ASSESS THE IMPACT OF UGANDA'S OIL AND GAS INDUSTRY ON THE ECOSYSTEM SERVICES AND LIVING CONDITIONS OF SMALL FARMERS IN THE ALBERTINE REGION

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A DISSERTATION SUBMITTED TO THE SCHOOL OF BUSINESS IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF BACHELOR OF SCIENCE IN OIL AND GAS MANAGEMENT OF UGANDA CHRISTIAN UNIVERSITY

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UGANDA CHRISTIAN UNIVERSITY

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DECLARATION

I, Iremeera Hope declare to the best of my knowledge that this research report is truly my original and has not been submitted in the fulfillment for any award of a degree in any other Institution of Higher Learning or University, so it is entirely out of my own efforts.

Signature …… Date ……

IREMEERA HOPE

CERTIFICATION

This research report has been successfully done under my supervision and in accordance with the relevant institutional rules and regulations. This report is now ready for acceptance by the Board of Examiners for an Award of a Bachelor of Science in Oil and Gas Management.

Signature  **Date 29th/04/2025**

James Abbey Mugerwa

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DEDICATION

This work is dedicated to my parents and my entire family for the continued support and inspiration for me to achieve this milestone.

ACKNOWLEDGEMENT

I thank the Almighty God for the protection, knowledge, wisdom and resources that have enabled me reach this far in completing my bachelors' studies.

I also extend my Special thanks to my supervisor Mr. Mugerwa James who has given me guidance throughout my research journey. I wish to also thank the managers of incubation centers who gave me an opportunity to access to the incubates to respond to my questionnaires, on the same note, my thanks go to my respondents who didn't give me a hard time once approached. I thank Mr. Mugalula George who worked tirelessly to collect data from the respondents. Finally, I thank all my lecturers who have taught me to be able to accomplish my bachelors.

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ABSTRACT

The study examined the impact of oil and gas industry on the ecosystem services and living conditions of small farmers in the Albertine region. The unclear connection between exploration, resource extraction, and the resulting negative social impacts has sparked much debate in Africa. Consequently, numerous scientific papers have attempted to clarify this relationship from various perspectives, including the original theory of flight and several evolutionary and dependency theories. It was guided by the following objectives to examine the impact of oil and gas industry on agricultural ecosystems, to examine the extent of environmental degradation resulting from oil and gas activities, to analyze the effectiveness of existing environmental protection policies and mitigation strategies.

The study adopted Modernization theory explains the process of modernization of society. The theory of modernization is based on the ideas of the German sociologist Max Weber (1864-1920). The study employed both qualitative (interview) and quantitative (survey) research methods were utilized. This was aided with a sample size of 184 is sufficient. The study reveals a moderate level of awareness and confidence in the implementation of environmental protection policies among communities affected by oil and gas activities in Uganda, with an overall mean of 3.20 (SD = 1.08). Respondents generally believe that environmental laws are enforced (*mean = 3.81*) and that oil companies follow government guidelines (*mean = 3.66*). The government, through agencies like the National Environment Management Authority (NEMA) and the Petroleum Authority of Uganda (PAU), should strengthen enforcement of environmental regulations, particularly around land use, water protection, and biodiversity conservation.

CHAPTER ONE

1.0 Introduction

The chapter contained the background of the study, statement of the problem, purpose of the study, significance of the study, objectives of the study, research questions, scope of the study, time scope and significance.

1.1 Background to the study

Globally, there is current high oil production and global population growth, the increasing demand for oil and gas makes these resources even more desirable. This is why countries with significant oil and gas reserves are considered wealthy due to their high emissions (Adusah-Karikari, 2015; Amoasah, 2010; Barker & Jones, 2013; Kumar, Adu-Larbi, Dorathy, Wokoma, & Abloh, 2013). The vicinity of the European and African Investment Company dug the first shallow well. The first deep well, Walkie B-1, was constructed in Butiaban in 1938 and is bituminous. The uninterrupted supply of oil and gas has hindered world economic development since the onset of industrialization, particularly in meeting the high energy demands of developed nations (Adusah-Karikari, 2015; Amoasah, 2010; Barker & Jones, 2013).

In Africa, the lack of experience in developing other natural resources, along with the experiences of other oil-producing nations, such as Nigeria and Cameroon, justify these fears (Obeng-Odum, 2013; Planetz, 2014). The trend toward studying natural resources remains a significant concern for scientists and politicians across many regions of Africa and the developing world. The unclear connection between exploration, resource extraction, and the resulting negative social impacts has sparked much debate in Africa. Consequently, numerous scientific papers have attempted to clarify this relationship from various perspectives, including the original theory of flight and several evolutionary and dependency theories (Aquimi, at el., 2006). However, it is not confined to these aspects.

At regional, the optimism has been observed by representatives of the Ugandan oil industry. In Western Uganda, there is a substantial body of literature on the environmental, social, and cultural impacts of the new oil and gas industry (Adusa-Caricari, at el., 2015). According to Manu (2011),

the primary interest of Ugandan oil and gas researchers is that oil production, informed by experiences from gold mining, can negatively impact the environment and nutrition of local populations. This situation can jeopardize livelihoods. Adusa-Caricari (2015) warns that the increasing benefits from oil research have become a burden to society. In this context, Manu (2011) cautions that Uganda may be on the verge of disaster. The impact of waste generated during resource development in many countries. These impacts include soil degradation, air and water pollution, and biodiversity loss. In many nations, competition for resources and space between the mining industry and local populations has escalated into an ongoing struggle. This situation is particularly pronounced when residents of resource-rich countries do not halt ongoing evacuation activities and fail to provide adequate alternatives (Adusah-Karikari, et al 2015).

1.2 Problem Statement

In many regions, particularly in developing countries, there is a strong connection between the exploitation of natural resources and the degradation of ecosystems. Extractive services have a significant impact on the collapse of ecosystem services, especially when their existence relies on these services. The primary research topics include the negative effects of oil and gas production on ecosystem services and the associated living conditions, as well as the dynamics of these effects. There is limited understanding of how these interactions take place in Uganda's western communities.

The Millennium Ecosystem Assessment (2005) indicates that the loss of ecosystem services occurs both directly and indirectly. Researchers in Uganda's mining sector have discovered that the degradation of crucial environmental services and resource development are linked, either directly or indirectly, to improved processes and emissions flow. Migration, therefore, leads to the transformation of arable land (Archondicis, at el., 2014). However, since the onset of oil and gas production in Uganda, there has been a lack of oversight regarding how mining activities impact these vital ecosystems. In this context, it is crucial to conduct empirical research to evaluate and measure the impact of oil production activities at the biophysical level and how changes in the services of culturally significant ecosystems influence the survival of these populations. Survival and cultural identity are closely related.

1.3 General Objectives of the study

The objective of the study is to assess the impact of oil and gas industry on the ecosystem services and living conditions of small farmers in the Albertine region.

1.3.1 Objectives of the study

i. To examine the impact of oil and gas industry on agricultural ecosystems in the Albertine Region
ii. To examine the extent of environmental degradation resulting from oil and gas activities in the Albertine Region.
iii. To analyze the effectiveness of existing environmental protection policies and mitigation strategies.

1.4 Research Questions

i. What is the impact of oil and gas industry on agricultural ecosystems in the Albertine Region
ii. What is the extent of environmental degradation resulting from oil and gas activities in the Albertine Region.
iii. What is the effectiveness of existing environmental protection policies and mitigation strategies.

1.5 Scope of the study

1.5.1 Geographical Scope

The study was conducted in Bunyoro (Albertina), western Uganda, specifically at Kyabigambire Sub-County, Kigorobya County, in Hoima District.

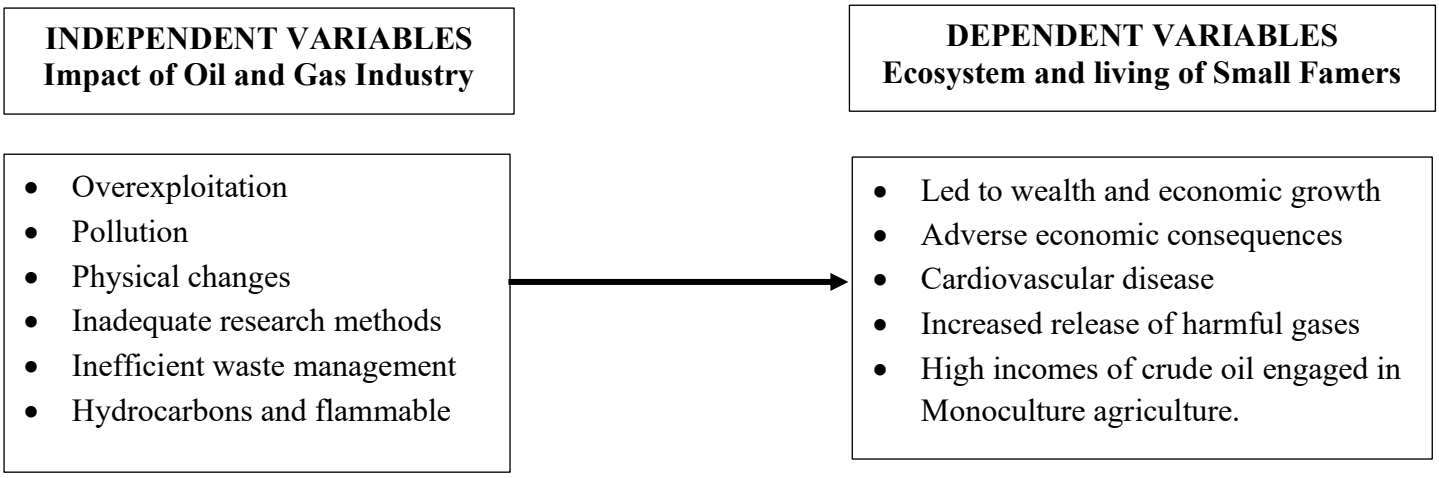
1.5.2 Content Scope

The study assessed the impact of the oil and gas industry on critical local ecosystems and the living conditions of small farmers. In this study independent variable (*oil and gas industry activities*) and dependent variable (*living conditions of small farmers*) are being adopted.

1.5.3 Time Scope

The study covered a period between 2010 and 2024 taking into an account of secondary data; this period is selected because it was within the time frame within the Albertine region. However, field data collection was conducted within four months (September, 2024 – May, 2025).

1.6 Conceptual framework



Source: *Adopted from Adecola et al., (2015) and modified by the researcher, (2025)*

Description of the conceptual framework

The figure indicates the at the two variables independent variable with attributes (*Overexploitation, Pollution, Physical changes, Inadequate research methods, Inefficient waste management and Hydrocarbons and flammable*) and dependent variable with (*led to wealth and economic growth, Adverse economic consequences, Cardiovascular disease, Increased release of harmful gases and high incomes of crude oil engaged in Monoculture agriculture*). The impact that is driven between the two is influential on the environment and the small famers surrounding the areas.

First, land use change has a direct impact on facilitating operations in major infrastructure priorities. Second, the unexpected wealth promised by the oil industry is stimulating a new wave of immigration to oil-producing regions. This indirectly led to the transition to the development of agricultural land in residential and commercial facilities, taking into account the arrival of migrants. More and more people are putting more and more pressure on the ecosystem, but more importantly, small farmers in these areas often have little agricultural experience, losing themselves due to the occupations of local aristocrats who want to gather the dust of wealth.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

The chapter provides literature by scholars in areas related to the current study. This was present the impact of oil and gas industry on the ecosystem services and living conditions of small farmers in the Albertine region. Literature inclined to the above guidelines was searched from published documents, journals, conference papers and the internet.

2.1 Theoretical review

2.1.1 Theory of modernization

The theory of modernization explains the process of modernization of society. The theory of modernization is based on the ideas of the German sociologist Max Weber (1864-1920) and underlies the model of modernization proposed by Harvard sociologist Talkot Parsons (1902-1979). The theory takes into account the internal factors of the country and believes that with the help of "traditional" countries are developing similarly to other developed countries. The theory of modernization was the main paradigm of the social sciences in the 1950s and 1960s and then gradually disappeared. It has existed since 1991, but it is still a controversial model.

The theory of modernization seeks to identify social variables that contribute to social progress and social development, and to explain the process of social development. Modernization theories are influenced by new critiques of socialist and free market ideologies, world system theorists, globalization theorists, and dependency theorists. Modernization theory emphasizes not only the process of change but also the response to change. It also explores internal dynamics, examines social and cultural structures and adapts to new technologies.

The modern theory of modernization begins with the views of the German sociologist Max Weber (1864-1920) on the role of rationality and irrationality in the transition from traditional to modern society. Weber's approach laid the groundwork for the famous model of modernization of Harvard sociologist Talcott Parsons (1902-1979), who translated Weber's texts into English in the 1930s.

Since 1945, Parsons' version has been widely used in sociology and other social sciences. He objected in the late 1960s because this principle was too general and could not be applied equally in all societies. In 1983, the German historian Thomas Neuberde gave a very detailed assessment of modern and traditional society based on German history.

Since the 1970s, the theory of modernization has been criticized by many scholars, including Andre Gund Frank (1929-2005) and Emanuel Wallerstein (1930-2019). In this model, the modernization of society involves the destruction of the original culture and the replacement of another Western. By definition, *modernity applies only to the skin,* so there is still any modern society. Modernists usually view Western societies as truly modern and compare them to other primitive or underdeveloped societies. This view demeans modern societies, even if their standard of living is the same as in Western societies. Opponents say modernity is independent of culture and can be adapted to any society. Both sides are following the example of Japan. Some see this as proof that non-Western societies can have a completely modern way of life. Others say Japan has moved further west as a result of modernization. Combining modernization with other processes widely used by theorists (democratization, emancipation, development), the concept becomes impure and therefore difficult to refute, as Tubbs said.

The theory has also been empirically criticized because modernization theorists reject external sources of social change. The dichotomy between the traditional and the modern does not help, because they are interconnected and often interdependent, and the "modern" is not perfect. Modernization in Europe has also been declared Eurocentric since the Industrial Revolution, the French Revolution and the Revolution of 1848, and has long been the most advanced stage in Europe. Anthropologists often go so far as to say that this view is racist and inherent in Western culture.

2.2 Related Literature

2.2.1 Ecosystem services

The Daily (1997) defines an ecosystem as a collection of organisms that live in a given area, the physical environment in which they grow, and the interactions that occur between them. Ecosystem services are also defined as conditions and processes that are created and produced by

ecosystems and natural species that create and sustain human life. Man takes a lot of food, natural fiber, medicine, wood, leather, as well as industrial products and goods from the ecosystems of his ancestors. In addition to supplying solid raw materials, the world's population must act as a genuine ecosystem support system, controlling the planet's weather, controlling depletion, preventing floods and droughts and so on. it totally depends on your abilities. (Daily, 1997; Dr. et al., 2011; EC et al., 2012; MA, 2005; Noss et al., 1995). Although the concept of ecosystem services is completely new, the idea it proposes has been long overdue (Lele et al., 2013). Wilson and Matthews (1970) identified the single goal of "environmental services," and the concept of ecosystem services became the key word (Lele et al. 2013; Norgard 2010).

2.2.2 The impact of the oil industry on agricultural ecosystems and living conditions

Oil and gas (N&G) are a valuable natural resource with the economic potential to sustain humanity. Unfortunately, industrial hazards remain a contentious issue in the global debate over the existence of the global problem and the "curse of resources". For some countries, the oil and gas industry is the food of their economy, and for others it can be called a curse that pollutes the environment and negatively affects human nutrition. (Watts, 2004). In a world already threatened by global warming, climate change and social and economic challenges, these issues call into question the sustainability of resources as a sustainable economic source and a sustainable source of energy. However, it is difficult to find a balance between the advantages and disadvantages of oil wealth (Obukri and Ibaba, 2008). Albertina is the mainstay of the Nigerian oil and gas industry and an important source of national income (Eklegbe, 2001; Adecola et al., 2015). However, Nigeria's oil and gas industry is described as an exploitative and paradoxical waste of resources leading to poverty, depletion of natural resources and poor economic development in rural areas (Ibeanu, 2000; Okoko, 1999). Residents of oil-producing communities are to blame for pollution, loss of income and poor quality of life (Erega and Iruge, 2009; Opukri and Ibaba, 2008).

Oil and gas production has led to wealth and economic growth, as well as poverty for many people in the Albertina region. The social enemy of the multinational oil company has intensified. This has led to violent, extremist protests and abductions by the Nigerian government and the international community (Eklegbe, 2001; Watts, 2004). Albertina is an agricultural community, and most people are heavily dependent on agriculture and natural resources as livelihoods (Uighur

and Aug, 2007; Taft and Hacken, 2015). Agriculture, forestry and fisheries are part of the main economic activities of the rural population, including those living in oil-producing settlements (Adeyemo & Zuofa, 2010; Ekpebu & Ukpong, 2012).

The oil and gas industry continues to compete for land, forests and water resources, which has a negative impact on agriculture and human life (Osuji and Onoyek, 2004). There is evidence that oil and gas exploration in the region has led to poverty, unemployment and migration as a result of agriculture and other traditional living conditions (Essien & John, 2010; Gaughran, 2009). As an oil-producing region, Albertina remains vulnerable to environmentally serious problems, including health and food security and other social and economic problems (Idemudia, 2009). It is therefore important to protect the environment and improve the living standards of people living in the region and elsewhere. This applies to environmentalists, government and citizens (Yagi, 2002; Navilo and Badejo, 2005).

Albert's growing influence on the oil and gas industry has been attracting attention for years. Conventional oil spills in the Albertine region make it one of the most affected oil spills in the world (Freenas, 2001). Oil and gas production has led to numerous reports of biodiversity, natural habitats and other environmental problems in the region. In particular, studies have shown that oil spills have increased pollution of the Alberta mangrove ecosystem, reduced biodiversity and caused significant species loss in most oil-producing areas (Zebe and Ui, 2014; Luiselli and Akani, 2003; Osuji and Onojek, 2004).).). Poor regulation of the region's oil and gas industry has led to environmental risks, including oil and gas explosions, natural gas explosions and oil spills; As a result, land, crops, livestock, forests and water resources are damaged. Oil spills and pipe explosions are major sources of pollution that cause serious damage to the environment and adverse economic consequences for humans (Han & Weng, 2010; Oliver-Smith, 1996; Sklavonos and Rigas, 2006). Oil production in the Alberta region is reported to be causing health problems, rising cost of living and loss of water resources (Bhua and Ukpong, 2018).

2.2.3 The impact of the oil industry on aquaculture ecosystems and living conditions

Oil drilling causes environmental pollution due to increasing global demand due to inadequate research methods, inefficient waste management and many other reasons. (Garang Koch and

Pafumirajira, 2019). Although the importance of crude oil exploration in the world is growing, it is polluting the environment. The effects of environmental pollution have reached alarming levels worldwide, especially in Africa (Kelishni, 2012). Achievements of industrialization and economic development in developing countries, especially in Africa, have undoubtedly increased the risk of environmental pollution (Briggs, 2003). Pollutants at an early age can have adverse effects on human health, including cardiovascular disease, mental illness, allergies, and respiratory disease (Kilishni, 2012).

Although the discovery and discovery of crude oil in Africa brings economic benefits, there is no doubt that oil exploration has affected some parts of the environment; Air, land, water and all living things on earth are badly damaged. Inevitable and often uncontrollable events in Africa due to oil spills, natural gas emissions (causes of various gas disruptions), noise and waste management (sewage treatment plants and solid waste) (Patak & Madalia, 2012). Major pollutants in oil and gas exploration and production; (1) Oil-resistant spills (oil and grease), wastewater contaminated with chemicals and drilling fluids, (2) crude derivatives and (3) carbon dioxide, sulfur dioxide, sulfur dioxide and fine nitrogen particles , hydrocarbons and flammable gases. Waste oils and gases and related by-products can contaminate water, soil and air. Civil reports show similar effects of extraction and drilling on surface water and soil as well as on wells around wells. Air quality problems at oil and gas fields due to air leaks from wells, pipelines, wells, compressor stations and many other infrastructures have been reported (Jiang et al. 2020). Other important dangers to the environment are dust particles that can pollute the environment, and natural gas fires and oil fields are known to cause air pollution. Gas emissions include sulfur dioxide, hydrocarbons, nitrogen oxides and gaseous gases. In addition, accidents, illegal spills of oil barrels, spilled water and oil can have catastrophic consequences for health and the environment that can last for decades.

Various oil refining activities, including gas production, refining, transportation and combustion, lead to the release of greenhouse gases, especially carbon dioxide, into the atmosphere. Combustion of fossil fuels (coal), oil and natural gas releases carbon dioxide (greenhouse gas), which causes global warming and serious environmental problems (Darkwah et al., 2018; Jiang et al., 2020). Similarly, the combustion of high-liquid gases produces aerosol vapors that also contribute to global warming (FOE, 2004; Darkwah et al., 2018). Acid rain has a negative impact on the ecosystem as a result of certain activities related to crude oil production. Oil spills are

intentional or illegal releases of petroleum hydrocarbons into the atmosphere and can affect a variety of coastal and marine habitats, including animals and fisheries, including human activities (soybeans). and Iseromedogen, 2019). According to a study by Ordinioha and Brisibe (2013), oil emissions reduce food security by 60%, and vegetable ascorbic acid and crude protein by 36%. The increase in cassava by 40% was due to an increase in child malnutrition by 24% (Ordinioha and Brisibe, 2013).

During the processing of crude oil, various types of waste are generated that pose a threat to the environment if they are not processed properly. Oil pollution affects the ability of soil to hold water, which retains water, prevents soil subsidence, and affects the rate and flow of soil moisture (Hewelke et al., 2018; Wei. Et al., 2020a, b wei et al., 2019). The physical and biochemical properties of crude oil-contaminated soils have changed (Dong et al. 2020; Marinescu et al. 2011; Zhao et al. 2020). A study in the Nigerian state of Onda found that oil and gas production causes soil degradation (Olujimi et al., 2011). Marinescu et al. (2011) observed an increase in the carbon / nitrogen (C / N) ratio of organic carbon in contaminated soils. The uptake of boron-salt soil during mining can alter the physical properties of the soil and indirectly affect plant growth (Patak and Mandalia, 2012). Studies have shown that acidification of the soil around fires and gas leaks over time can lead to loss of yields and agricultural opportunities (Zhao et al. 2020).

2.2.4 Impact on humans and aquatic species

Spills of crude oil and oil have a negative impact on the environment and pose a short-term and long-term threat to surrounding plants, animals and even humans (Baron et al. 2020; Pepitido et al.). 2020; Beier et al. 2020); Places and everything else. 2020). Aesthetics, environmental appearance, economy and lifestyle of people living in the environment are not without these shortcomings. Contaminated soil damages the structure of the building and adversely affects its foundation, causing the building to collapse and perish (Alpha and Wilkinson, 2020). PAHs have been shown to cause toxic compounds in crude oil, cancer, and cardiovascular disease in aquatic organisms (Brett et al., 2017; Dubinski et al., 2018; Murthy et al., 2015). People have long been exposed to oil pollution, and their children also suffer from cancer and heart disease (McKenzie et al. 2019; Stenehjem et al. 2015; Strelitz et al. 2019). Significant increases in crude oil pollution continue to be a problem for researchers.

The axillary tendon causes changes in the structure of normal bacteria in the intestines of fish. These changes were observed after less than 48 hours (Améndola-Pimenta et al., 2020) and after 28 days (Cerqueda-García et al., 2020) at high loads. Although the concentration of oxygen in the digestive tract of fish has not been measured, it is believed that the toxic effects of crude oil and natural gas cause oxygen deficiency, and the activity of bacteria affects the availability of oxygen. On the other hand. Ackerly and Esbaugh (2020) reported that 24-hour exposure to crude oil followed by hypoxic conditions *had an additional effect on the metabolism and aerobic performance of perch (Cyanopus ocelots) compared to fish exposure time.* Subject to availability. (2021) also found that the specific growth rates of aquatic species decreased within a few weeks after exposure to crude oil. Low growth rate corresponds to a decrease in the standard rate of the enzyme, but does not affect its aerobic properties. Polycyclic aromatic hydrocarbons and crude oil have been shown to affect fish species. Magnusan et al. (2020) *Danio Rerio embryos* under the influence of crude oil revealed retinal cell death and bradycardia. *Oily killer fish (Fundulus grandis) reduced* cardiovascular activity. Exposure to crude oil (Gurong et al. 2021) also reduces the chances of successful ovulation.

Oil pollution hit the birds hard and they died. Susceptibility to influenza to various sea and seabirds, suppression of the immune system, damage to cell oxidation, decreased reproductive success, organ dysfunction, hemolytic anemia and other diseases, including physiological fatalities. (Goethe, 1968; Briggs et al.)., Yamato et al., 1996, Esler et al 200, Giese et al 200, Golet et al., 2002, Alonso-Alvarez et al., 2007, Fallon et al 2018 (2020). Inadequate oil waste disposal systems pose a serious threat to humans and animals. Water can enter the body, making it toxic to marine life.

Fisheries play an important role in the socio-economic development of Ghana. The length of the coastline is 550 km and stretches from the eastern Aflau to the western half of the Asni (BG, 2008). Fisheries accounted for 4% of GDP in 2009 and 1.4% in 2013 (GSS, 2014). According to Ata-Mills et al. (2004: 13), “Fisheries have different implications for its existence and economic development in West Africa. Ghana’s marine resources are an important source of food and economic activity.

Ghana has two main sources of fish production: deep-sea fishing and inland fish farming. Eighty-five percent of the total catch is deep-sea fish. The seafood sector can be divided into three broad categories, including industrial marine fishing, marine fishing, and artisanal fishing or canoeing (Brithome, 2009). The study focuses on the fleet of ships, including motorized and non-motorized aircraft. According to Amador et al. (2006), the fleet consisted of approximately 11,213 vessels, with approximately 124,229 fish. 70-80% of the country's deep-sea fisheries are handicrafts (Mensah et al., 2006).

It goes through several stages of fish production, processing and distribution (Brithome, 2009). In Ghana, sex fishing is regulated by sex. Males process and sell fish and females while providing funds for fish (Harper et al., 2013). Some are female roles, where trust and boat owners play an important role in securing fish supplies (Harness, 1991: 134). For example, in the Minina and Epam study from 1960 to 1970, more and more fishermen funded their purchases for fishing and tourism (Walker, 2001). After the advent of foreign aircraft in the craft sector in the early 1960s, fishermen began investing in aircraft, offering mysterious owners loans to buy them or themselves (Over, 1992, 1998). Thus, the increasing use of foreign engines "has contributed to a significant increase in labor productivity and productivity" in the craft sector (new ibid: 43).

Oil and gas exploration opens up great opportunities for economics and development (Darcoa, 2010). After exploration and extraction at sea from Ghana's oil reserves, citizens discussed the possible social, economic and environmental impacts of coastal cities near the Jubilee region. According to Ejekumhene et al. (2010) Oil and gas exploration and production can contribute to economic, social, environmental and cultural change in different fishing communities. This change can be positive or negative. There are limited studies of the impact of the oil and gas industry on aquaculture for both men and women, as oil production is a relatively new industry. This article has been revised to fill in some of these gaps.

2.2.5 The impact of the oil industry on water bodies in the socio-cultural systems of oil production

Oil exploration and refining in Africa has social and economic consequences. At the end of 2007, it had 117,481 billion barrels of crude oil, making Africa the fastest-growing source of energy with

9.49% of the world's reserves (Naima, 2011). Oil research is very beneficial to the country and the world economy, for example, the revenues of the oil industry is the backbone of the economy of African oil producers; It is also used in other countries. Sector Development Goals (Olusimi et al., 2011; Mensah and Casadeval, 2019). However, in modern society, rapid development and the pursuit of comfort in human life have become a top priority for the environment.

The world's largest oil producers are the United States, Russia and Saudi Arabia, which account for 54% of world production (Investopedia 2020), and Africa is currently among the top 10 oil producers. Oil and gas are the main products of international trade because of their easy transportation in world trade. Under the U.S. Geography Act of February 2010 (Kramer, 2010), more than 275 new sites have been found in West Africa since 2000. Reduce unemployment on the African continent, develop infrastructure and tackle wealth and hunger. (Hiring, 2011; Faria, 2020). Despite the discovery of oil fields and reserves in Africa in the last century, poor resource management, insufficient investment in violence and corruption hamper expected growth and development, but the negative impact of research and regulation is greater.

For example, the Nigerian government has full control over property rights. That is, they use sovereignty to remove their country (Bole et al. 2001; Agbogidi et al. 2005). Preliminary reports show that the total wealth accumulated as a result of crude oil exploration in Nigeria has been destroyed by only 1% of the total population (Jangar, 2007; Bhura et Tari, 2015). The average price of a barrel of oil and a liter of gasoline, verified and verified between 1970 and 2020, shows that it earned $ 669 billion from crude oil sales between 1970 and 2010. In addition, $ 742 million between 1999 and 2010. Using natural gas per cubic centimeter, it cost $ 192 billion, of which 58,773,375,000 cubic meters were burned and about 1,151,300 billion in circulation (ODU). Aal. 2016). Nigeria is the largest crude oil producer in Africa and the seventh largest exporter of crude oil to the world's tenth refinery (Amnesty International, 2006; Donoa et al., 2015).

Despite high oil revenues, Nigeria is one of the poorest borrowed countries in the world (Agbiboa, 2013; Investopedia, 2020). According to the Corruption Perceptions Index (CPI) (Umid, 2017), 70% of the 200 million people earn less than $ 2 a day as a result of corruption and poor resource and income management. The transfer of treasury funds to the people and the granting of public

control rights, contracts, licenses and production rights has weakened economic growth and caused civil war, looting and unrest in Nigeria.

In Africa, in particular, local corruption by government officials is a major obstacle to the exploration and refining of crude oil in Africa. Many oil-rich African communities lack infrastructure. Fertile land and clean rivers are important resources for the economic well-being of local communities, and crude oil refining, exploration and transport have a negative impact on economic well-being (Ehrim *et al*., 2018). Oil wells (Yangar, 2007) have deprived most settlements of drinking water. The impact of oil spills on water bodies poses a threat to aquatic organisms, increasing hunger and poverty (Pittok et al., 2018).

In this process, the flow of crude oil from storage facilities also affects agricultural land, otherwise the fertile land becomes poorer. As a result, the economic downturn has led to declining crop production and yields (Sam et al., 2017; Chizioke et al., 2018), which in turn has affected sales and agriculture on agricultural GDP. Gas combustion is characterized by the release of harmful gases and particles that pose a threat to human and animal health (Otitoloju and Dan-Patrick 2010). More than 250 toxins have been detected in the exhaust gases, including polycyclic aromatic hydrocarbons (PAHs), hydrogen sulfide, toluene, benzene, sulfur dioxide, nitrogen dioxide, xylene, etc .; Some are responsible for acid rain and the ozone layer. Deficiency due to global warming, cancer and other adverse effects (Jiva et al., 2019). This is why the constant emission of particles and primary gases around oil-producing communities can be a cause for concern.

In addition, major oil producers in Africa are heavily dependent on crude oil production. There is no responsibility for the corruption of the system, so large sums come from outside. This hindered the development of oil refining infrastructure, as most of the money went elsewhere. As a result of crude oil exploration, the social and economic structure of many African countries has changed, leading to irresponsibility and low citizen participation (Kyumugasho 2016). Significant differences in human development have been found in the amount of oil extracted by most of these countries. Countries with much lower oil incomes have better outcomes for human development and potential. This means that if profits are not managed efficiently, redistributed efficiently and not used properly to invest in different households; income cannot automatically become a thriving bad economy.

Despite significant exploration and refining of crude oil in Nigeria, the country continues to experience national growth. This is mainly due to the negligence of other sectors of the economy due to high incomes of crude oil engaged in monoculture agriculture (Adefolaju, 2014). The inability of most African governments to reduce corruption and the risks associated with oil pollution is accelerating armed activity in crude oil production areas (Tantua and Kamruzman, 2016; Babatude et al., 2018). Moreover, poverty is an important test for countries that produce crude oil in Africa (Sam and Zebe, 2018). Crude oil is mainly extracted in rural Africa. Due to the low level of education of the people living in these communities, the technical skills needed to conduct and work with research are often imported. About 70% of people in the Niger Delta live on less than $ 1 a day (Amnesty International, 2006).

Despite the initial commercial discovery of oil in Angola in 1955 and the rapid growth of the oil industry since then, economic growth has been highly volatile between 1985 and 2015, averaging only 5% per year (Mohammed, 2018). After the discovery of oil in Angola between 1975 and 2002, a civil war broke out that limited the potential for growth and development (Malachias, 2001). However, between 2006 and 2015, Angola accounted for 97% of oil exports and 45% of GDP (World Bank, 2017). As one of the main drivers of Angola's economic growth, its high dependence on oil exports has so far caused great concern to politicians, especially as a result of the global recession and the Covid-19 epidemic.

Prior to the discovery of oil in 1959, Libya was traditionally known for its cultivation (Blake, 1969). Since its inception, crude oil has been a major source of income (50% of GDP, 97% of exports and 75% of national income) and has played a key role in Libya's socio-economic development (Al-Sharif, 2005). Although the advent of oil has brought great prosperity, the country has lost its economic diversification and affected the management of some goods and services, especially after the external volatility of world oil prices (Ali and Harvey, 2013). Falling Egyptian crude oil exports, the global economic downturn and the instability of world markets have led to a sharp decline in living standards and social security, which has angered Egyptian unions and officials. The significant decline in crude oil prices has exacerbated the need for IMF lending, which has led to structural reforms, austerity measures and currency devaluation (Al-Shimi, 2016).

Restrictions on hunting in oil-producing areas have changed the diet of the Ghanaian oil community (Naguah and Mensah, 2016; Akakpo et al., 2018), and at the same time have affected their standard of living. Lack of crude oil exploration and refining, frustration at work, extreme poverty, degradation and social conflicts between rural and urban areas are many characteristics associated with these oil-producing areas (Mugi Sa, 2016; Dauda, 2017); Matemila. and b.) ..., 2018).). The impact of oil wells is often felt in local communities because it can affect their social values (Ventemann and Zappe, 2015). For example, in the Niger Delta region of Nigeria, members of the local community take a holiday bath to celebrate the New Year, which is part of the well-being of the New Year community. Such cultural beliefs eradicate crude oil production and oil spills (Onegbulum, 2018; Oniana and Sam, 2020). Other economically viable water species such as oysters (Crassostria *virginica)*, tilapia indigo (Oreochromis *nilotix)*, rainbow trout (Oncorhinchus *micis)*, oil pollution (D Anna et al. 2021; Garcia et al. 2020).). This affects the environmental conditions, the economy and the livelihoods of the oil-producing areas. Allegedly unethical treatment of multinational oil companies (MNCs) and NACs has led to public action against them in host communities, human rights organizations, and NGOs. These violations are mainly based on the MNOC's attitude towards nature, humanity and civil rights (Kalou and Ot, 2019)**.**

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

This chapter contains the research design, sampling design and type, different methods that the researcher used to collect data from various sources and also to interpret the data so as to come up with a conclusion on this topic on assessing the impact of oil and gas industry on the ecosystem services and living conditions of small farmers in the Albertine region.

3.1 Research design

The study employed both qualitative (interview) and quantitative (survey) research methods were utilized. This design was chosen because it allowed for a detailed understanding of specific particulars considered in other approaches, as well as an explanation of how common social forces are formed and developed in particular locations.

3.2 Population of the study

The study consecrated on the population of Kyabigambire sub-county, Kigorobya County in Hoima District with about 1,000 people. However, the study targeted a population of 850 people, these include the community, leaders and oil and gas personal.

3.4.1 Sampling Size

According to Krejcie and Morgan (1970) table, it states that for a population of 850, a sample size of 184 is sufficient.

Table 1: Showing the Sampling Size

Population category	Population	Sample size
Members	20	10
Key Informants	70	37
Oil & Gas Personal	80	42
Oil Organisations	180	95
Total	**350**	**184**

Source: *Primary Data, 2025*

3.6 Sampling Techniques

Sampling Simple random sampling was used to select Oil & Gas Personal, Members. This category of respondents was targeted because they are the residents who have faced the effects of oil and gas. The sampling technique was preferred because of being cost effective in terms of money and time saving in terms of collecting data, high level of flexibility, accurate and free of bias.

Purposive sampling was used to select the oil and gas sector workers, local leaders using purposive sampling. These was considered knowledgeable in impact of oil and gas industry on the ecosystem services and living conditions of small farmers.

3.7 Data Collection Methods

Data will be collected from both primary and secondary sources. Primary data was collected from community members of Kyabigambire sub-county, Kigorobya County and local leaders (local council/opinion leaders). To these, questionnaires was presented and interviews was conducted.

Secondary data was collected from review of existing documents in line with the objectives of the study. Key documents was reviewed including oil and gas sector policies and sector performance reports available in online repositories, Hoima public library, Kyabigambire sub-county,

Kigorobya County Local Government archives and newspapers. It was also involve reviewing recent Journals publications and oil sector bulletins.

3.8 Data collection instruments

3.8.1 Questionnaire

The questionnaire was used to collect both quantitative and qualitative data from community members, impact of oil and gas industry on the ecosystem services and living conditions of small farmers. The questionnaire were non-structured with mainly pen-ended questions requiring respondents to give responses by writing short notes (*Appendix II*). The questionnaire consists of structured and semi-structured questions aimed at gathering both qualitative and quantitative data from respondents. It is divided into the following sections: Section A: Demographic Information; Section B; Section C:; Section D.

The open-ended items in the questionnaires enabled respondents to express their opinions freely and in detail about the subject under study without biasing them with pre-determined answers by the researcher. However, some close-ended questionnaire items was also be used because of the ease with which they can be coded thus facilitating easy statistical analyses.

The questionnaire copies was hand-delivered by the researcher and the research assistants who waited further to be dully filled by the respondents and returned them. This method is preferred for this category of respondents because it involves keeping a record of data collected for further reference. Besides, it is a suitable method for collecting large data over a large area and from a large sample within the shortest possible time.

3.8.2 Interview guide

During the study, interviews was conducted with district officials, oil and gas sector employees and local leaders using interview guides (*Appendix III*). Interview was used to collect data on the impact of oil and gas industry on the ecosystem services and living conditions of small farmers. The interview guide is designed for key informants, including community leaders, environmental officers, and oil industry representatives. Section A: General Information; Section B: Land Use

and Agriculture; Section C: Environmental and Ecosystem Changes; Section D: Socioeconomic and Cultural Impact .

Interview method was used in this study because it provides an opportunity to interact with the respondents who may not be in position to fill the questionnaire because of lack of time and yet they have very critical information in relation subject of investigation. Interviews helped to create a link with data collected using questionnaire by clarifying the details that would not be offered using questionnaires.

3.9 Validity of the Instruments

3.9.1 Validity

This indicates the degree to which results obtained from the analysis of the data actually represent the phenomena under study (Mugenda & Mugenda, 2003). Data validity was tested by using the Content Valid Index (CVI). To achieve this, a copy of the questionnaire was distributed to the supervisors and field experts to rate the relevant items/questions in relation to the research objectives, the relevant questions were then divided by the total number of items. Validity was tested as follows:

$$\text{CVI}= \frac{\text{valid Items}}{Total\ Number\ of\ Items}$$

The acceptable rate that researcher preferred is 0.5 that resulted from the division of the corrected questions out of the total questions.

3.9.2 Reliability

According to Kasomo (2006), reliability refers to how consistent a research procedure or instrument is. It therefore means the measure of degree to which research instruments yields consistent results or data after repeated trials. The test re-test method was used to assess the reliability of the instruments. This involved administering the same questionnaires twice to 25 respondents in region and correlating their responses independently. After administering the questionnaires, a correlation co-efficient was calculated using appropriate formula to establish the

relationship between the two set of scores. Spearman's Brown Prophecy formula was applied as shown below:

$$\textit{Reliability of the entire test} = \frac{\textit{(Reliability of 0.5 test) (r)}}{\textit{1+ (Reliability of 0.5 test) (r)}}$$

Where r, is Coefficient of correlation

The mean of the reliability is established at 0.79 therefore the internal consistency (Reliability) of the instrument is confirmed. A coefficient of 0.7 and above would mean that the research instruments are reliable hence a display consistence in the research finding. The reliability test produces a coefficient of correlation of 0.79, this meant that the data collection instruments was reliable enough to give consistent findings.

3.10 Data Analysis

3.10.1 Quantitative data analysis

The data was collected are analyzed in terms of quantity and quality. Quantitative data are assessed using the Social Science Statistical Package (SPSS) based on the research questions and objectives, where the data are analyzed using descriptive and approximate methods. Descriptive media include frequency tables, graphs, updates, averages, and comparative statistics and percentages.

To characterize the dominant the impact of oil and gas industry on the ecosystem services and living conditions of small farmers in terms of procedures undertaken, intensity, and spatial coverage was used in SPSS. MCA is applicable where the responses obtained from the study variables are measured on a nominal scale or as categorical, like "Yes" and "No" (Johnson & Wichern, 2006) just like it was in the current study. The results were shown as percentage of variance in a tubular form and visualized on a 'scree' plot.

3.10.2 Qualitative data analysis

Data collected from the field in form of verbal response from the key informant was mainly qualitative in nature thus analysed accordingly. The responses were transcribed, organised and categorised under themes objectives of the study. This was mean identifying common responses in line with the objectives of study. Qualitative data analysis involved the use of descriptions as either direct quotations or narratives of the responses from the interviews

The Spearman rank correlation co-efficient was used to test the direction and the magnitude of the relationships, this was because the researcher will be using ordinal scale of measurement; the 5-Likert Scale. The findings were presented in tables and narrations. Qualitative data from the open ended items was analyzed through content analysis; organizing based on the emerging themes.

Table 2: Mean Rang of a five-level Likert scale

Scale	Mean range	Interpretation
Strongly agree	4.20-5.00	Very high
Agree	3.40-4.19	High
Not sure	2.60-3.39	Moderate
Disagree	1.80-2.59	Low
Strongly Disagree	1.00-1.79	Very low

Adopted from Renis Likert (1932)

3.11 Ethical Considerations

This study will be conducted following ethical procedures governing social research studies. An introductory letter will be obtained from Uganda Christian University, introducing the researcher to the respondents as seeking assistance in conducting the survey. Consent will be sought from respondents before questionnaire is handed to them or before interviews is conducted. Attention will be also given to the rules governing photography in the area of study for the observable elements of the study.

The questionnaire will contain an introductory statement requesting for the respondent's cooperation in providing the required information for the study. The respondents will further assure of the confidentiality of the information provided and that the study findings will be meant

for academics' research purposes only. Plagiarism will be avoided by acknowledging secondary information sources through referencing.

3.12 Limitation of the study

The major limitations of this study are expected to be time constraints, and lack of first-hand writings. To get an accurate data needs it was considered that a lack of time and willingness by entrepreneurs to complete questionnaires might create problems in obtaining a representative sample.

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION, INTERPRETATION AND DISCUSSIONS

4.0 Introduction

This chapter analyzes the data collected from the respondents, presents and interprets and discusses it. The chapter comprises the questionnaire response rate and objective specific themes. The chapter found out results on *the impact of oil and gas industry on agricultural ecosystems in the Albertine Region, the extent of environmental degradation resulting from oil and gas activities in the Albertine Region, and lastly to analyze the effectiveness of existing environmental protection policies and mitigation strategies*.

4.1 Demographic Information

This section analyses, presents and interprets the findings on the respondent's age in completed years, their gender and level of education.

4.1.1 Age of the respondents

The respondents were asked to state their age in completed years. The results are as shown in table

	Frequency	Percent
Less than 30 years	27	14.7
30-45 years	96	52.2
45 – 60 years	27	14.7
60-65 years	25	13.6
65 and above	9	4.9
Total	184	100.0

Source: *Primary Data, 2025*

The average age of the respondents was 30-45; the oldest respondent had 65 years with the youngest respondent having 30years. Most of the respondents at 96 (52.2%), were between ages 30-45 closely followed by 27(14.7%) falling between 45-60 years, the least number of respondents falling between the ages 65 years at 9(4.9%). This means that respondents had adequate knowledge due to their experience for the study.

4.1.2 The respondents' gender

The respondents were asked to state their gender. The results are as shown in table

Table 3: Showing the respondent gender

	Frequency	Percent
Male	83	45.1
Female	101	54.9
Total	184	100.0

Source: *Primary Data, 2025*

The females were the most at 101(54.9%) with the females being the least at 83(45.1%) were male. The respondents were selected randomly, this therefore implies that there were more female farmers thus this be relevant.

4.1.3 Level of Education

The respondents were asked to state their level of education and the results are as shown in table

Table 4: Showing the respondent's level of education

	Frequency	Percent
Secondary	48	26.1
Tertiary	84	45.7
Diploma	38	20.7
Degree	14	7.6
Total	184	100.0

Source: *Primary Data, 2025*

The highest level of education for the most of the respondents was tertiary level at 84(45.7%), followed by Secondary holders at 48(26.1%), Diploma at 38(20.7%) with the minority being degree holders at 14(7.6%). This implies that the majority were educated and has relevant information to the study.

4.1.2 The respondents' marital status

The respondents were asked to state their gender. The results are as shown in table

Table 5: Showing the respondent marital status

	Frequency	Percent
Single	40	21.7
Married	100	54.3
Widowed	26	14.1
Divorced/Separated	18	9.8
Total	184	100.0

Source: *Primary Data, 2025*

As seen in the table 2 above, majority of the study respondents constituting 100(54.3%) were married and these were followed by respondents who were single as reported by 40(21.3%) of the respondents finally 26(14.1%) were widowed, the study respondents reported to fall under the category of Separated/divorced represented by 18(9.8%). All these respondents of the study regardless of their status were willing to provide the information that was required by the study that helped in understanding the study problem that was under research.

4.2 The impact of oil and gas industry on agricultural ecosystems in the Albertine Region

Table 6: Descriptive statistics showing the rate on the impact of oil and gas industry on agricultural ecosystems in the Albertine Region

	Mean	Std. Dev.	Interpretation
Statement			
Oil and gas exploration/production in the Albertine region impacted agricultural activities in your area	2.58	1.14	Moderate
There is air pollution, wildlife displacement, deforestation noticed since the start of oil and gas activities	3.27	.814	Moderate
Access to farmland or grazing land changed due to oil and gas developments	2.58	1.05	Moderate
There concerns about food safety or contamination due to industrial pollutants	2.82	1.14	Moderate
Water availability for irrigation or livestock been affected by oil and gas activities	3.23	.76	Moderate
Average mean	**2.89**	**0.99**	

Source: ***Primary Data, 2025***

The results indicate a moderate perceived impact of oil and gas activities on agricultural and natural resources in the Albertine region, with an overall average mean of **2.89 (SD = 0.99)**. This suggests that while the effects are noticeable, perceptions vary among respondents, reflecting mixed experiences in different localities. The item Oil and gas exploration/production in the Albertine region impacted agricultural activities in your area received a mean score of 2.58 (SD = 1.14), indicating a relatively low to moderate level of agreement. This could be due to localized disruptions such as land clearance, soil compaction, or displacement of farmers, as reported in studies that document how oil infrastructure can limit access to arable land and affect crop yields (Tumusiime et al., 2020; Boamah & Overå, 2016).

The statement with the highest level of agreement was there is air pollution, wildlife displacement, and deforestation noticed since the start of oil and gas activities, with a mean of 3.27 (SD = 0.814). This supports findings by the Uganda National Environment Management Authority (NEMA, 2020), which report significant environmental degradation in oil exploration zones, including loss of biodiversity and increased carbon emissions from machinery and road development. Respondents also noted changes in land use, particularly access to grazing and farmland, which had a mean of 2.58 (SD = 1.05). This reflects concerns about land fragmentation and the displacement of pastoralist and agrarian communities, consistent with previous research showing how oil activities often interfere with traditional land tenure systems (Ite, 2007; Ahebwa et al., 2012). Concerns about food safety or contamination due to pollutants scored a mean of 2.82 (SD = 1.14), which may relate to fears of chemical runoff, waste mismanagement, or airborne pollutants affecting crop and livestock quality. These concerns are corroborated by Okonkwo et al. (2020), who found high levels of heavy metals and hydrocarbons in food and water sources in similar oil-impacted regions.

Finally, the availability of water for irrigation and livestock was perceived as moderately affected (**mean = 3.23, SD = 0.76**), echoing community reports of reduced water levels or contamination of local water bodies. UNEP (2011) and NEMA (2020) have emphasized the threats to freshwater systems posed by oil drilling, especially when spill response and environmental safeguards are inadequate.

4.3 The extent of environmental degradation resulting from oil and gas activities in the Albertine Region

Table 7: Descriptive statistics showing the extent of environmental degradation resulting from oil and gas activities in the Albertine Region.

	Mean	Std. Dev	Interpretation
Interactive Participation			
Oil and gas activities have led to deforestation in this area.	3.95	1.03	High
Water sources near oil facilities are polluted or unsafe.	3.09	1.40	Moderate
There has been an increase in air pollution due to oil extraction.	3.45	1.18	High
Soil fertility has declined in areas near oil developments.	3.97	1.03	High
Wildlife populations have decreased since oil activities began.	3.29	1.35	Moderate
My household struggles to access clean water due to oil activities.	**3.55**	**1.21**	
Traditional medicinal plants are harder to find			

Source: *Primary Data, 2025*

The analysis of community responses under the interactive participation dimension reveals a strong perception of environmental degradation linked to oil and gas activities. The responses demonstrate that local communities are aware of the changes occurring in their environment, and their lived experiences reflect widespread ecological disruption. The overall means fall above 3.0 for all items, indicating a general agreement that oil and gas activities have negatively affected the ecosystem in the Albertine region.

The item Soil fertility has declined in areas near oil developments received one of the highest mean scores at 3.97 (SD = 1.03), suggesting a strong consensus among respondents that oil-related land use changes, contamination, and erosion have undermined agricultural productivity. These results are consistent with findings by Tumusiime et al. (2020), who reported that communities near oil drilling sites in Uganda observed decreased crop yields and increased soil compaction due to heavy machinery use. Similarly, deforestation was widely acknowledged, with a mean of **3.95 (SD = 1.03)**. This supports previous environmental assessments that identify forest clearing for road

construction, seismic surveys, and pipeline installations as major contributors to forest degradation in the Albertine region (NEMA, 2020; Ahebwa et al., 2012). Deforestation in turn destabilizes local microclimates and contributes to biodiversity loss.

The perception of air pollution due to oil extraction scored 3.45 (SD = 1.18), with many respondents expressing concerns about increased dust, emissions from generators, and gas flaring. These forms of pollution not only affect human respiratory health but also disrupt the natural balance of flora and fauna, echoing conclusions from UNEP (2011) in oil-affected areas of Nigeria.

Meanwhile, wildlife population decline scored 3.29 (SD = 1.35), pointing to observable impacts on biodiversity. Communities noted reduced sightings of common species, attributing this to noise, habitat loss, and human activity. These findings mirror those of Boamah and Overå (2016), who argue that oil activities often intersect with conservation zones, leading to species displacement and poaching risks due to improved road access.

Water-related challenges were also notable. The statement "My household struggles to access clean water due to oil activities" had a mean of 3.55 (SD = 1.21), while "Water sources near oil facilities are polluted or unsafe" had a mean of 3.09 (SD = 1.40). These perceptions highlight growing concerns about industrial pollution, especially near rivers and wetlands. Field studies by Okonkwo et al. (2020) in the Niger Delta show similar community experiences where oil spills and runoff reduced both the quantity and quality of water for domestic and agricultural use.

The relatively high standard deviations (e.g., SD = 1.40 for polluted water sources) suggest that while general agreement exists, individual experiences vary possibly due to geographical differences in exposure to oil activities or varying levels of awareness. Nevertheless, the strong mean scores across all indicators suggest that communities not only observe these impacts but also actively discuss and participate in highlighting them. Overall, these findings underscore the importance of including local voices in environmental governance. Interactive participation is vital in ensuring that oil development proceeds without undermining the long-term ecological and social stability of resource-dependent communities (Ite, 2007; Tabaire & Ochieng, 2021).

4.4 To analyze the effectiveness of existing environmental protection policies and mitigation strategies.

Table 8: Descriptive statistics Showing an analyze the effectiveness of existing environmental protection policies and mitigation strategies.

	Mean	Std. Dev.	Interpretation
I am aware of environmental protection policies related to oil and gas.	3.02	.97	Moderate
Environmental Impact Assessments (EIAs) are conducted before oil projects.	2.86	1.06	Low
Oil companies follow environmental guidelines set by the government.	3.66	1.21	Moderate
Environmental laws are consistently enforced in oil-producing regions.	3.81	1.13	High
Communities are informed about their environmental rights and policies.	2.67	1.03	Moderate
Average Mean	**3.204**	**1.08**	**Moderate**

Source: *Primary Data, 2025*

The findings related to community awareness and perception of environmental protection policies in oil-producing regions reveal a moderately positive outlook, with an **average mean of 3.20 (SD = 1.08)**. This suggests that while some mechanisms for policy awareness and implementation exist, gaps remain especially in community engagement and access to information.

The statement environmental laws are consistently enforced in oil-producing regions had the highest mean score of 3.81 (SD = 1.13), indicating that a majority of respondents believe in the presence and activity of regulatory enforcement agencies. This perception could stem from visible actions by bodies such as the National Environment Management Authority (NEMA) or the Petroleum Authority of Uganda (PAU), which have conducted inspections and issued public notices related to environmental compliance (NEMA, 2020). However, this finding may not reflect

the full picture, as some studies argue that enforcement is often selective or delayed due to political and economic interests (Ite, 2007; Tabaire & Ochieng, 2021).

A slightly lower but still strong agreement was observed in the item oil companies follow environmental guidelines set by the government, which had a mean of 3.66 (SD = 1.21). This suggests that respondents generally perceive oil firms as compliant possibly due to highly publicized corporate social responsibility (CSR) efforts and visible infrastructure standards. Nonetheless, researchers such as Okonkwo et al. (2020) caution that while guidelines may exist on paper, enforcement and monitoring are often inconsistent, particularly in rural or remote areas. Interestingly, the mean for community members are aware of environmental protection policies related to oil and gas" was 3.02 (SD = 0.97), indicating a moderate level of awareness among the public. While this may seem encouraging, it also reveals a critical gap: a substantial portion of respondents remain uninformed or uncertain about specific policy details. This is supported by Ahebwa et al. (2012), who found that many rural populations living near extractive projects had limited access to environmental information and documentation.

The statement environmental Impact Assessments (EIAs) are conducted before oil projects received a mean of 2.86 (SD = 1.06). This suggests skepticism among communities about whether EIAs are effectively carried out or whether their results are acted upon. Although EIAs are legally required in Uganda under the Environmental Management Act (2019), concerns persist about superficial assessments or the exclusion of local stakeholders during public hearings (Tumusiime et al., 2020).

The lowest mean score (2.67, SD = 1.03) was recorded for communities are informed about their environmental rights and policies, pointing to a significant weakness in public education and participatory governance. This aligns with Boamah and Overå (2016), who emphasized that local communities often feel sidelined in decision-making processes, especially when oil operations are managed by centralized institutions or foreign firms.

In general, while perceptions suggest that environmental laws and regulations exist and are partly enforced, there is a critical disconnect between policy creation, community involvement, and public awareness. This gap hinders genuine environmental justice and sustainable development in

oil-rich regions. Effective implementation must be accompanied by community education, participatory monitoring, and transparent access to environmental data.

Only 33.2% of respondents believed mitigation efforts were effective, and less than 16% were aware of EIAs. This illustrates a significant gap in community engagement and environmental governance. Although Uganda has robust legal frameworks including the Environmental Management Act (2019) and Petroleum Act (2013) implementation remains weak, especially in rural areas (Tabaire & Ochieng, 2021).

The lack of transparency, poor compensation mechanisms, and minimal involvement of affected communities weaken the effectiveness of environmental safeguards. These findings are in line with the critiques of environmental governance in Sub-Saharan Africa by Ite (2007), who argues that enforcement of environmental regulations is often undermined by political and economic interests.

4.4 Summary of the chapter

The study reveals a moderate level of awareness and confidence in the implementation of environmental protection policies among communities affected by oil and gas activities in Uganda, with an overall mean of 3.20 (SD = 1.08). Respondents generally believe that environmental laws are enforced (mean = 3.81) and that oil companies follow government guidelines (mean = 3.66). However, these views are contrasted by lower levels of awareness about specific environmental protection policies (mean = 3.02) and skepticism toward the actual conduct and effectiveness of Environmental Impact Assessments (EIAs) (mean = 2.86).

The lowest score was recorded on whether communities are informed about their environmental rights and policies (mean = 2.67), highlighting a significant gap in public engagement and access to information. This suggests that while policies and legal frameworks may be in place, community participation and transparency remain limited.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the summary of the findings of the main study, conclusions, recommendations arrived at and contribution to body of knowledge. It also gives suggestions for further research.

5.2 Summary of Findings

The study observed that average age of the respondents was 30-45; the oldest respondent had 65 years with the youngest respondent having 30years. The females were the most at 101(54.9%) with the females being the least at 83(45.1%) were male. The highest level of education for the most of the respondents was tertiary level at 84(45.7%), followed by Secondary holders at 48(26.1%), majority of the study respondents constituting 100(54.3%) were married.

5.2.1 The impact of oil and gas industry on agricultural ecosystems in the Albertine region.

The study findings indicate that oil and gas activities have had a moderate but concerning impact on agricultural ecosystems in Uganda's Albertine region. Communities report that agricultural productivity has been disrupted due to environmental degradation linked to oil exploration and production. Specifically, respondents observed a decline in soil fertility (mean = 3.97), which affects crop yields and long-term land usability. Deforestation (mean = 3.95) and air pollution (mean = 3.45) were also identified as major issues, contributing to habitat loss, altered weather patterns, and reduced farming efficiency.

In addition, access to clean water was reported as a growing challenge. Households indicated they struggle to access clean water (mean = 3.55), and that pollution of water sources near oil installations (mean = 3.09) has impacted irrigation and livestock farming. Concerns about food safety and contamination from industrial pollutants were also noted (mean = 2.82), raising alarm over potential health and market implications for local agricultural products.

The findings also highlight wildlife displacement (mean = 3.29), which affects ecosystem services such as pollination and pest control, further influencing agricultural productivity. Overall, the data suggests that oil and gas development is exerting significant pressure on agricultural ecosystems, with impacts on land use, water quality, biodiversity, and food systems. These trends underscore the urgent need for integrated land-use planning, environmental safeguards, and community-led mitigation efforts to protect agricultural livelihoods in oil-rich regions.

5.2.2 The extent of environmental degradation resulting from oil and gas activities in the Albertine Region.

The study findings reveal that oil and gas activities have contributed significantly to environmental degradation in the Albertine Region. Respondents expressed moderate to high levels of concern across various indicators of environmental health and ecosystem integrity. Key areas of degradation include deforestation (mean = 3.95) and declining soil fertility (mean = 3.97), both of which threaten land productivity and natural vegetation cover. These findings indicate that land clearing for oil infrastructure and heavy machinery operations are leading to loss of tree cover and degradation of arable soils.

Air and water pollution were also highlighted, with increased air pollution (mean = 3.45) linked to emissions from oil extraction equipment, and contaminated or unsafe water sources (mean = 3.09) affecting both human and animal consumption. Limited access to clean water (mean = 3.55) further underscores the impact on basic community needs and agricultural sustainability. Moreover, the study points to wildlife displacement (mean = 3.29), reflecting a disruption in biodiversity due to habitat fragmentation and noise pollution. These environmental stressors collectively threaten not only ecological balance but also the well-being and livelihoods of local communities dependent on natural resources. The findings indicate a noticeable extent of environmental degradation as perceived by residents, with relatively consistent agreement across most indicators. The high mean scores and standard deviations suggest both widespread impact and some variation in severity based on location and proximity to oil activities.

5.2.3 The effectiveness of existing environmental protection policies and mitigation strategies.

The findings indicate that while environmental protection policies and mitigation strategies exist in Uganda's oil and gas sector, their implementation and effectiveness are perceived as inconsistent by local communities in the Albertine region. The overall average mean score of 3.20 (SD = 1.08) reflects a moderate level of satisfaction and awareness, with key variations across policy dimensions.

Respondents expressed strong agreement that environmental laws are enforced (mean = 3.81) and that oil companies generally adhere to government environmental guidelines (mean = 3.66). These results suggest some confidence in regulatory frameworks and industry compliance at a formal level. However, concerns remain regarding transparency and public involvement. A relatively low mean score for community awareness of environmental rights and policies (mean = 2.67) indicates that many residents feel excluded from policy processes or lack access to essential environmental information. Similarly, perceptions of Environmental Impact Assessments (EIAs) (mean = 2.86) suggest skepticism about whether such assessments are conducted meaningfully or influence decision-making. The findings highlight a policy-practice gap: while environmental regulations are acknowledged, limited community engagement, poor dissemination of policy information, and inadequate follow-up on mitigation strategies reduce their effectiveness on the ground.

This underscores the need for stronger public participation mechanisms, enhanced environmental education, and more transparent implementation of mitigation measures to ensure that environmental governance in oil-rich areas is inclusive, accountable, and sustainable

5.4 Conclusion

This study set out to assess the impact of Uganda's oil and gas industry on ecosystem services and the living conditions of smallholder farmers in the Albertine Region. The findings reveal that while oil development presents significant economic potential for the country, it has also led to notable environmental degradation, including deforestation, soil infertility, water contamination, and air pollution.

These changes have disrupted key ecosystem services that are vital for small-scale farming communities, such as access to clean water, fertile land, and biodiversity. As a result, the livelihoods of farmers have been increasingly threatened by declining agricultural productivity, reduced access to natural resources, and weakened food security.

Furthermore, while environmental protection policies exist, their implementation remains inconsistent, and community participation in mitigation efforts is limited. The disconnect between policy frameworks and on-the-ground realities has amplified the vulnerability of rural populations.

In conclusion, without stronger environmental governance, transparent policy enforcement, and meaningful inclusion of local communities in oil-related decision-making processes, the long-term sustainability of both the environment and rural livelihoods in the Albertine Region remains at risk. A balance must be struck between resource extraction and ecological and social sustainability to ensure that oil wealth does not become a source of impoverishment for those closest to its origin.

5.5 Recommendation to the study

To address the adverse impacts of Uganda's oil and gas industry on ecosystem services and the living conditions of small-scale farmers, several key interventions are recommended.

The government, through agencies like the National Environment Management Authority (NEMA) and the Petroleum Authority of Uganda (PAU), should strengthen enforcement of environmental regulations, particularly around land use, water protection, and biodiversity conservation. Environmental Impact Assessments (EIAs) must be more participatory and transparent, ensuring that local farmers and community members are actively involved in decision-making processes that affect their livelihoods.

The study recommends that a restoration programs should be implemented in degraded areas such as reforestation, soil rehabilitation, and cleanup of contaminated water sources to recover lost ecosystem services that support agriculture.

It is also vital to develop alternative livelihood programs and compensation schemes for smallholder farmers who lose access to land or whose yields are affected by pollution or displacement. These should be timely, fair, and based on community-defined priorities.

The study recommends that environmental education and awareness campaigns should be rolled out at the grassroots level to empower communities with knowledge about their environmental rights, sustainable land management, and how to hold oil companies accountable.

A holistic and inclusive approach will help ensure that oil development does not come at the expense of ecological integrity or the survival of rural farming communities. cooperatives, the Ministry of Cooperative Development should make sure there are fundamental academic and experience requirements that management committees must achieve.

Additionally, incidents of coffee theft must be halted. The process of hiring new employees must abide by moral standards and productivity goals. To ensure the profitability of the business and effective service delivery, cooperative societies need to be reorganized and administered like corporate organizations with competent management structures.

The government and stakeholders must look for alternate sources of the market that offer better coffee pricing in order to ensure a continued interest in coffee farming. This can assist in addressing issues with coffee price volatility brought on by reliance on conventional marketplaces.

The government must boost local consumption through campaigns and promote the value addition of coffee by investing in agro processing to make sure it is accessible to locals and available in a variety of forms in order to secure the sustainability of the coffee market. By providing employment for the women and young people who are underrepresented in the coffee value chain, this can help with issues of inequality.

The county government created a farm input subsidy scheme and ensures that farmers receive their inputs on time in order to guarantee a high return on their produce. This will be accomplished through upgrading the transportation and communication systems. The personnel of the ministry of agriculture should train farmers to ensure proper input usage. The factory management should install crop management surveillance systems to guarantee compliance with the requirement.

To ensure efficiency, cooperative societies must spend in mechanizing activities and upgrading factory equipment, such as dyeing tables and service automation.

In order to help farmers understand market demands for coffee and current market prices, the government should create legislation that will enable more farmer participation in the coffee value chain. Key players' roles need to be reviewed.

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APPENDICES: APPENDIX I

INTRODUCTORY LETTER FOR THE RESPONDENTS

Dear Sir/ Madam,

Greetings!

My name is **Iremeera Hope** am conducting a bachelor's of Science of Oil and Gas of Uganda Christian University. Part of the requirements for the award a dissertation. My study is entitled,

"***assess the impact of Uganda's Oil and Gas Industry on the ecosystem services and living conditions of small farmers in the Albertine Region"***

Within this context, may I request you to participate in this study by answering the questionnaires? Kindly do not leave any option unanswered. Any data you will provide shall be for academic purposes only and no information of such kind shall be disclosed to others.

Thanking you in advance for your cooperation.

Yours faithfully,

APPENDIX II: QUESTIONNAIRE

Please tick in the appropriate box and also fill in the blank spaces provided for those questions where elaborate answers are required. You are requested to complete this questionnaire as honestly and objectively as possible. Use the space at the back of this questionnaire if you need more space for your responses.

SECTION A: SOCIO-DEMOGRAPHICS

1. Gender of the respondent

Male [ ]

Female [ ]

3. Indicate your Age group

25 years or less [ ]

26-35 years [ ]

36-45 years [ ]

46-55 years [ ]

With 55 years and above [ ]

4. Education Level

Diploma [ ]

Degree [ ]

Masters [ ]

PhD [ ]

None of the above [ ]

5. How many years have you worked in oil and gas industry?

2 – 4 years [ ]

5 - 7 years [ ]

8 - 10 years [ ]

11 and above [ ]

SECTION B: THE IMPACT OF OIL AND GAS INDUSTRY ON AGRICULTURAL ECOSYSTEMS IN THE ALBERTINE REGION.

This section analyses, presents and interprets and discusses the findings for the second objective of the study: the impact of oil and gas industry on agricultural ecosystems in the Albertine region.

	Description	**Response**				
		Strongly agree	Agree	Not sure	Disagree	Strongly disagree
1	Oil and gas exploration/production in the Albertine region impacted agricultural activities in your area					
2	There is air pollution, wildlife displacement, deforestation noticed since the start of oil and gas activities					
3	Access to farmland or grazing land changed due to oil and gas developments					
4	There concerns about food safety or contamination due to industrial pollutants					
5	Water availability for irrigation or livestock been affected by oil and gas activities					

SECTION C: THE EXTENT OF ENVIRONMENTAL DEGRADATION RESULTING FROM OIL AND GAS ACTIVITIES IN THE ALBERTINE REGION.

This section analyses, presents and interprets and discusses the findings for the second objective of the study: extent of environmental degradation resulting from oil and gas activities in the Albertine region.

Statement	**1**	**2**	**3**	**4**	**5**
Oil and gas activities have led to deforestation in this area.	□	□	□	□	□
Water sources near oil facilities are polluted or unsafe.	□	□	□	□	□
There has been an increase in air pollution due to oil extraction.	□	□	□	□	□
Soil fertility has declined in areas near oil developments.	□	□	□	□	□
Wildlife populations have decreased since oil activities began.	□	□	□	□	□
My household struggles to access clean water due to oil activities.					
Traditional medicinal plants are harder to find					

SECTION D: TO ANALYZE THE EFFECTIVENESS OF EXISTING ENVIRONMENTAL PROTECTION POLICIES AND MITIGATION STRATEGIES.

This section analyses, presents and interprets and discusses the findings for the second objective of the study: analyze the effectiveness of existing environmental protection policies and mitigation strategies.

Statement	**1**	**2**	**3**	**4**	**5**
I am aware of environmental protection policies related to oil and gas.	□	□	□	□	□
Environmental Impact Assessments (EIAs) are conducted before oil projects.	□	□	□	□	□
Oil companies follow environmental guidelines set by the government.	□	□	□	□	□
Environmental laws are consistently enforced in oil-producing regions.	□	□	□	□	□
Communities are informed about their environmental rights and policies.	□	□	□	□	□

APPENDIX 1V

DETERMINING THE SAMPLE SIZE OF A SPECIFIC POPULATION

N	*S*	*N*	*S*	*N*	*S*
10	10	220	140	1200	291
15	14	230	144	1300	297
20	19	240	148	1400	302
25	24	250	152	1500	306
30	28	260	155	1600	310
35	32	270	159	1700	313
40	36	280	162	1800	317
45	40	290	165	1900	320
50	44	300	169	2000	322
55	48	320	175	2200	327
60	52	340	181	2400	331
65	56	360	186	2600	335
70	59	380	191	2800	338
75	63	400	196	3000	341
80	66	420	201	3500	346
85	70	440	205	4000	351
90	73	460	210	4500	354
95	76	480	214	5000	357
100	80	500	217	6000	361
110	86	550	226	7000	364
120	92	600	234	8000	367
130	97	650	242	9000	368
140	103	700	248	10000	370
150	108	750	254	15000	375
160	113	800	260	20000	377
170	118	850	265	30000	379
180	123	900	269	40000	380
190	127	950	274	50000	381
200	132	1000	278	75000	382
210	136	1100	285	1000000	384