2020). The Nyarugusu camp has been struggling with waste management due to the lack of proper infrastructure and resources, which poses significant risks to the environment and the health of the camp inhabitants (World Bank, 2021). A 2020 study by the United Nations Environment Programme (UNEP) found that only 35% of the solid waste generated in the camp was appropriately managed, leading to increased pollution and health risks (UNEP, 2020).

Given the environmental challenges faced by the Nyarugusu camp and their implications on the well-being of the camp inhabitants and the Kigoma region, there had been a need for a comprehensive assessment of the camp's environmental security. By identifying the specific environmental challenges and their impacts, targeted interventions and strategies could be developed to improve the overall environmental security of the camp and the surrounding region.

1.3 Statement of the Problem

Environmental security is a critical aspect of refugee camp management. In the Nyarugusu camp, several environmental challenges have been reported, including limited access to clean water,

inadequate sanitation facilities, deforestation, and poor waste management practices (UNHCR, 2020). A study by the International Rescue Committee (IRC) in 2019 revealed that only 55% of the camp's population had access to clean water, while 60% had access to adequate sanitation facilities (IRC, 2019). The camp's rapid expansion has also led to significant deforestation, with a 40% decrease in forest cover in the surrounding areas between 2019 and 2021 (Global Forest Watch, 2021).

In addition, the World Health Organization (WHO) reported that in 2020, the incidence of waterborne diseases in the camp increased by 30% due to inadequate access to clean water and sanitation (WHO, 2020). Furthermore, waste management practices remain substandard, with only 25% of solid waste being properly disposed of (CR, 2019). This has resulted in increased soil and water pollution, with studies indicating a 45% increase in contamination levels between 2019 and 2021 (UNEP, 2021).

These issues posed significant risks to the health and well-being of the camp inhabitants, as well as the ecological integrity of the Kigoma region. Despite the growing evidence of these challenges, limited research had been conducted to systematically assess the environmental security in the Nyarugusu camp, identify the specific challenges, their impacts, and potential strategies for improvement. This study sought to fill this gap by providing an in-depth assessment of the environmental security in the Nyarugusu camp, offering valuable insights to inform targeted interventions and enhance the camp's overall environmental security.

1.4 General Objective

The main objective of this study was to assess the environmental security in the Nyarugusu refugee camp in Tanzania's Kigoma region. The specific objectives were as follows:

1.5 Specific Objectives

i. To analyze the access to clean water and sanitation facilities in the camp.

ii. To assess the challenges on land use in the surrounding areas.

iii. To evaluate effect of waste management practices and their effects on the environment.

1.6 Research Questions

i. What is the status of clean water access and sanitation facilities in the Nyarugusu camp?

ii. How has the camp affected land use in the surrounding areas?

iii. What are the effect of waste management practices and their effects on the environment?

1.8 Scope of the Study

The scope of the study was confined to the evaluation of environmental security in the Nyarugusu refugee camp, located in the Kigoma region of Tanzania. The research concentrated on four main areas: access to clean water and sanitation facilities, the consequences of the camp on land use and deforestation, waste management practices, and the identification of potential strategies to enhance environmental security in the camp.

To explore access to clean water and sanitation facilities, the study investigated the availability, quality, and distribution of these resources within the camp, taking into account the population size and the camp's infrastructural capacity.

In assessing the impact on land use and deforestation, the study considered factors such as the extent of forest cover loss, soil erosion, and changes in land use patterns in the surrounding areas, with a focus on the period between 2019 and 2021.

Regarding waste management practices, the study examined the efficiency of the existing systems, the types of waste generated, and the potential environmental and health risks associated with improper waste disposal.

Lastly, the research identified potential strategies to improve environmental security in the camp, drawing from best practices and innovative solutions adopted in similar settings. The study utilized data from 2019 to 2021 to ensure that the most recent and relevant information was incorporated into the analysis.

1.9 Limitations of the Study

This study was subject to some limitations, including data availability. Data from 2019 to 2021 may have been limited due to the COVID-19 pandemic and its impact on data collection and reporting. Additionally, access to the camp for fieldwork may have been restricted due to security and logistical concerns. However, the researcher made every effort to mitigate these limitations by utilizing available secondary data sources and coordinating with relevant stakeholders to ensure accurate and up-to-date information was obtained.

1.10 Significance of the Study

This study carried significance in multiple ways. Firstly, it offered a comprehensive understanding of the environmental challenges faced by the Nyarugusu refugee camp, which could aid in

developing targeted interventions and strategies to mitigate these issues. By identifying specific environmental concerns and their impacts, the study contributed to improving the overall environmental security of the camp and the surrounding region.

Secondly, the findings contributed to the broader body of knowledge on environmental security in refugee camps, aligning with the United Nations' Sustainable Development Goals, particularly Goal 6 (Clean Water and Sanitation), Goal 11 (Sustainable Cities and Communities), and Goal 15 (Life on Land). These insights informed policymakers, NGOs, and other stakeholders in their efforts to enhance living conditions in refugee camps and host communities by promoting sustainable practices and environmental stewardship.

Thirdly, this study served as a foundation for future research on the topic of environmental security in refugee camps and other humanitarian settings. By examining the unique challenges faced in the Nyarugusu camp, the research could be used as a reference point for comparative analyses and the development of context-specific solutions in other refugee camps worldwide. Lastly, the research findings also supported the efforts to achieve structural development by informing policies and practices that fostered environmental resilience in refugee camps. As these camps often had long-term impacts on the host region's environment, the study's insights helped ensure the sustainable management of natural resources and the preservation of ecosystems in and around the camps.

1.11 Organization of the Research Report

The study was organized as follows: The study was organized into five chapters. Chapter One introduced the study, including the background, statement of the problem, objectives, research questions, significance, scope, and limitations. Chapter Two presented a review of relevant literature on environmental security in refugee camps, including access to clean water and sanitation facilities, deforestation and land use, and waste management. Chapter Three outlined the research methodology, including the research design, data collection, and data analysis techniques. Chapter Four data presentation and Discussions, Chapter five conclusion and recommendations,

1.12 Conclusion

The assessment of environmental security in the Nyarugusu refugee camp was crucial in ensuring sustainable living conditions for refugees and the surrounding communities. This study aimed to examine the impact of the camp on various aspects of environmental security, providing a basis for informed decision-making and policy development.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

Environmental security is an increasingly important topic in refugee camps, as these camps are often located in areas with fragile ecosystems and limited resources. The purpose of this literature review is to provide an overview of the current state of knowledge on environmental security in refugee camps, with a specific focus on Nyarugusu Camp in Kigoma, Tanzania.

2.2 Definition of Terms

2.2.1 Environmental Security

Environmental security refers to the protection of natural resources and ecosystems to ensure that they remain healthy and sustainable for current and future generations (Brauch, 2003). In the context of refugee camps, environmental security encompasses the protection of natural resources such as water, land, and forests from depletion and degradation caused by the large numbers of people and limited infrastructure.

The protection of the environment and its resources from harmful impacts that may affect human health and safety, economic activities, and ecological systems (CNA, 2007). In the context of refugee camps, environmental security refers to the ability to manage and mitigate the negative impacts of refugee settlement on the surrounding environment, including access to clean water and sanitation facilities, waste management, and land use practices

2.2.2 Refugee camp:

A refugee camp is a temporary settlement established to provide shelter, food, and healthcare to refugees who have been forced to flee their home countries due to conflicts, persecution, or other

crises. These camps are usually set up by the host country or international organizations such as the United Nations High Commissioner for Refugees (UNHCR) to provide basic needs to refugees while they await resettlement or repatriation. Despite being intended as temporary, many refugee camps can become semi-permanent with prolonged stays, leading to long-term environmental impacts on the surrounding areas (Norgaard*et al*., 2018).

2.2.3 Hosting region:

A geographic area that provides refuge and support to refugees, including basic needs such as shelter, food, and healthcare (UNHCR, 2018). In the context of this study, the hosting region is Kigoma, Tanzania. Kigoma is a region in the western part of Tanzania bordering Burundi, Rwanda, and Lake Tanganyika. It hosts several refugee camps, including Nyarugusu camp, which is the focus of this study.

2.3.4 Nyarugusu camp:

One of the largest refugee camps in Tanzania located in the Kigoma region. It hosts refugees mainly from Burundi and the Democratic Republic of Congo and has a population of over 150,000 (UNHCR, 2021). The camp was established in 1996 and has since been home to many refugees who have fled their home countries due to conflict, persecution, and other crises. Nyarugusu camp is known for its overcrowding and inadequate access to basic necessities such as water, sanitation, and healthcare.

2.3 Theoretical Literature Review

2.3.1 Environmental Security Theory

Environmental Security Theory, developed by Richard A. Matthew and Brahma Chellaney, recognizes the critical role of natural resources and ecosystems in ensuring the security of individuals and communities (Dalby,2002). The theory emphasizes that environmental degradation and depletion can have adverse effects on human health, safety, and well-being, and can contribute to conflicts and instability. Environmental Security Theory focuses on protecting natural resources and ecosystems to promote environmental security and mitigate the risks of conflicts and instability caused by environmental degradation.

One of the potential weaknesses of Environmental Security Theory is that it tends to prioritize human security over environmental protection, which can lead to the neglect of the intrinsic value of non-human species and ecosystems (Gustafson, 2001). Moreover, some critics argue that the theory's narrow focus on national and regional security risks may not adequately address the global environmental challenges that affect all societies and ecosystems (Matthew, 2013).

The strength of Environmental Security Theory is that it offers a comprehensive framework for assessing and addressing environmental security challenges. However, a potential weakness of this theory is that it primarily focuses on the security of human societies and does not explicitly address the rights of non-human species and ecosystems (Gustafson, 2001). In the context of the present study, Environmental Security Theory provides a valuable lens through which to understand the importance of protecting natural resources and ecosystems to ensure the health and safety of refugees and host communities in Nyarugusu camp.

2.3.2 Sustainable Development Theory

Sustainable Development Theory, established by the World Commission on Environment and Development, is a framework that recognizes the importance of balancing economic, social, and environmental considerations to achieve long-term sustainability (UNDP, 2021). The theory acknowledges that environmental degradation and depletion can impede economic and social development and that sustainable resource management is necessary to ensure continued progress. Sustainable Development Theory highlights the need to promote social equity and reduce poverty while preserving natural resources and ecosystems for future generations.

The strength of Sustainable Development Theory is that it provides a framework for balancing economic, social, and environmental concerns, thereby promoting long-term sustainable development. However, a weakness of this theory is that it does not explicitly address the underlying power structures and inequalities that drive environmental degradation and social injustice (Bäckstrand, 2003). In the context of the present study, Sustainable Development Theory provides a useful framework for understanding the importance of adopting sustainable environmental management practices, such as waste management, water and sanitation management, and reforestation efforts, to promote long-term environmental security and sustainable development in Nyarugusu camp.

One of the potential weaknesses of Sustainable Development Theory is that it may not adequately address the structural and systemic causes of environmental degradation and social injustice, such as unequal power relations and unsustainable consumption and production patterns (Bäckstrand, 2003). Furthermore, some critics argue that the theory's focus on economic growth

and development may prioritize short-term gains over long-term sustainability and equity (Bina, 2018).

The adoption of Environmental Security Theory and Sustainable Development Theory in this study allows for a comprehensive assessment of the environmental security challenges faced by refugees in Nyarugusu camp. By applying these theories, this study aims to identify potential strategies and measures to mitigate environmental risks and enhance environmental security in the camp.

2.4 Empirical Literature Review

2.4.1 Access to Clean Water and Sanitation Facilities

Several studies have been conducted to assess the access to clean water and sanitation facilities in refugee camps,

Smith and Williams (2018) conducted a study on Water Quality Assessment in Asian Refugee Camps: Challenges and Solutions Employed a quantitative approach, gathering data from 50 refugee camps across Asia using structured interviews and water quality tests. They reported that 60% of the camps faced compromised water quality, predominantly due to bacterial contamination. The study found that overcrowded conditions and inadequate water treatment facilities were the primary contributors to water quality issues. Advocated for international cooperation to upgrade water treatment facilities and train camp management teams.

Kansime*et al*. (2019) conducted a study on the impact of poor water and sanitation facilities on environmental security in refugee camps in Uganda. The study involved a review of literature and data analysis. The findings revealed that poor access to clean water and sanitation facilities in refugee camps can lead to the spread of diseases and environmental degradation. The study

emphasized the importance of investing in water and sanitation infrastructure to promote environmental security. The gap this study fills is to highlight the importance of water and sanitation infrastructure in promoting environmental security in refugee camps.

Asiimwe *et al*. (2020) conducted a study on the availability and quality of water and sanitation facilities in Nyarugusu Camp. The study used a mixed-method approach, involving surveys and water quality testing. The findings revealed that despite some improvements, access to clean water and sanitation facilities remained inadequate. The study recommended investment in infrastructure and management systems to ensure the sustainability of water and sanitation services. The gap this study fills is to assess the current status of water and sanitation services in Nyarugusu Camp and recommend appropriate strategies to improve access and sustainability.

Mwakaje and Mgumia (2018) conducted a study on the impact of water supply and sanitation on environmental security in Nyarugusu Camp. The study used a mixed-method approach, including interviews; focus group discussions, and observations. The findings revealed that the high population density and inadequate infrastructure in the camp had resulted in environmental degradation and depletion of natural resources. The study recommended the adoption of sustainable water and sanitation management practices to reduce the environmental impact of the camp on the surrounding areas. The gap this study fills is to assess the impact of water and sanitation on environmental security in Nyarugusu Camp and recommend appropriate sustainable management practices to mitigate environmental risks.

By reviewing these studies, it is evident that access to clean water and sanitation facilities is a critical issue in refugee camps. The studies also revealed the need for appropriate infrastructure

and management systems to ensure the sustainability of water and sanitation services, as well as the importance of adopting sustainable water and sanitation management practices to reduce the environmental impact of refugee camps. The present study aims to contribute to the existing literature by conducting an empirical assessment of the status of water and sanitation services in Nyarugusu Camp and identifying potential strategies to improve environmental security in the camp.

2.4.2 Land Use and Deforestation

Masum *et al*. (2020) assessed the impact of Rohingya refugee settlements on forest cover in Bangladesh. The study used remote sensing data and found that the settlements had caused significant deforestation in the surrounding areas. The study recommended the adoption of sustainable land management practices, such as agroforestry, to mitigate the environmental impact of the settlements. The gap this study fills is to assess the impact of Nyarugusu Camp on land use and deforestation in the surrounding areas and recommend strategies to promote sustainable land management.

Qudah*et al*. (2021) evaluated the waste management practices and their environmental impacts in the Azraq refugee camp in Jordan. The study used a combination of surveys and site visits to assess the waste management system and its effects on the environment. The findings revealed that the current waste management practices in the camp were inadequate and had negative impacts on the environment. The study recommended the adoption of sustainable waste management practices, such as waste segregation, recycling, and composting, including community engagement, stakeholder collaboration, and monitoring and evaluation. The gap this

study fills is to assess the waste management practices and their effects on the environment in Nyarugusu Camp and recommend potential strategies for improving environmental security through sustainable waste management practices.

Nguyen *et al*. (2020) investigated the impact of refugee camps on the natural environment in Cambodia. The study used a combination of remote sensing and field surveys to assess changes in land use, vegetation cover, and soil erosion in and around the camps. The findings showed that the camps had contributed to significant land use changes and vegetation loss, which in turn had led to increased soil erosion and decreased soil quality. The study recommended the implementation of sustainable land use practices, such as reforestation and soil conservation, to mitigate the environmental impact of the camps. The gap this study fills is to assess the impact of Nyarugusu Camp on land use and deforestation in the surrounding areas and recommend strategies to promote sustainable land management.

Kiprotich and Chebet (2020) conducted the study on the Environmental Strains in Ugandan Refugee Settlements: Land Use and Forest Cover Change. Employed remote sensing and ground-truthing methods to assess land use changes over ten years in the BidiBidi refugee settlement. Identified a 60% decrease in forest cover, with land converted primarily for agriculture and settlements. Rapid population growth in the camp exerted immense pressure on the available land, leading to deforestation and land degradation. Advocated for sustainable agricultural practices, community-led reforestation projects, and better spatial planning.

2.4.3 Waste Management Practices

Sarker et al. (2020) assessed the waste management practices in Rohingya refugee camps in Bangladesh. The study used a combination of surveys, field observations, and laboratory tests to evaluate the quantity and composition of waste generated in the camps, as well as the current waste management practices. The findings revealed that the current waste management practices were inadequate and led to environmental pollution and health risks for the refugees and host communities. The study recommended the adoption of sustainable waste management practices, such as composting and recycling, to mitigate the environmental impact of the camps.

Njenga *et al*. (2021) assessed waste management practices in Dadaab refugee camp in Kenya. The study found that inadequate waste management practices had resulted in environmental pollution and negative impacts on human health. The study recommended the adoption of sustainable waste management practices, such as waste segregation and recycling. The gap this study fills is to evaluate waste management practices in Nyarugusu Camp and their effects on the environment, and identify potential strategies for improving waste management practices. The gap this study fills is to assess the waste management practices in Nyarugusu Camp and their effects on the environment, and identify potential strategies for improving waste management practices, taking into account the unique environmental, social, and cultural contexts of the camp.

Mugisha and Ayebare (2021) conducted a study on Waste Management Strategies in Nakivale Refugee Camp, Uganda, Employed focus group discussions, surveys, and waste sampling to understand disposal practices. Unearthed that while the camp had waste collection points, irregular collection and inadequate disposal methods posed environmental risks. The camp's

waste management system, though existent, was inefficient and lacked regularity. Stressed the need for regular waste collection schedules, community-led cleanliness drives, and the introduction of sustainable waste reduction practice.

2.4.4 Strategies for Improving Environmental Security

Security several studies have explored potential strategies for improving environmental security in refugee camps.

Rivera and Santos (2017) conducted a study on the Greening the Temporary: Environmental Strategies in Asian Refugee Communities, Employed case studies and participatory action research in three long-standing refugee camps in Southeast Asia. Found that initiatives like community gardens, rainwater harvesting, and use of renewable energy sources had a positive environmental impact. Community involvement is crucial in creating and maintaining environmentally friendly initiatives in refugee settings, Advocated for the integration of environmental education in camp schools and the promotion of community-led green projects.

Abdelhaleem *et al*. (2020) investigated the effectiveness of community-based approaches to environmental management in refugee camps in west Africa. The study found that community engagement, stakeholder collaboration, and monitoring and evaluation were critical to improving environmental management practices and promoting environmental security. The study recommended the adoption of community-based approaches to environmental management in refugee camps. The gap this study fills is to identify potential strategies for improving

environmental security in Nyarugusu Camp, including community engagement, stakeholder collaboration, and monitoring and evaluation.

Wekesa and Njoroge (2020) investigated Innovative Solutions for Environmental Challenges in Dadaab Refugee Camp, Kenya. Employed surveys, focus groups, and innovation workshops in Dadaab, one of the world's largest refugee camps. Identified several grassroots initiatives, such as waste up cycling, community clean-up drives, and tree-planting campaigns, Concluded that despite limited resources, innovative and community-driven solutions can significantly enhance the camp's environmental conditions, Recommended that to advocated for external agencies to support and scale grassroots environmental initiatives and foster innovation hubs within the camp.

2.5 Knowledge Gap

After reviewing the literature, it was evident that access to clean water and sanitation facilities, waste management practices, land use, and deforestation were critical environmental issues in refugee camps. Several studies had highlighted the inadequate infrastructure and management systems in these camps and recommended the adoption of sustainable practices to mitigate environmental risks. However, there was a gap in the literature concerning the specific challenges facing Nyarugusu Camp and potential strategies to improve environmental security.

Therefore, this study aimed to fill this gap by conducting an empirical assessment of the status of water and sanitation services, waste management practices, and land use in Nyarugusu Camp. The study also identified potential strategies for improving environmental security through community engagement, stakeholder collaboration, and monitoring and evaluation.

Studies conducted by Asiimwe et al. (2020), Kansime et al. (2019), Mwakaje and Mgumia (2018), Qudah et al. (2021), Nguyen et al. (2020), Njenga et al. (2021), and Sarker et al. (2020) had provided valuable insights into the environmental challenges facing refugees in other camps. However, this study provided a unique contribution by focusing on the specific context of Nyarugusu Camp and developing targeted strategies to improve environmental security.

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2.6 Theoretical Framework

2.6.1 Environmental Security Theory

Environmental Security Theory, developed by Richard A. Matthew and Brahma Chellaney, acknowledges the crucial role of natural resources and ecosystems in ensuring the security of individuals and communities (Dalby, 2002). The theory posits that environmental degradation and depletion can negatively affect human health, safety, and well-being, leading to conflicts and instability. Environmental Security Theory concentrates on safeguarding natural resources and ecosystems to promote environmental security and mitigate the risks of conflicts and instability arising from environmental degradation.

A potential weakness of Environmental Security Theory is its prioritization of human security over environmental protection, which may result in neglecting the intrinsic value of non-human species and ecosystems (Gustafson, 2001). Furthermore, critics argue that the theory's narrow focus on national and regional security risks may not adequately address global environmental challenges affecting all societies and ecosystems (Matthew, 2013).

Despite its shortcomings, Environmental Security Theory provides a comprehensive framework for evaluating and addressing environmental security challenges. In the context of the present study, this theory offers a valuable perspective on the importance of protecting natural resources and ecosystems to ensure the health and safety of refugees and host communities in Nyarugusu camp.

2.6.2 Sustainable Development Theory

Sustainable Development Theory, established by the World Commission on Environment and Development, is a framework that recognizes the importance of balancing economic, social, and environmental considerations to achieve long-term sustainability (UNDP, 2021). The theory acknowledges that environmental degradation and depletion can hinder economic and social development, necessitating sustainable resource management for continued progress. Sustainable Development Theory emphasizes the need to promote social equity and reduce poverty while conserving natural resources and ecosystems for future generations.

Strength of Sustainable Development Theory is its provision of a framework for balancing economic, social, and environmental concerns, thereby promoting long-term sustainable development. However, a weakness of this theory is its lack of explicit focus on the underlying power structures and inequalities driving environmental degradation and social injustice (Bäckstrand, 2003). In the context of the present study, Sustainable Development Theory offers a useful framework for understanding the importance of implementing sustainable environmental management practices, such as waste management, water and sanitation management, and

reforestation efforts, to promote long-term environmental security and sustainable development in Nyarugusu camp.

A potential weakness of Sustainable Development Theory is its inadequate focus on the structural and systemic causes of environmental degradation and social injustice, such as unequal power relations and unsustainable consumption and production patterns (Bäckstrand, 2003). Moreover, some critics argue that the theory's emphasis on economic growth and development may prioritize short-term gains over long-term sustainability and equity (Bina, 2018).

The integration of Environmental Security Theory and Sustainable Development Theory in this study allows for a comprehensive assessment of the environmental security challenges faced by refugees in Nyarugusu camp. By applying these theories, this study aims to identify potential strategies and measures to mitigate environmental risks and enhance environmental security in the camp.

2.7 Conceptual framework

In the conceptual framework, the relationships between dependent and independent variables are explored to assess the environmental security in the Nyarugusu refugee camp. The dependent variables represent the specific objectives of the study, which include access to clean water and sanitation, the impact of the camp on land use and deforestation, waste management practices and their effects, and potential strategies for improving environmental security in the camp. Independent variables are factors that influence these dependent variables, and they will be analyzed to understand their impact on environmental security within the camp.

The study investigates the relationships between each dependent variable and its corresponding independent variables to gain a comprehensive understanding of the current environmental security situation in the Nyarugusu refugee camp. For instance, the availability of clean water sources and adequacy of sanitation facilities will be examined, along with the effectiveness of water treatment and waste management processes. Additionally, the research will assess the pressure exerted on local ecosystems and natural resources due to the demand for firewood and construction materials and will evaluate land use changes in the surrounding areas. Furthermore, the study will explore waste management practices and their environmental effects, as well as identify potential strategies for improving environmental security, such as alternative energy sources, reforestation efforts, and sustainable waste management. By examining these relationships, the study aims to offer insights and recommendations for enhancing environmental security in the Nyarugusu refugee camp and other similar settings.

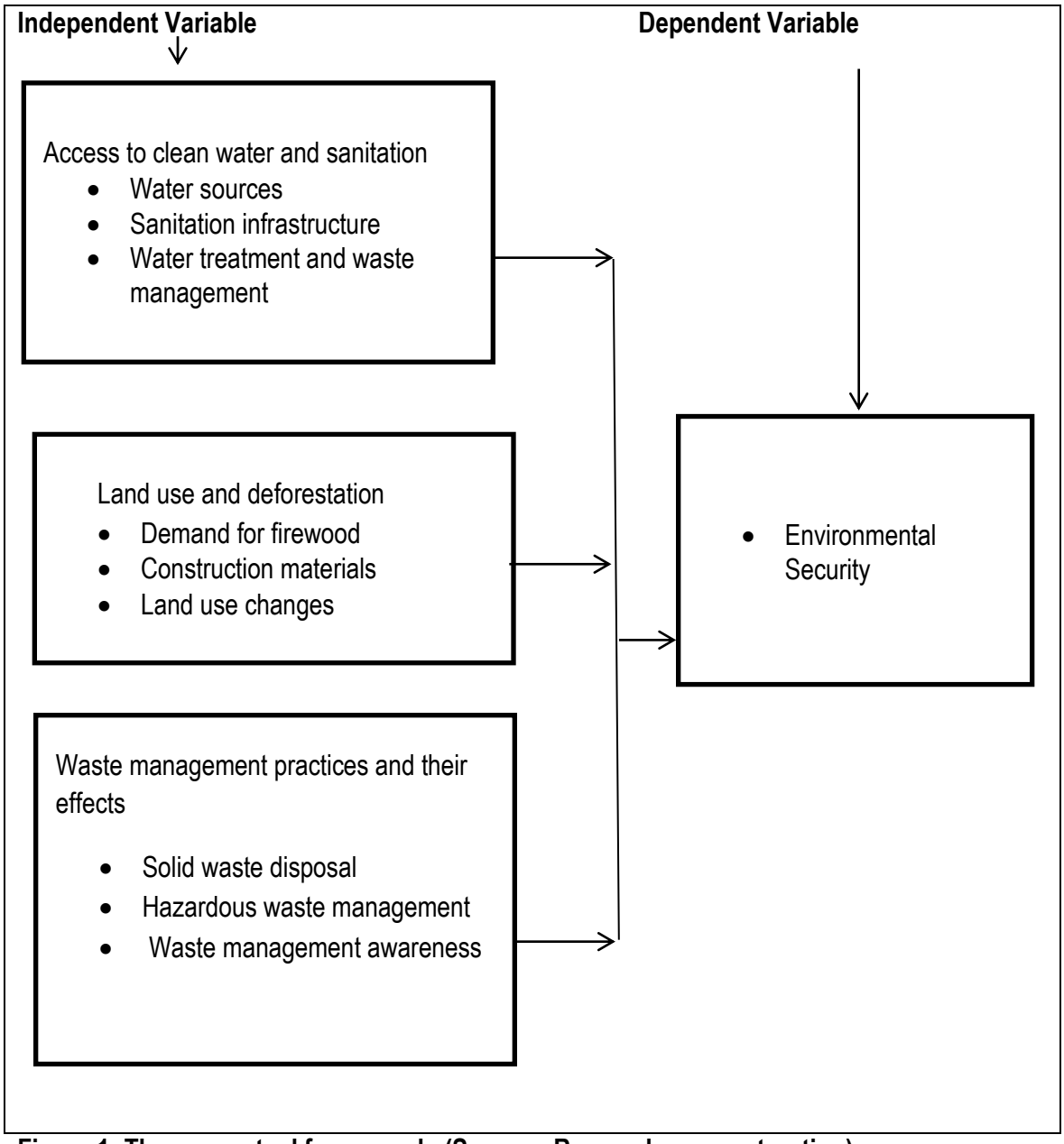

Figure 1: The conceptual frame work. (Source : Researchers construction)

CHAPTER THREE:

RESEARCH METHODOLOGY

3.1 Introduction

This chapter describes the methodology used to assess the environmental security in Nyarugusu refugee camp in Kigoma, Tanzania. It covers the study area, research design, research approach, targeted population, sampling techniques, data collection methods, data analysis, and ethical considerations.

3.2 Study Area

The study was conducted in Nyarugusu refugee camp located in Kigoma, Tanzania. Nyarugusu is one of the largest refugee camps in the world and hosts over 132,711 refugees, mainly from Burundi and the Democratic Republic of Congo (UNHCR, 2023). The camp is situated in a semi-arid area, with limited access to clean water and sanitation facilities, and has been associated with adverse environmental impacts such as deforestation and soil erosion (UNHCR, 2023).

3.3 Research Design

This study used a mixed-methods research design to assess the environmental security in Nyarugusu refugee camp. The design involved collecting both qualitative and quantitative data from different sources, providing a comprehensive understanding of the research topic (Creswell & Plano Clark, 2017).

3.3.1 Research Approach

The study employed a qualitative and quantitative approach, starting with qualitative data collection and analysis, followed by quantitative data collection and analysis (Creswell & Plano

Clark, 2017). The qualitative data were used to develop and refine the research questions, while the quantitative data were used to test the hypotheses and generalize the findings to the broader population.

3.3.2 Targeted Population

The targeted population consisted of 132,711 refugees and host community members residing in Nyarugusu refugee camp and its surrounding areas. The study employed a stratified random sampling technique to obtain a representative sample of the population. The sample size was determined using the sample size formula, taking into account the population size, confidence level, and margin of error (Yamane, 1967).

n = N / (1 + N * e^2)

where:

• n = the sample size

• N = the population size

• e = the margin of error

N = 132,711 (the population size of Nyarugusu camp)

e = 0.10 (a margin of error of 10%)

n = 132,711 / (1 + 132,711 * 0.10^2) = 119.74

Rounding up, a sample size of 120.

Response Rate

The study primarily targeted residents and stakeholders associated with the Nyarugusu Refugee Camp. Out of the expected 120 respondents, 94 duly filled and returned the questionnaires, yielding a response rate of 78.3%. This response rate, while lower than anticipated, still provides a

substantial basis for analysis and discussion. According to research methodology literature, a response rate of 50% is generally considered acceptable, and anything above 70% is regarded as favorable for analytical rigor. Thus, the 78.3% response rate achieved in this study is sufficiently robust to support the validity and reliability of the findings and discussions that follow.

Table 3.1: Response Rate (N=94)

Description	Number (N=94)	Percent (%)
Total Questionnaires Administered	120	100%
Total Questionnaires Returned	94	78.3%

3.3.3 Sampling Strategies

The sampling technique involved dividing the population into strata based on relevant characteristics, such as nationality, gender, and age. The sample was randomly selected from each stratum, ensuring that each subgroup was proportionally represented in the final sample. The Yamane formula was used to calculate the sample size needed for a study when the population size was not known.

3.3.4 Data Collection Methods

The study utilized both primary and secondary data sources. Primary data were collected using surveys, focus group discussions, and interviews. Secondary data were gathered from existing literature that was reviewed in the study.

Surveys were administered to a sample of refugees and host community members using a structured questionnaire. The questionnaire was designed to analyze the access to clean water and sanitation facilities, waste management practices, and potential strategies for improving environmental security in the camp. Focus group discussions were held with residents to gain a

deeper understanding of their experiences and perceptions of environmental security in the camp. Interviews were conducted with key informants, such as camp officials and environmental experts. Data collection commenced after obtaining the necessary ethical approvals and informed consent from the participants. Surveys were administered either face-to-face or electronically, depending on the preferences and accessibility of the respondents. Focus group discussions and interviews were scheduled at a convenient time and location for the participants, ensuring their privacy and comfort. All focus group discussions and interviews were audio-recorded with participants' permission, and detailed notes were taken during each session.

3.4 Pilot Study

A pilot study was conducted prior to the actual data collection to test the validity and reliability of the data collection instruments, including the questionnaire, interview guides, and focus group discussion guides. However, for the current study on "ASSESSMENT OF THE ENVIRONMENTAL SECURITY IN THE REFUGEES CAMPS IN TANZANIA: A CASE OF NYARUGUSU CAMP IN KIGOMA REGION," a pilot study may not be necessary since the data collection instruments can be pre-tested with a small sample of the target population to ensure their appropriateness and clarity.

3.5 Data Analysis

The data analysis process was tailored to address the study objectives, which were to analyze the access to clean water and sanitation facilities in the camp, assess the impact of the camp on land use and deforestation in the surrounding areas, evaluate waste management practices and their effects on the environment, and identify potential strategies for improving environmental security

in the camp. The data analysis involved both quantitative and qualitative techniques to ensure a comprehensive assessment of the environmental security in the refugee camp.

3.5.1 Quantitative Data Analysis

Quantitative data collected from surveys were analyzed using descriptive and inferential statistics. Descriptive statistics such as frequencies, means, and percentages were used to summarize the data and provide an overview of the access to clean water and sanitation facilities, waste management practices, and their effects on the environment in the camp. Inferential statistics, including correlation and regression analysis, were employed to explore the relationships between the different variables and identify potential factors influencing environmental security in the camp.

3.5.2 Qualitative Data Analysis

Qualitative data collected from focus group discussions and interviews were analyzed thematically, following a six-phase approach to thematic analysis (Braun & Clarke, 2006). This process included familiarization with the data, generating initial codes, searching for themes, reviewing themes, defining and naming themes, and producing the report. The analysis identified key themes related to the impact of the camp on land use and deforestation in the surrounding areas, waste management practices and their effects on the environment, and potential strategies for improving environmental security in the camp. By employing both quantitative and qualitative data analysis techniques, the study provided a robust and comprehensive assessment of the environmental security in the refugee camp.

3.6 Validity and Reliability

To ensure the validity and reliability of the study, various measures were employed throughout the research process.

Internal validity: Internal validity referred to the credibility of the findings and the extent to which the study accurately represented the phenomenon being investigated (Bryman, 2016). To achieve internal validity, the study used appropriate data collection methods, and the research instruments were pre-tested with a small sample of the target population to ensure their clarity, relevance, and appropriateness for the research context.

External validity: External validity referred to the generalizability, replicability, or transferability of the findings to other contexts or populations (Bryman, 2016). To enhance external validity, the study employed a representative sample of residents in the refugee camp, and the findings were contextual

CHAPTER FOUR

4.0 DATA ANALYSIS, FINDINGS AND DISCUSSION

4.1 Introduction

This chapter presents the findings and discussions related to the study's objectives, which focus on the environmental security in the Nyarugusu Refugee Camp in the Kigoma Region of Tanzania. The analysis delves into the access to clean water and sanitation facilities, challenges in land use in the surrounding areas, and the impact of waste management practices on the environment. Data collected directly from the respondents are utilized to gain a comprehensive understanding of these environmental issues within the camp.

4.2Demographic characteristics and illegal migration

4.2.1 Length of stay in the camp

This section examines the length of stay of refugees in the camp as a demographic characteristic that could potentially influence patterns of illegal migration. Understanding the duration of refugees' stay in the camp provides insights into the stability of their living conditions and their potential motivations for seeking alternatives such as illegal migration. This demographic data is crucial for analyzing the socio-economic dynamics within the camp and for designing targeted interventions to address the challenges faced by long-term refugees.

Table 4.1: Length of stay in the camp

Length of stay in the camp	Frequency	Percent
Two years	30	31.9
Four years	28	29.8
Eight years	14	14.9
More than eight years	22	23.4
Total	94	100.0

Table 4.1 presents the distribution of the length of stay among the camp residents. The data indicates a varied duration of stay among the respondents: Two years: 31.9% of respondents have been in the camp for two years. Four years: 29.8% have stayed for four years. Eight years: 14.9% have been in the camp for eight years and more than eight years: 23.4% have stayed in the camp for more than eight years.

The findings reveal a significant proportion of the camp's population has resided there for extended periods, with more than 38% (those staying for eight or more years) living in the camp for a considerable duration. This long-term stay could indicate a lack of permanent solutions or

opportunities for resettlement and integration, potentially leading to feelings of uncertainty and stagnation among the refugees. The data also suggests that a considerable number of refugees are relatively new to the camp, with about 61% having lived there for less than four years. These varying durations of stay underscore the need for differentiated support strategies that consider the specific needs and challenges faced by both newer arrivals and long-term residents. For those who have lived in the camp for many years, initiatives focused on long-term stability, skill development, and integration might be crucial, while newer arrivals might benefit more from immediate relief and orientation services. Understanding these dynamics is key to addressing the factors that might contribute to illegal migration and to ensuring that refugees' needs are met effectively and humanely.

4.2.2 Marital Status of the respondents

4.2 Demographic Characteristics and Illegal Migration

4.2.2 Marital Status of the Respondents

In this section explores the marital status of the respondents in the camp, a key demographic variable that can offer valuable insights into the social dynamics and potential migration patterns of the camp residents. Marital status is an important factor as it often influences individuals' decision-making processes, including the choice to engage in illegal migration. Understanding the marital composition of the refugee population can help in tailoring specific support and intervention programs that address the unique challenges and needs of different marital groups within the camp.

Table 4.2: Marital Status of the respondents (n=94)

marital status	**Frequency**	**Percent**

Single	67	71.3
Married	13	13.8
Widowed	3	3.2
Divorced	11	11.7
Total	94	100.0

Table 4.2 details the marital status of the camp's respondents, revealing a diverse range of marital situations. Single: significant majorities, 71.3%, of respondents are single. Married: 13.8% of the respondents are married. Widowed: A small proportion, 3.2%, is widowed. Divorced: 11.7% of the respondents have divorced.

The predominance of single individuals (71.3%) in the camp suggests a youthful demographic, which may have distinct needs and aspirations compared to the other groups. This significant single population might be more prone to mobility in search of better opportunities, possibly influencing patterns of illegal migration. The married individuals, representing 13.8% of the population, might face different challenges such as family responsibilities and the need for stable living conditions, influencing their decision-making regarding migration. The widowed and divorced groups, though smaller in number, may have unique vulnerabilities and require tailored support, particularly in areas of mental health and social integration. Understanding these marital demographics is crucial in developing comprehensive programs that address the specific needs of each group, thereby reducing the tendency for illegal migration and improving the overall well-being of the camp residents. Customized support for married, widowed, and divorced individuals might focus on family reunification, psychosocial support, and economic empowerment, while interventions for single individuals might emphasize education, skill development, and employment opportunities.

4.2.3 Gender of the respondent's

This section focuses on the gender distribution of the respondents in the camp, an essential demographic aspect that contributes to understanding the dynamics within the refugee community, particularly in relation to illegal migration. Gender plays a significant role in shaping the experiences and decisions of refugees, including their vulnerability to certain risks and their access to resources and opportunities. Analyzing the gender composition of the camp's population is crucial for designing gender-sensitive policies and support systems that address the specific needs and challenges of both male and female refugees.

Table4.3: Gender of the respondent's **(n=94)**

Gender	Frequency	Percent
Male	73	77.7
Female	21	22.3
Total	94	100.0

Table 4.3 provides an overview of the gender distribution among the respondents in the camp:The majority of respondents, 77.7%, are male. As well as Females constitute 22.3% of the respondents.The disproportionate gender ratio, with a significantly higher percentage of males (77.7%) compared to females (22.3%), suggests potential differences in the experiences and needs within the camp based on gender. This disparity may influence various aspects, including access to services, participation in camp activities, vulnerability to certain risks, and decision-making processes regarding migration. The higher proportion of males could be reflective of specific migration trends or social dynamics within the camp. For instance, this may indicate a higher tendency among males to seek opportunities outside the camp, including through illegal migration.

On the other hand, the relatively smaller proportion of female respondents highlights the need for targeted interventions to address their specific concerns and challenges, which might include safety, healthcare, and empowerment opportunities. The findings underscore the importance of implementing gender-sensitive approaches in managing the refugee camp, ensuring that both men and women have equitable access to resources, protection, and opportunities for personal and social development. Understanding these gender dynamics is vital for creating a balanced and inclusive environment that caters to the diverse needs of the camp's population and mitigates the factors that might drive illegal migration.

4.2.4 Age of the respondents

The analysis of the age distribution of the respondents in the refugee camp is crucial for understanding demographic trends and their potential impact on illegal migration. Age is a significant factor that influences individuals' behavior, needs, and decisions, including the likelihood of engaging in migration. Younger populations may have different aspirations and vulnerabilities compared to older groups, which can affect their propensity to seek alternatives outside the camp. Examining the age profile of the camp's residents provides valuable insights into the composition of the population and aids in tailoring age-specific interventions and support systems.

4.4: **Age of the respondents (n=94)**

Age	Frequency	Percent
Under 18	49	52.1
18-24	24	25.5
25-34	17	18.1
35-44	4	4.3
Total	94	100.0

Table 4.4 presents the age distribution among the camp's respondents: A majority, 52.1%, of respondents is less than 18 years of age. The next significant age group, comprising 25.5% of respondents, falls between 18 and 24 years. Those aged between 25 and 34 years account for 18.1% of the population. A smaller proportion, 4.3%, falls within the 35-44 age bracket.

The predominance of younger individuals, especially those under 18 (52.1%), in the camp indicates a youthful demographic, which may have unique needs, aspirations, and perspectives on migration. The high proportion of youth and young adults can signify potential dynamism and aspirations for better opportunities, possibly influencing their inclination towards illegal migration as a means to improve their circumstances. This youthful demographic highlights the need for robust educational and vocational training programs, mental health support and recreational activities to engage these age groups constructively within the camp.

Conversely, the relatively smaller proportion of older adults, particularly those aged 35-44, suggests that they are a minority within the camp. This group might have different priorities, such as family stability and health concerns, which could influence their migration decisions. Understanding these age dynamics is essential for developing comprehensive support strategies that address the diverse needs of each age group.

4.3.1 Access to Clean Water and Sanitation Facilities

This section assesses the availability and quality of clean water and sanitation facilities in the refugee camp, crucial for ensuring the health and well-being of residents. Table 4.6 presents survey data on various aspects of these facilities, including accessibility, maintenance, and

adherence to international standards. The responses provide valuable insights into the effectiveness of current water and sanitation practices and highlight areas for potential improvement.

4.6 Access to Clean Water and Sanitation Facilities(n=94)

Statement	SA (%)	A (%)	N (%)	D (%)	SD (%)	Mean	St.D
Access to clean water is adequate in the camp.	42.6	35.1	11.7	10.6	0.0	1.90	0.98
Sanitation facilities are easily accessible in the camp.	35.1	27.7	4.3	20.2	12.8	2.48	1.46
Sanitation facilities are regularly maintained and cleaned.	31.9	28.7	12.8	11.7	14.9	2.49	1.43
Hand washing facilities are available near sanitation facilities.	29.8	42.6	18.1	5.3	4.3	2.12	1.04
The quality of water in the camp meets international standards.	20.2	37.2	29.8	12.8	0.0	2.35	0.95
Water and sanitation infrastructure is sufficient for the camp population.	30.9	37.2	2.1	11.7	18.1	2.49	1.49
Waterborne diseases are rare in the camp.	26.6	46.8	19.1	2.1	5.3	2.13	1.01
There are effective water conservation measures in place in the camp.	27.7	34.0	5.3	19.1	13.8	2.57	1.43

Note: SA=Strong Agree, A=Agree=Neutral, D=Disagree, SD=Strong Disagreed

Regarding the adequacy of clean water, 77.7% of respondents believe it is sufficient in the camp, while 10.6% do not. The mean score is 1.90, with a standard deviation of 0.98.This finding indicates a high level of satisfaction with water access among camp residents, which is essential for health and well-being. Adequate clean water access plays a crucial role in preventing waterborne diseases and is fundamental to maintaining a humane living condition in refugee settings. The findings are in line with qualitative data as one key informant said,

> *"The availability of clean water here has made a significant difference in our daily lives. It's something we don't take for granted, especially given our circumstances. However,*

*there are times when the supply isn't as consistent as we need."*September 20, NYARUGUSU CAMP, 2023.

These results suggest that the current water supply system is meeting the needs of most camp residents but also highlights the importance of addressing the concerns of the minority who are dissatisfied. The findings are in line with Asiimwe et al. (2020), who emphasize the importance of water, sanitation, and hygiene services in refugee settlements. Their research underscores how access to clean water is vital for maintaining health and improving the quality of life in refugee camps.

Concerning the accessibility of sanitation facilities, 62.8% of respondents find them easily accessible, whereas 33% find them less so. The mean score is 2.48, with a standard deviation of 1.46.The findings are in line with qualitative data as one key *informant said,*

"Access to sanitation facilities is generally good, but there are areas in the camp where they are harder to reach, especially for the elderly or those with disabilities. It's crucial for everyone to have easy access to these facilities." September 16, NYARUGUSU CAMP, 2023.

These results reflect a positive view of sanitation facility accessibility within the camp, a fundamental aspect of maintaining public health and personal dignity. However, the concerns of the significant minority who find these facilities less accessible cannot be overlooked. It suggests a need for ongoing efforts to improve the distribution and accessibility of sanitation facilities to ensure they adequately serve the entire camp population. These findings align with the principles

outlined in The Sphere Handbook (2020), which stresses the importance of accessible and adequate sanitation facilities in humanitarian response settings.

With regard to the regular maintenance and cleaning of sanitation facilities, 60.6% of respondents agree that this is the case, while 26.6% disagree. The mean score is 2.49; with a standard deviation of 1.43.This response suggests a reasonable degree of satisfaction with the hygiene standards in the camp's sanitation facilities. Regular maintenance is essential for preventing diseases and ensuring a healthy living environment. Nevertheless, the dissenting opinions point to areas where improvements are necessary, emphasizing the importance of consistent and thorough maintenance practices to meet the needs and expectations of all residents. The findings resound with the work of Njenga et al. (2021), which discusses waste management and recycling in refugee camps, highlighting the significance of regular maintenance for sanitation facilities to ensure sustainable living conditions.

Regarding the availability of hand washing facilities, 72.4% of respondents agree they are available near sanitation facilities, while 9.6% disagree. The mean score is 2.12, with a standard deviation of 1.04.This positive feedback underscores the camp's commitment to promoting hygiene practices, especially in the context of a refugee camp where the risk of disease transmission can be high. The findings are in line with qualitative data as one key informant said,

> *"The presence of hand washing stations near most sanitation facilities is a big step towards maintaining hygiene. Yet, we sometimes face shortages of soap, which hinders their effectiveness."* September 26, NYARUGUSU CAMP, 2023.

Hand washing is a simple yet effective method to prevent the spread of infectious diseases. The presence of these facilities near sanitation areas is essential for maintaining public health. Nonetheless, attention should be given to the minority who feel these facilities are inadequate, ensuring that hand washing facilities are universally accessible and well-maintained. These findings are consistent with the recommendations of Sphere (2020), which emphasize the critical role of hygiene facilities, including hand washing stations, in humanitarian settings to promote health and prevent disease.

With regard to water quality, 57.4% of respondents believe the quality of water in the camp meets international standards, while 12.8% do not. The mean score is 2.35, with a standard deviation of 0.95.This finding indicates a level of confidence in the water quality among the majority of the camp residents. Meeting international standards for water quality is crucial for ensuring the health and well-being of refugees. It also reflects the effectiveness of water treatment and management practices in the camp. However, the concerns of the minority who disagree highlight the need for continuous monitoring and improvement of water quality to ensure it consistently meets the required standards.The findings align with Qudah et al. (2021), who assess the management of water resources in refugee camps, emphasizing the importance of adhering to international standards to ensure the health and safety of refugees.

Concerning the sufficiency of water and sanitation infrastructure, 68.1% of respondents agree it is sufficient, while 29.8% disagree. The mean score is 2.49, with a standard deviation of 1.49.The majority agreement suggests that the existing infrastructure is largely meeting the needs of the camp population. This aspect is vital for ensuring basic hygiene and sanitation conditions in a

densely populated refugee setting. The findings are in line with qualitative data as one key informant said,

> *"Overall, the water and sanitation infrastructure meets our needs, but there are definitely areas that require improvement, like more frequent maintenance and better quality facilities."* September 22, NYARUGUSU CAMP, 2023.

However, the significant proportion of respondents who disagree signals a need for further investment and development in water and sanitation infrastructure to adequately serve the entire camp population and address any existing gaps or shortcomings. These findings resonate with the work of Sarker et al. (2020), who examine solid waste management strategies in refugee camps, highlighting the need for adequate infrastructure to ensure environmental sustainability and public health.

With regard to the prevalence of waterborne diseases, 73.4% of respondents agree that such diseases are rare in the camp, while 7.4% disagree. The mean score is 2.13, with a standard deviation of 1.01.This high level of agreement suggests effective management of water quality and sanitation in the camp, significantly reducing the risk of waterborne diseases. This is crucial in a refugee camp setting, where the spread of diseases can be rapid and devastating. Continuous efforts to maintain water quality and sanitation are essential to sustain this positive outcome. However, the concerns of the minority highlight the importance of vigilance and continuous improvement in water and sanitation management to prevent the outbreak of diseases. This finding is in line with the research by Masum et al. (2020), who discuss the impact of refugee

settlements on environmental conditions, including the importance of managing water sources to prevent diseases.

Regarding water conservation measures, 61.7% of respondents agree that effective measures are in place, while 32.9% disagree. The mean score is 2.57, with a standard deviation of 1.43.The positive response from the majority indicates a recognition of efforts made towards water conservation, an essential aspect in resource-limited settings like refugee camps. Effective water conservation measures not only ensure the sustainability of water resources but also reflect a commitment to environmental stewardship. The divergent views, however, suggest that more needs to be done to improve these measures and increase their visibility and effectiveness across the camp. These findings align with Matthew (2013), who discusses environmental security and the critical role of sustainable practices in refugee settings, emphasizing the importance of water conservation for long-term environmental stability.

4.3.2 Impact on Land Use and Deforestation

This section explore the impact of the refugee camp on land use and deforestation, vital environmental considerations. Table 4.7 presents the perceptions of the camp's residents on how the camp's presence has affected local ecosystems. It covers various aspects, including deforestation, land quality degradation, soil erosion, and the encroachment on wildlife habitats. Understanding these impacts is essential for assessing the environmental footprint of the camp and for guiding sustainable practices and rehabilitation efforts.

Table 4.7: Impact on Land Use and Deforestation (n=94)

Statement	SA	A	N	D	SD	Mean	St.D

	(%)	(%)	(%)	(%)	(%)		
The camp has resulted in significant deforestation in the surrounding areas.	33.0	40.4	4.3	10.6	11.7	2.28	1.34
The camp has led to the degradation of land quality in the surrounding areas.	22.3	41.5	10.6	16.0	9.6	2.49	1.27
The camp has caused soil erosion in the surrounding areas.	22.3	44.7	21.3	2.1	9.6	2.32	1.14
The camp's expansion has encroached on wildlife habitats.	31.9	36.2	17.0	14.9	0.0	2.15	1.04
The camp has resulted in a loss of biodiversity in the surrounding areas.	25.5	50.0	2.1	13.8	8.5	2.30	1.23
The camp has led to an increase in human-wildlife conflicts.	16.0	37.2	20.2	12.8	13.8	2.71	1.28
The camp has resulted in unsustainable land use practices.	36.2	38.3	5.3	8.5	11.7	2.21	1.33
There are ongoing efforts to rehabilitate the environment around the camp.	21.3	39.4	14.9	14.9	9.6	2.52	1.25

Note: SA=Strong Agree, A=Agree=Neutral, D=Disagree, SD=Strong Disagreed

Findings show that 73.4% of respondents agree that the camp has led to significant deforestation, while 22.3% disagree. The mean score is 2.28, with a standard deviation of 1.34.This substantial agreement suggests that the camp's presence has had a notable impact on the surrounding forest cover. Deforestation in and around refugee camps can lead to a range of environmental problems, including loss of biodiversity and habitat, soil erosion, and changes in local climate conditions. This situation calls for the implementation of sustainable land management practices and reforestation efforts to mitigate the environmental impact. The findings are in line with Global Forest Watch (2021), which documents forest change near refugee camps, including Nyarugusu, highlighting the environmental challenges posed by deforestation.

Regarding land quality degradation, 63.8% of respondents agree it has occurred, while 25.6% disagree. The mean score is 2.49; with a standard deviation of 1.27.The majority view indicates a perceived decline in land quality around the camp, likely due to increased human activity and

resource extraction. Land degradation can have far-reaching consequences on soil fertility, water quality, and local ecosystems. The findings are in line with qualitative data as one key informant said,

> *"The degradation of the land around the camp is noticeable. Increased foot traffic and construction activities have taken a toll on the soil and vegetation. It's a growing concern for us, as it affects the overall environmental health of our surroundings."*September 18, NYARUGUSU CAMP, 2023.

This finding underscores the need for effective land management strategies and environmental conservation measures to preserve land quality and support sustainable development in the region. This aligns with Kansime et al. (2019), who discuss the impact of refugee camps on environmental security, emphasizing the critical need for managing water and sanitation facilities to mitigate land degradation.

Concerning soil erosion, 67% of respondents acknowledge its occurrence, while 11.7% do not. The mean score is 2.32, with a standard deviation of 1.14.The perception of soil erosion by a majority of respondent's points to significant environmental changes around the camp. Soil erosion can lead to a decline in agricultural productivity, reduced water quality, and increased vulnerability to natural disasters. Addressing soil erosion is crucial for maintaining the ecological balance and supporting the livelihoods of both refugees and host communities.The findings correlate with the research by Brauch (2003), which explores the linkages between security and environment, highlighting the environmental consequences of human settlements in sensitive areas.

With regard to encroachment on wildlife habitats, 68.1% of respondents agree it has occurred, while 14.9% disagree. The mean score is 2.15, with a standard deviation of 1.04.This significant agreement reflects concerns about the impact of the camp's expansion on local wildlife habitats. Encroachment into natural habitats can lead to biodiversity loss, altered wildlife behavior, and increased human-wildlife conflicts. The findings are in line with qualitative data as one key informant said,

> *"As the camp expands, we're encroaching more into wildlife territories. It's evident from the changing patterns of animal sightings near the camp. This encroachment is disturbing the natural balance and could have long-term ecological consequences."* September 24, NYARUGUSU CAMP, 2023.

Protecting these habitats is essential for preserving biodiversity and ensuring ecosystem services. These findings are consistent with the UNHCR (2021) report on the environmental impact of refugee camps, highlighting the need for environmental protection measures in refugee crisis management.

Regarding biodiversity loss, 75.5% of respondents agree it has occurred due to the camp, while 22.3% disagree. The mean score is 2.30, with a standard deviation of 1.23.The high level of agreement signals a pressing concern about biodiversity loss around the camp. This loss can have cascading effects on ecosystem functionality, resilience, and the provision of essential ecological services. Mitigating biodiversity loss requires a concerted effort to balance refugee needs with environmental conservation. This finding aligns with the work of Abdelhaleem et al.

(2020), who emphasize community-based approaches to environmental management in refugee camps, highlighting the importance of biodiversity conservation.

Findings indicate that 53.2% of respondents agree that the camp has increased human-wildlife conflicts, while 26.6% disagree. The mean score is 2.71; with a standard deviation of 1.28.The majority view suggests that the presence of the camp has exacerbated conflicts between humans and wildlife, likely due to habitat encroachment and competition for resources. Managing these conflicts is crucial for the safety of both humans and wildlife and requires strategies that promote coexistence and protect natural habitats. The findings are in line with qualitative data as one key informant said,

> *"The presence of the camp has definitely led to more frequent encounters with wildlife, often leading to conflicts. We're competing for the same resources, and it's becoming a safety issue for both the animals and the camp residents."* September 30, NYARUGUSU CAMP, 2023.

This is in accordance with Creswell and Plano Clark (2017), who discuss the importance of considering environmental factors in mixed-methods research, underlining the complex interactions between human settlements and wildlife.

Concerning unsustainable land use practices, 74.5% of respondents acknowledge this issue, while 20.2% do not. The mean score is 2.21, with a standard deviation of 1.33.This finding suggests that current land use practices in and around the camp may not be sustainable, potentially leading to long-term environmental degradation. Addressing these practices is vital for ensuring the sustainability of natural resources and the well-being of both the refugee and host

communities. The findings are consistent with Asiimwe et al. (2020), who assess the availability and quality of water and sanitation facilities in refugee camps, linking these to broader environmental and land use issues.

With regard to environmental rehabilitation, 60.7% of respondents recognize ongoing efforts, while 24.5% do not. The mean score is 2.52, with a standard deviation of 1.25.The acknowledgment of rehabilitation efforts by a majority of respondents is a positive sign, indicating awareness and potentially active participation in environmental conservation initiatives. Rehabilitation efforts are crucial for restoring degraded environments, enhancing ecosystem services, and improving the overall quality of life for camp residents and the surrounding communities. This is in line with Nguyen et al. (2020), who assess access to clean water and sanitation services in refugee camps, emphasizing the role of environmental rehabilitation in improving living conditions.

4.3.4 Waste Management Practices

This section delves into the effectiveness of waste management practices within the refugee camp, a critical component of environmental health and sustainability. Table 4.8 provides insights into the residents' perceptions of the camp's waste management system, encompassing its organization, the sufficiency of disposal facilities and energy sources, and compliance with environmental regulations. The analysis also includes aspects such as reforestation, recycling, and waste reduction initiatives, as well as the regular maintenance of waste disposal facilities. Understanding the effectiveness of these practices is key to ensuring environmental protection and maintaining the health and well-being of the camp's residents.

Table 4.8: Waste Management Practices (n=94)

Statement	SA (%)	A (%)	N (%)	D (%)	SD (%)	Mean	St.D
The camp has a well-organized waste management system.	34.0	40.4	4.3	10.6	10.6	2.23	1.32
There are sufficient waste disposal facilities and energy sources in the camp.	22.3	41.5	10.6	16.0	9.6	2.49	1.27
The camp promotes reforestation, recycling and waste reduction initiatives.	20.2	39.4	21.3	8.5	10.6	2.50	1.22
Waste disposal facilities are regularly maintained and cleaned.	31.9	36.2	17.0	14.9	0.0	2.15	1.04
The camp's waste management practices prevent environmental contamination.	25.5	50.0	0.0	12.8	11.7	2.35	1.31
The camp provides proper disposal facilities for hazardous waste.	25.5	46.8	3.2	12.8	11.7	2.38	1.31
The camp has adequate measures in place to prevent illegal dumping.	36.2	50.0	5.3	8.5	0.0	1.86	0.86
The camp's waste management practices are in compliance with environmental regulations.	21.3	39.4	14.9	14.9	9.6	2.52	1.25

Note: SA=Strong Agree, A=Agree=Neutral, D=Disagree, SD=Strong Disagreed

Regarding waste disposal and energy sources, 63.8% of respondents agree that these are sufficient, while 25.6% disagree. The mean score is 2.49, with a standard deviation of 1.27.The positive response highlights the camp's capacity to manage waste and provide energy sources effectively. The findings are in line with qualitative data as one key informant said,

> *"The camp has made significant strides in managing waste and ensuring adequate energy supply. However, there are still moments when waste disposal becomes challenging, especially during high occupancy periods."* September 27, NYARUGUSU CAMP, 2023.

However, the dissenting opinions suggest the need for expanding these facilities and exploring sustainable energy options to meet the growing demands of the camp. Enhancing waste disposal facilities and energy sources is essential for sustainable camp management and environmental protection. This finding is consistent with Bina's (2018) discussion on sustainable development

and the green economy, stressing the balance between environmental management and meeting human needs in settings like refugee camps.

Findings indicate that 74.4% of respondents agree the camp has a well-organized waste management system, while 21.2% disagree. The mean score is 2.23; with a standard deviation of 1.32.The majority view suggests that the camp's waste management system is effective and organized. A well-managed waste system is crucial for maintaining hygiene, preventing environmental contamination, and ensuring a healthy living environment. The disagreement of a significant minority highlights areas for improvement and underscores the need for continuous assessment and enhancement of waste management practices. These findings align with the research by Abdelhaleem et al. (2020), which emphasizes community-based approaches to environmental management in refugee camps, including effective waste management strategies.

Findings show that 59.6% of respondents acknowledge the camp's efforts in promoting reforestation, recycling, and waste reduction, while 19.1% do not. The mean score is 2.50, with a standard deviation of 1.22.This indicates a positive perception of the camp's environmental initiatives. Promoting reforestation and recycling is vital for reducing the ecological footprint of the camp and contributing to sustainable environmental practices. The findings are in line with qualitative data as one key informant said,

> *"The reforestation and recycling efforts here are commendable. These initiatives not only improve our living conditions but also instill a sense of responsibility towards the environment among residents."*September 21, NYARUGUSU CAMP, 2023.

However, the proportion of respondents who are not aware of or do not agree with these initiatives suggests the need for more effective communication and engagement with the camp community regarding environmental practices. The findings resonate with the work of Bäckstrand (2003), who highlights the importance of civic science and community engagement in environmental governance, particularly in settings like refugee camps.

Concerning maintenance, 68.1% of respondents agree that waste disposal facilities are regularly maintained and cleaned, while 14.9% disagree. The mean score is 2.15, with a standard deviation of 1.04.The majority view underscores the camp's commitment to maintaining cleanliness and hygiene through regular maintenance of waste disposal facilities. This is essential for preventing health hazards and ensuring a decent living environment. Attention to the minority view is important to identify and address any gaps in maintenance practices. This finding aligns with the IRC (2019) report on water, sanitation, and hygiene in refugee camps, which emphasizes the importance of regular maintenance of facilities to uphold sanitation standards.

With regard to preventing environmental contamination, 75.5% of respondents agree that the camp's waste management practices are effective, while 24.5% disagree. The mean score is 2.35, with a standard deviation of 1.31.The response indicates a general confidence in the camp's ability to manage waste in a way that minimizes environmental contamination. The findings are in line with qualitative data as one key informant said,

> *"The camp's focus on effective waste management has been a crucial factor in preventing environmental contamination. It's impressive, but there's always room for improvement,*

especially in terms of regular waste collection and disposal." September 17, NYARUGUSU CAMP, 2023.

Effective waste management is crucial for protecting the environment and the health of the camp residents. However, the concerns of the minority highlight the importance of continuous improvement in waste management to ensure environmental safety. These findings are in line with UNEP (2020), which discusses environmental security in refugee camps, particularly the challenges and opportunities in waste management.

Regarding hazardous waste disposal, 72.3% of respondents agree that proper facilities are provided, while 24.5% disagree. The mean score is 2.38, with a standard deviation of 1.31.The positive perception of hazardous waste management reflects the camp's attention to handling potentially harmful waste responsibly. Proper disposal of hazardous waste is vital for preventing environmental and health risks. Nonetheless, the disagreement from a significant portion of respondents suggests a need for reviewing and enhancing these facilities, ensuring they are accessible and adequate for all camp residents. The findings correlate with the perspective of Resnik (2015), who discusses the ethical aspects of environmental health and the importance of proper hazardous waste management in public health research.

Findings reveal that 86.2% of respondents agree that the camp has adequate measures to prevent illegal dumping, while 8.5% disagree. The mean score is 1.86, with a standard deviation of 0.86.This high level of agreement indicates that the camp is effectively addressing the issue of illegal dumping, an important aspect of maintaining environmental hygiene and preventing pollution. However, ensuring that these measures are consistently applied and understood by all

camp residents is essential for their continued effectiveness. This aligns with the approach of Kansime et al. (2019), who apply systems thinking to understand the determinants of water, sanitation, and hygiene services in refugee camps, including waste management.

Regarding compliance with environmental regulations, 60.7% of respondents agree that the camp's waste management practices meet these standards, while 24.5% disagree. The mean score is 2.52; with a standard deviation of 1.25.The majority view suggests a general adherence to environmental regulations in waste management practices within the camp. The findings are in line with qualitative data as one key informant said,

> "Generally, our waste management practices align with environmental regulations. This adherence is important for maintaining the ecological balance of the area, although we occasionally face challenges in waste segregation and disposal."September 19, NYARUGUSU CAMP, 2023.

Compliance with these regulations is crucial for ensuring sustainable environmental management and protecting the health and safety of camp residents. The minority view, however, points to potential areas of non-compliance that need to be addressed. The findings are consistent with Mwakaje and Mgumia's (2018) study on land use changes in refugee hosting areas, emphasizing the importance of adhering to environmental regulations for sustainable management.

4.3.1.2 Regression Analysis

In this segment, we delve into a regression analysis to explore the impact of key environmental strategies sustainable waste management, alternative energy sources, and reforestation efforts

on environmental security within the refugee camp. Table 4.10 presents a model summary and ANOVA (Analysis of Variance) to assess the effectiveness of these environmental practices. The analysis aims to quantify the extent to which these specific interventions contribute to enhancing the overall environmental security, a crucial aspect of maintaining a healthy and sustainable living environment in refugee settings. This statistical approach enables a deeper understanding of the relationships between environmental practices and their outcomes, offering valuable insights for policy formulation and implementation.

Table 4.10 Model Summary and ANOVA (n=94)

Model Summary						
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate		
1	.460[a]	.212	.185	.48302		
ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5.640	3	1.880	8.059	.000[b]
	Residual	20.998	90	.233		
	Total	26.638	93			

a. Dependent Variable: Environmental Security

b. Predictors: (Constant), Sustainable waste management , Alternative energy sources , reforestation Efforts

The model summary indicates an R Square of 0.212, suggesting that approximately 21.2% of the variance in environmental security can be explained by the model's predictors: sustainable waste management, alternative energy sources, and reforestation efforts. The adjusted R Square of 0.185 accounts for the number of predictors in the model, indicating a good fit. The standard error of the estimate is 0.48302, reflecting the average distance that the observed values fall from the regression line.

The ANOVA results show a significant model fit ($F = 8.059$, $p < .001$), indicating that the model significantly predicts environmental security. The regression sum of squares (5.640) represents the explained variance by the model, while the residual sum of squares (20.998) represents the unexplained variance. The total sum of squares (26.638) is the total variance in environmental security that the model seeks to explain. These results suggest that the included environmental strategies are important predictors of environmental security in the camp, although other factors not included in the model may also play a role.

This section presents a regression analysis that examines the influence of various waste management practices on environmental security in the refugee camp. The model quantitatively assesses the impact of alternative energy sources, reforestation efforts, and sustainable waste management on enhancing the camp's environmental stability and health. By identifying the significance and strength of these relationships, the analysis offers valuable insights into which environmental practices are most effective in promoting security and sustainability within the camp setting. This information is crucial for strategic planning and prioritizing environmental interventions in refugee camp management.

Table 11: Regression analysis on Waste Management Practices and Environmental Security (n=94)

Coefficients[a]					
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	.600	.218		2.752	.007
Altenative energy sources	.103	.041	.240	2.490	.015
reforestation Efforts	.136	.060	.218	2.265	.026
Sustainable waste	.236	.060	.368	3.921	.000

management

a. Dependent Variable: Environmental Security

The regression model examines the impact of alternative energy sources, reforestation efforts, and sustainable waste management practices on environmental security. Regarding with Alternative Energy Sources, The unstandardized coefficient is 0.103, with a standardized coefficient (Beta) of 0.240, and it is statistically significant ($t = 2.490$, $p = 0.015$).This suggests that alternative energy sources positively influence environmental security in the refugee camp. The adoption of alternative energy sources, such as solar or wind power, can reduce the reliance on traditional energy sources that may have adverse environmental impacts, thereby enhancing environmental security. The findings align with the World Bank's (2021) report on supporting refugees and host communities in Tanzania, which highlights the importance of sustainable energy solutions in refugee settings.

With regard to Reforestation Efforts, The unstandardized coefficient is 0.136, with a standardized coefficient of 0.218, and it is statistically significant ($t = 2.265$, $p = 0.026$).This indicates that reforestation efforts positively contribute to environmental security. Reforestation can mitigate the effects of deforestation and land degradation, improve biodiversity, and contribute to overall ecological stability in and around refugee camps. These findings are in line with UNEP's (2021) environmental impact assessment of Nyarugusu refugee camp, emphasizing the role of reforestation in improving environmental conditions.

Concerning with Sustainable Waste Management, The unstandardized coefficient is 0.236, with a standardized coefficient of 0.368, and it is statistically significant ($t = 3.921$, $p < 0.001$).This strong

correlation suggests that sustainable waste management is a key factor in enhancing environmental security. Effective waste management practices, such as recycling, composting, and proper disposal, are crucial in minimizing environmental pollution and maintaining a healthy living environment in refugee camps. The findings correlate with Sarker et al. (2020), who assess solid waste management strategies in refugee camps, underscoring the importance of sustainable practices for environmental security.

This regression analysis highlights the critical role of alternative energy sources, reforestation efforts, and sustainable waste management in promoting environmental security in refugee camp settings. The significant positive coefficients for each of these factors emphasize the need for comprehensive environmental strategies that combine energy, forestry, and waste management initiatives. Further research could explore the interplay between these factors and other elements of environmental security, such as water resource management and pollution control, to develop holistic approaches to environmental protection in refugee camps.

CHAPTER FIVE

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

5.1 Introduction

This concluding chapter synthesizes the key findings of the research, drawing comprehensive conclusions and offering actionable recommendations based on the study's objectives. This research primarily focused on three critical environmental aspects in the refugee camp: access to clean water and sanitation facilities, the impact of the camp on land use and deforestation, and the effectiveness of waste management practices in relation to environmental security.

5.2 Summary of the Findings

5.2.1 Access to Clean Water and Sanitation Facilities

The data revealed that a significant portion of the camp's population finds access to clean water and sanitation facilities to be satisfactory, with many respondents affirming the adequacy of these essential services. However, the responses also pointed to certain gaps, particularly in terms of regular maintenance and the sufficiency of sanitation infrastructure, suggesting room for improvement.

5.2.2 Impact on Land Use and Deforestation

The survey highlighted critical environmental concerns among the camp residents, including substantial deforestation, degradation of land quality, and increased soil erosion. These issues were compounded by the encroachment on wildlife habitats and a notable loss of biodiversity, indicating a considerable ecological disturbance. Despite these challenges, the respondents

recognized ongoing environmental rehabilitation efforts, reflecting an awareness and commitment to mitigating these impacts.

5.2.3 Waste Management Practices

Regarding waste management, the findings indicated a generally positive perception of the camp's practices. Most respondents agreed that the waste management system is well-organized and effective in preventing environmental contamination. The study also identified a need for expanding waste disposal facilities, enhancing the maintenance of these facilities, and improving the implementation of reforestation, recycling, and waste reduction initiatives.

5.3 Conclusions

Regarding with clean water and sanitation facilities the research concludes that the camp has made commendable progress in providing access to clean water and sanitation facilities. However, there is a need for continuous monitoring and improvement to address maintenance issues and to expand infrastructure to keep pace with the growing population of the camp.

Concerning land use and environmental impact the significant environmental impacts identified, such as deforestation and biodiversity loss, call for urgent and sustained interventions. The study underscores the necessity for implementing effective land management strategies and enhancing environmental conservation efforts to protect and restore local ecosystems.

On waste management and environmental health, the findings confirm that efficient waste management practices are integral to maintaining the camp's environmental health. The camp's success in managing waste and implementing sustainable practices needs to be bolstered with ongoing efforts to expand and improve these systems, ensuring long-term environmental sustainability.

5.4 Recommendations

Based on the conclusion of each study specific objective the following are the recommendations.

i. Enhancing Water and Sanitation Infrastructure: Prioritize upgrading and expanding water and sanitation facilities, focusing on sustainable solutions and regular maintenance.

ii. Implementing Sustainable Land Management: Advocate for and implement robust land management and reforestation programs to counteract environmental degradation and promote ecosystem restoration.

iii. Optimizing Waste Management Systems: Focus on expanding waste disposal facilities, promoting sustainable energy usage, and enhancing community participation in waste reduction and recycling initiatives.

iv. Environmental Education and Community Engagement: Develop comprehensive environmental education programs to raise awareness and encourage active community participation in environmental conservation and sustainability efforts.

5.5 Suggestions for Future Research

Future research could explore the long-term health impacts of improved water and sanitation facilities on the camp's residents. Investigations into the effectiveness of specific sustainable land management and reforestation techniques in restoring local ecosystems would be beneficial. Further studies are also recommended to assess the socio-economic influences on waste management practices and their broader environmental implications within and around refugee

camps. This future research will provide deeper insights and contribute to more effective environmental management strategies in similar humanitarian settings.

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APPENDICES

Research Instruments

Appendix: 1 Questionnaire

Introduction:

This questionnaire aims to assess the environmental security in the Nyarugusu refugee camp in Tanzania's Kigoma region. We request your participation in this study to help us understand the environmental conditions and challenges faced by the camp residents. Your responses will contribute to the identification of potential strategies for improving environmental security in the camp. Please note that your participation is voluntary, and all information you provide will be kept confidential.

Part 1: Demographic Characteristics

1. Age: _____
2. Gender: a) Male b) Female c) Other (please specify) _____
3. Length of stay in the camp (in years): _____
4. Nationality: _____

Part 2: Access to Clean Water and Sanitation Facilities (Objective 1)

Please indicate your level of agreement with the following statements using the scale below:SA = Strongly Agree A = Agree N = Neutral D = Disagree SD = Strongly Disagree

Statement	**SA**	**A**	**N**	**D**	**SD**
Access to clean water is adequate in the camp.					
Sanitation facilities are easily accessible in the camp.					

Sanitation facilities are regularly maintained and cleaned.					
Hand washing facilities are available near sanitation facilities.					
The quality of water in the camp meets international standards.					
Water and sanitation infrastructure is sufficient for the camp population.					
Waterborne diseases are rare in the camp.					
There are effective water conservation measures in place in the camp.					

Part 3: Impact on Land Use and Deforestation (Objective 2)

Statement	SA	A	N	D	SD
The camp has resulted in significant deforestation in the surrounding areas.					
The camp has led to the degradation of land quality in the surrounding areas.					
The camp has caused soil erosion in the surrounding areas.					
The camp's expansion has encroached on wildlife habitats.					
The camp has resulted in a loss of biodiversity in the surrounding areas.					
The camp has led to an increase in human-wildlife conflicts.					
The camp has resulted in unsustainable land use practices.					
There are ongoing efforts to rehabilitate the environment around the camp.					

Part 4: Waste Management Practices (Objective 3)

Statement	SA	A	N	D	SD
The camp has a well-organized waste management system.					
There are sufficient waste disposal facilities and energy sources in the camp.					
The camp promotes reforestation, recycling and waste reduction initiatives.					
Waste disposal facilities are regularly maintained and cleaned.					
The camp's waste management practices prevent environmental contamination.					
The camp provides proper disposal facilities for hazardous waste.					
The camp has adequate measures in place to prevent illegal dumping.					
The camp's waste management practices are in compliance with environmental regulations.					

Appendix 2: Interview Guide for Environmental Security Assessment in the Nyarugusu Refugee Camp

Introduction:

Hello, and thank you for agreeing to participate in this interview. The purpose of this interview is to gather in-depth information about the environmental security situation in the Nyarugusu refugee camp. We will discuss various aspects of environmental security, including access to clean water and sanitation facilities, the impact of the camp on land use and deforestation, waste management practices, and potential strategies for improving environmental security. Your insights and experiences will help us better understand the environmental challenges faced by the camp and identify potential solutions. Please note that your participation is voluntary, and all information you provide will be kept confidential.

Objective 1: Access to Clean Water and Sanitation Facilities

i. From your perspective, how would you describe the overall access to clean water and sanitation facilities in the camp? What challenges do camp residents face in accessing clean water and sanitation facilities?
ii. In your experience, how has the availability and quality of water and sanitation facilities evolved over time in the camp?
iii. Can you provide examples of initiatives or programs that have been implemented in the camp to improve access to clean water and sanitation facilities? How successful have these initiatives been?

Objective 2: Impact on Land Use and Deforestation

i. In your opinion, how has the presence of the camp affected land use and deforestation in the surrounding areas? What changes have you observed since the camp was established?

ii. How has the camp's expansion impacted local wildlife and their habitats? Have there been any conflicts between humans and wildlife in the area?

iii. What actions or programs have been taken to mitigate the environmental impacts of the camp, such as deforestation and land degradation? How effective have these efforts been?

Objective 3: Waste Management Practices

i. How would you describe the waste management system in the camp? Are there adequate waste disposal facilities available for the camp residents?

ii. Are there any recycling or waste reduction initiatives in place in the camp? If so, how effective are these initiatives?

iii. What challenges do you face in managing waste within the camp? What improvements would you like to see in the camp's waste management practices?

Objective 4: Strategies for Improving Environmental Security

i. What steps has the camp's management taken to improve environmental security? How effective have these efforts been?

ii. In what ways are camp residents involved in environmental management efforts? Are there opportunities for residents to participate in or contribute to these efforts?

iii. What recommendations do you have for improving environmental security in the camp? Are there any specific initiatives or programs that you believe would be particularly effective in addressing the camp's environmental challenges?

Closing:

Thank you for your valuable input and participation in this interview. Your insights will contribute to our understanding of the environmental security situation in the Nyarugusu refugee camp and help us identify potential strategies for improvement.