ANALYSING THE EFFECTS OF OIL AND GAS EXPLORATION ACTIVITIES ON PEOPLE'S LIVELIHOODS IN THE ALBERTINE GRABEN IN WESTERN UGANDA

BY

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DECLARATION

I, declare that this dissertation entitled “Effects of Oil and Gas Exploration Activities on People’s Livelihoods in Butiaba Sub County, Buliisa District” is my original piece of work and has never been presented to any University or higher institution of learning for any academic award.

Signed……... Date……

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APPROVAL

I certify that this research report titled, “Effects of Oil and Gas Exploration Activities on People’s Livelihoods in Butiaba Sub County, Buliisa District” has been compiled under our guidance and supervision and is now ready for submission with my approval.

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DEDICATION

This work is dedicated to my beloved husband; Mr. Bukuba Obadia and our dear children; Jett Jethro Ainomugisha and Jesse Jetheth Ainobusigye who stood with me during this study program.

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ACRONYMS

BDLG:	Buliisa District Local Government
CNOOC:	Chinese National Offshore Oil Corporation
CSOs:	Civil Society Organizations
CSR:	Corporate Social Responsibility
CV:	Content Validity
CVI:	Content Validity Index
DDP:	District Development Plan
DPR:	Department of Petroleum Resources
DRC:	Democratic Republic of Congo
ESA:	Environmental Sensitivity Atlas
MEMD:	Ministry of Energy and Mineral Development
MRA:	Multiple Response Analysis
NAPE:	National Association of Professional Environmentalists
NATOIL:	Uganda National Oil Company
NEMA:	National Environmental Management Authority
NESAQ:	National Environmental Standards Air Quality
NOGP:	National Oil and Gas Policy
NPV:	Net Present Value
PAU:	Petroleum Authority of Uganda
PCA:	Multiple Correspondence Analysis
PEAP:	Poverty Eradication Action Plan
PEPD:	Petroleum Exploration and Production Department

SAQs:	Self-Administered Questioners
SPSS:	Statistical Packages for Social Scientist
TOLSIP:	Tullow Oil Link School Improvement Project
Total E & P:	Total Exploration and Production
UBOS:	Uganda National Bureau of Statistics
UDHR:	Universal Declaration of Human Rights
UFA:	Uganda Forestry Authority
UGS:	Uganda Shillings
UIA:	Uganda Investment Authority
UN:	United Nations
UWA:	Uganda Wildlife Authority

ABSTRACT

This study was conducted to establish the effects of oil and gas exploration activities on people's livelihoods in Butiaba Sub County, Buliisa District in the Eastern shores of Lake Albert, western Uganda. Across sectional survey design was adopted to realise the study objectives, using both quantitative and qualitative approaches. All the 4 parishes in Butiaba Sub County were included in the study, picking 5 villages from each. A sample of 310 respondents comprising of 297 household heads and 13 key informants were selected from the study area using simple random and purposive sampling strategies. Questionnaires were administered to household heads while interviews were held with the key informants comprising of oil and gas companies' employees, District officials, and local leaders. Field data was collected through direct field observations and documentation. Questionnaire responses were organised and coded to generate quantitative data, which were analysed using Multiple Response Analysis (MRA) with the help of SPSS version 23.0 and the results reported as frequencies and percentages. Qualitative data obtained during key informant interviews underwent content analysis and the results were reported in form of narratives. The study found out that surveying was the most dominant oil and gas exploration activity followed by mapping, oil well drilling, site clearance, seismic probing, construction works and land acquisition which was the least dominant among all the activities. Commissioning of oil and gas exploration activities was found to have had both positive and negative effects on people's livelihoods. Positively there was increased engagement in livelihood activities such as trade and commerce (by 10.3%), casual employment (by 26.2%) formal employment (by 84) and sand mining (by 8.2%). Further positive outcomes included increased access to food and infrastructural developments. Negatively, there was decreased engagement in livelihood activities such as crop farming (by -32.1%), livestock farming (by -26%) and fishing (by -45%). Other negative outcomes included increase in land conflicts and displacement of people thus affecting their production. To deal with the negative effects of oil and gas exploration activities, tree planting, resettlement & compensation and exploration sites restoration were the main mitigation measures undertaken by oil and gas companies, the community and NGOs in Butiaba Sub County. From the study, a conclusion is reached that commissioning of oil and gas exploration activities in the Albertine region has brought about a number of positive effects on people's livelihood sources leading to job creation, market expansion, increase in land value and development of social amenities from the exploration support infrastructure. However, the activities have also affected people's livelihood sources negatively. An integrated stakeholder involvement is suggested for managing the effects of oil and gas exploration activities in Buliisa and future research to focus on assessing effects of oil and gas exploration on land resources from which people derive their livelihoods, using remote sensing and GIS.

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

With increasing oil and gas prices worldwide, regions endowed with this finite and non-renewable resource continue to reap the benefits of the lucrative businesses associated with the resource development. Countries under this category include Iran, USA, Ukraine and others (Ascher, 1999). As such, other countries continue to trace for existence of this non-metallic mineral beneath the surface and water. This explains the time-to-time discoveries being made including those on land with unbearable conditions such as Antarctica and Greenland (Wenrui et al., 2013; Evans, 2009).

In Africa, considerable oil and gas resources are believed to exist thus providing the potential to spar growth of the continent (Demierre et al., 2015). However, 38 out of 53 African countries still depend on oil imports from elsewhere because of limited exploration and exploitation of this resource (Jiang, 2009). Oil fields only exist in Libya, Nigeria, Angola and Algeria (African Development Bank and the African Union, 2009).

In Uganda, oil and gas exploration in dates back to the early 1920s, when oil seepages were first reported, but intensive exploration works commenced in the 1980s after changes in colonial policies (Ericson, 2014; Manyak, 2015). Aeromagnetic data in 1983 confirmed the existence of sedimentary basins in the Albertine Graben (Manyak, 2015). The enactment of the Petroleum Exploration and Production Act in 1985 preceded that led to the licensing of international companies to undertake seismic surveys and drilling. In the first five years of this century, there

was increased licensing and exploration activity. In 2006, Uganda confirmed the existence of commercially viable oil deposits in the Albertine Graben, explored by Australia's Hardman Resources and UK's Tullow Oil. This set-in motion the scramble to explore and extract oil in Western Uganda (Muyombwa et al., 2014). Today, the Albertine Graben is divided into several exploration areas out of which the government of Uganda has licensed five, both onshore and offshore in and around Lake Albert, to oil exploration companies (Baineomugisha et al., 2006).

According to the Ministry of Energy and Mineral Development (MEMD, 2015), 66 exploration and appraisal wells have been sunk, of which 59 were successful. It is estimated that 6.5 billion barrels of oil have been discovered, of which 1.5 to 2 billion barrels are recoverable (MEMD, 2015). It is postulated that Uganda's oil deposits will be the largest onshore discovery made in sub-Saharan Africa in at least 20 years. The Ugandan reserves are the fourth largest in Africa following Libya, Nigeria, Angola and Algeria (Ojambo and Bakhsh, 2013). Some of the largest oil fields are located in the Kaiso-Tonya area in Hoima District. This area has been selected to be the location of Uganda's only oil refinery (Ladu, 2013). The strategy is to build a refinery that meets the petroleum products needs of Uganda and its regional neighbours and to export the rest of crude oil production via a pipeline to Kenya's Port of Lamu (Ouga, 2014). This has changed now as Uganda chose the Tanzanian route over Kenyan (MEMD, 2016).

Oil is potentially present in four basins in Uganda; but the main focus of oil exploration in this study was the Albertine Graben, which is about 500 km long, 45 km wide, and stretches along Uganda's Western border with the Democratic Republic of Congo (DRC), from Lake Edward up through Lake Albert to the North, bordering South Sudan (Kyomugasho, 2016). In the late 1990s, several small oil companies began exploring oil in Uganda and in 2006; oil was

discovered in the Albertine Graben region, in blocks that were jointly licensed to the Anglo-Canadian company Heritage Oil and the Anglo-Irish company, Tullow Oil plc. In the first half of 2010, Heritage sold their stake to Tullow for US$ 1.5 billion, after which Tullow brought in investment from bigger players. Hence Tullow farmed down two-thirds of its oil interests to Total SA (French), operating in Uganda as Total Exploration and Production (Total E&P); and China National Offshore Oil Corporation (CNOOC), with each agreeing to pay US$ 1.45 billion to split the area three ways (Wass and Musiime, 2013). The farm down followed the signing of Production Sharing Agreements (PSAs) with the Government of Uganda.

According to Uganda Land Alliance (2011) and the Secretariat Convention on Biological Diversity (2010), most people in Uganda depend on subsistence agriculture dominated by smallholder formers. These grow mainly food crops like bananas, cassava, maize and legumes, alongside coffee, cotton, tobacco and tea (Kwiringira et al., 2019). The peasants also keep livestock such as cattle, sheep, goats, and pigs for their livelihoods. Grazing is done communally on privately owned land or among individual persons. Fishing is another prime source of livelihood for the people of Butiaba Sub County in Buliisa District (Kwiringira et al., 2019). Several studies show that fishing across the Albertine region contributes to 18.7% of the total national fish catch and 15% is always from Lake Albert only. Fish Processing Industry is an immense source of livelihood as it provides employment opportunities to many people in Butiaba Sub County (Kyomugasho, 2016). Prior to oil exploration, access to land and water from the lake was not restricted. Women had easy access to forests and bushes to get traditional medicine and firewood used for cooking (Wan et al., 2011). Like other activities such as crop farming and animal keeping, women could get income from selling herbal medicine to sustain their lives. Vokes (2012) revealed that there is a negative link between oil and gas exploration

activities, and livelihoods. Aigbedion and Lyayi (2007) also gave an example of the Delta States of Nigeria where oil spillage of differing intensity forced the pipelines to burst and its impacts were severe on both livelihoods and the environment.

Kadafa and Ayuba (2012) noted that oil and gas exploration affect the environment by exposing oil leakages and spills, gas flaring and deforestation to create access routes to new areas, which are occupied by the people. Natural forests, which have been sources of medicinal herbs to most rural women, have been destroyed hence making it difficult for some women to earn income. Men who use forests as hunting grounds and communal grazing areas are also affected in the aftermath of oil and gas exploration activities (Kyomugasho, 2016). Pollution caused by oil exploration destroys livelihoods in local communities hence limiting the present and future generations to make a living on their land (Thompson, 2011; Ifunanya, 2010). According to Ifunanya (2010), communities formerly engaged in growing cassava, green pepper, rice, yams and vegetables normally face the negative impacts of oil and gas exploration. Explosions from pipelines also result in injuries and some cause deaths in the local communities.

During oil and gas exploration activities, the economies of countries where this mineral resource my benefit but also experience negative effects in terms of peoples' livelihoods (Kadafa and Ayuba, 2012). Activities such as seismic data collection, drilling and extraction of oil and gas samples affect human beings both directly and indirectly (Dowokpor, 2015; Ayuba, 2012; Thompson, 2011; Ifunoya, 2010; Aigbedion and Iyayi, 2007). Rivers in the Niger Delta, which is the largest wetland in Africa and among the ten most important wetlands and marine ecosystems in the world, have been contaminated and its biodiversity destroyed due to oil leakage, making the area an ecological wasteland (Aigbedion and Iyayi, 2007). Udoinyang and Igboekwe (2011)

argue that emission and accidental spills of chemicals from oil industry pollutes lake water, seismic activities scare off fish and they disappear into deeper waters. Worse still, the on-shore drilling of oil and gas calls for clearing of forests, leading to disappearance of hunting grounds, extinction of important tree species and herbs that have been important to people's livelihoods (de Graft et al., 2010).

With the recent commissioning of large-scale oil and gas exploration activities in Uganda, it is anticipated that the effects of oil and gas exploration witnessed in Ghana, Nigeria and elsewhere are likely to emerge in here to (Hansen et al., 2016). However, this information is limited in Uganda. The situation therefore warrantee studies to be conducted in specific areas of oil and gas exploration in Uganda on how the activities have affected people's livelihoods. It is against such a background that this study was designed to assess effects of oil and gas exploration activities on the livelihoods of people in Butiaba Sub County in Buliisa District.

1.2 Statement of the Problem

In the Albertine oil region and Butiaba Sub County particularly where renewed large-scale oil and gas exploration is taking place, communities largely depend on fishing, hunting and subsistence farming as their livelihood activities all of which are facilitated by biodiversity resources (Gwayaka, 2018; Sserwanga, 2018). In the event of oil and gas discovery and related activities such as drilling, surveying, mapping, production and transportation, these livelihood activities are likely to be affected as it has been the case with most African countries where oil and gas exploration has taken place (African Development Bank and the African Union, 2009). However, different exploration activities and techniques are employed in different localities, which can account for differences in the emerging effects too. According to Louis (2015), a shift

in government policy from wild life conservation to oil and gas exploration, whose intension is to offer Ugandans with economic and social benefits could impart devastating pressure on soils and ecological units of flora and fauna, hence affecting people's livelihoods both directly and indirectly. To mitigate the effects of oil and gas exploration in the Albertine region, the government of Uganda through its agencies; Uganda Wildlife Authority (UWA), Uganda Investment Authority (UIA), Uganda Forestry Authority (UFA), National Environment Management Authority (NEMA) put in place policies to ensure management of the sector (Gwayaka, 2018).

Whereas many researchers have scrutinized the impact of oil and gas industry in the world (Dowokpor, 2015; Ayuba, 2012; Thompson, 2011; Ifunoya, 2010; Aigbedion and Iyayi, 2007), information is limited in the Albertine region especially in affected villages of Walukuba upper, Booma upper, Bugoigo upper, Nyamukuta, Tugo-Mili, Kisomere and Kiwambula. There is limited information on the major oil and gas exploration activities taking place in Butiaba Sub County, their effects on people's livelihoods and whether or not various stakeholders provide for mitigation of the adverse effects. The current study was therefore conducted to provide such information, which is necessary for oil and gas policy review before the sector enters into actual production stage.

1.3 Study Objectives and Research Questions

1.3.1 General Objective

The main objective of the study was to ascertain the oil and gas exploration activities in Buliisa District in the Albertine region of Uganda and their effect on people's livelihoods.

1.3.2 Specific Objectives

This research was guided by the following objectives.

i. To characterise the dominant oil and gas exploration activities taking place in Buliisa District.
ii. To examine the effects of oil and gas exploration activities on people's livelihoods in Butiaba Sub County.
iii. To analyze the mitigation measures put in place by oil & gas companies, government and Non-Governmental organizations against the adverse effects of oil and gas exploration activities on people's livelihoods in Butiaba Sub County.

1.3.3 Research Questions

This research was guided by the following questions.

i. What are the major oil and gas exploration activities taking place in Butiaba Sub County?
ii. What are the dominant livelihood sources before and after commissioning of oil and gas exploration activities in Butiaba Sub County?
iii. How have oil and gas exploration activities affected people's livelihoods in Butiaba Sub County?
iv. Which measures have oil/gas companies, government and Non-Governmental organizations put in place to mitigate the impacts of oil, and gas exploration activities in Butiaba Sub County have put in place?

1.4 Significance of the Study

The findings of this study will be of paramount importance to various organisations both private and state operated here in Uganda in a number of ways.

Findings on the dominant oil and gas exploration activities being undertaken by oil and gas companies in Butiaba Sub County and the mitigation measures against the negative effects of such activities will enable the line ministries to ascertain compliance or non-compliance with the oil and gas sector legal and policy frameworks. This will enable review and/ or institution of new policies and regulations to ensure mitigation of the negative effects of the sector on people's livelihoods.

The study findings will indicate to the oil and gas exploration companies operating in the Albertine region on what the communities expect to gain from their companies. This will inform company policy on Corporate Social Responsibility in future to develop areas with the resource to avoid the nemesis of the oil curse as has been the case with some areas in Africa suffering from their effects.

Findings from the current study will contribute to the existing body of knowledge on oil and gas sector effects on livelihoods here in Uganda where the sector is relatively new. The findings will therefore act as reference material for future researchers in oil rich areas.

1.5 Scope of the Study

1.5.1 Geographical Scope

The study was carried out in Butiaba Sub County found in Buliisa District**.** Butiaba Sub County is located on the Eastern shores of Lake Albert in the Albertine region and originally found with traces of hydrocarbon deposits in the Albertine region. The Sub County has physical presence of oil and gas exploration infrastructure and with limited information of how the activities have affected people's livelihoods.

1.5.2 Content Scope

The study set out to establish the effects of oil and gas exploration activities on the livelihoods of the people. It specifically focused on the ongoing oil and gas exploration activities in the area, the livelihoods before and after commissioning of oil and gas exploration and existing mitigation measures devised against the negative effects of oil and gas exploration activities on people's livelihoods. Thus, social economic data of the variables under the study were collected.

1.5.3 Time Scope

The study covers a period between 2006 and 2019; this period was selected because it was within the time-frame within which Buliisa District experienced increased oil and gas exploration activities. However, field data collection was conducted within a period of two months (October – November 2018).

1.6 The Conceptual Framework

The conceptual framework demonstrates the relationship between independent and dependent variables of the study. It mainly highlights the relationship between oil and gas exploration activities and people's livelihoods in Butiaba Sub County (Figure 1.1).

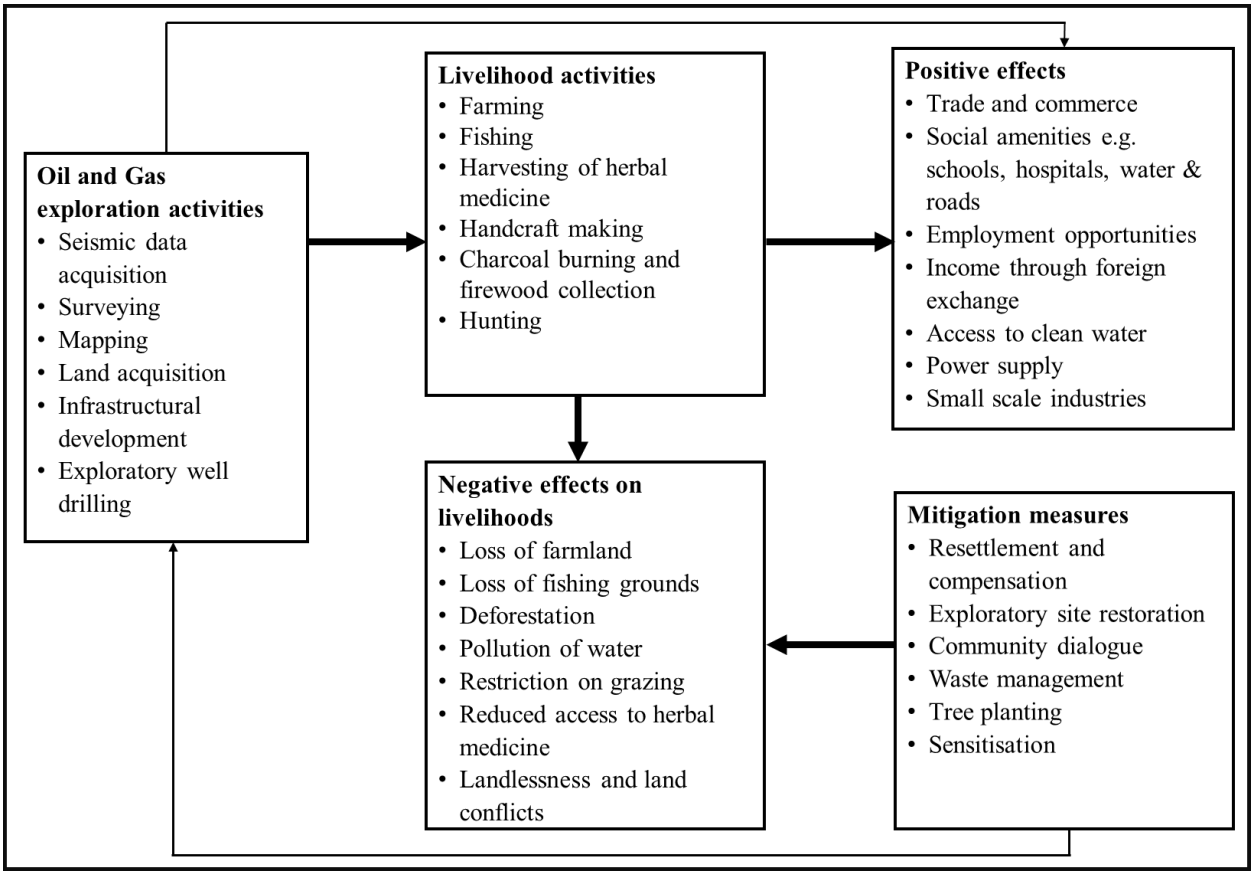

Figure 1.1: Conceptual framework by the author

From Figure 1.1, oil and gas exploration and related activities is conceptualised as the independent variable that affects people's livelihoods in the community of Butiaba Sub County (as the dependent variable). Components of people's livelihoods as the dependent variable include activities such as fishing, hunting, farming and wood fuel harvesting. It is hypothesised

that undertaking oil and gas exploration activities such as mapping, surveying, seismic data acquisition and exploratory well drilling, is associated with both negative and positive effects on people's livelihoods. However, without mitigation measures, the effects on livelihoods are largely negative since oil and gas exploration takes place on the land from which the community undertakes livelihood activities. With mitigation measures in place, the negative effects of oil and gas exploration activities are minimised while the positive benefits are enhanced hence improved livelihoods. The mitigation measures can be undertaken by companies involved in oil and gas explorations, government, local community or non-government organisation

1.8 Definitions of Key Terms

Oil and Gas: is a type of fuel for example diesel, petroleum, kerosene etc.

Oil and Gas Exploration: is the search by geologists for deposits of hydrocarbons; particularly petroleum and natural gas beneath the earth.

Hydrocarbons: are organic compounds of hydrogen and carbon, which are the chief components of petroleum and natural gas

Oil Well Pad: is the area that has been cleared for a drilling rig to work on a plot of land designated for natural gas or oil extraction. The pad is constructed by clearing all trees and other vegetation as well as other obstacles to allow for engineering works to take place.

Livelihoods: is a set of activities, involving securing water, food, medicine, shelter among others; and capacity to acquire above necessities working either individually or in groups using

endowments for meeting requirements of the self and his/her household on a sustainable basis with dignity.

Mitigation: is the action of reducing the severity, seriousness or painfulness of oil and gas exploration activities. The measures that are being put in place to reduce the negative impacts of oil and gas exploration activities.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter presents findings by various scholars on oil and gas exploration activities and how these affect the peoples' livelihoods. It includes a scrutiny of various documents containing findings from studies conducted in different parts of the world including Uganda. The review is done following the objectives of the study.

2.2 Oil and Gas Exploration Activities

The E&P/UNEP (1997) report indicates that oil and gas industry comprise of the upstream part which deals with exploration and production and the downstream, which deals with refining and processing of crude oil and gas products, their distribution and marketing. The document further shows that in order to appreciate the origins of the potential impacts of oil development upon the environment, it is important to understand the activities involved. It identifies the exploration activities to include exploration surveying; exploration drilling; appraisal; development and production; and decommissioning and rehabilitation.

According to Ukoli (2005) and Briggs (1996), oil and gas exploration activities involve surveying, exploratory well drilling and seismic acquisition of land. Surveying and mapping surface and subsurface geologic features are to identify areas of oil and gas deposits. Collecting seismic data is to evaluate economically producible quantities of oil and gas and identifying the best location to drill exploratory wells as well as testing the formation. Engineers determine the possibility of accessing oil and its quality in these worldwide activities. There is always drilling

and delineation of wells when determining where oil and gas is, to measure the area and thickness of the oil and gas bearing reservoirs.

Omorede (2014) posits that exploration is a highly sophisticated technology that involves a gravity of magnetic survey, passive seismic or regional seismic reflection survey that works on the principle of the time it takes for reflected sound waves to travel through matter (rock) of varying densities and using the process of depth conversion to create profile of the substructure. To Cordaid (2016), oil and gas exploration includes use of aerial survey where an airplane or helicopter with special equipment is flown an area suspected to have deposits to collect information about the type of rock underground. It also includes seismic data collection where a technology called seismic is used to build the image or picture of what lies underground. Further, exploration drilling involves the drilling exploration well is done after seismic survey. The procedure of drilling wells require consent from Government which assesses whether the drilling activities can have any effect on the environment or not and that the local communities have to be communicated as well (Cordaid, 2016).

Exploration related activities which include site preparation where a wide area about 2 times a football pitch is cleared for an oil well pad, and that the oil pad is always fenced off to prevent illegal entry, protect the expensive equipment and keep people and livestock at safe distance (European Commission, 2019). There is also another process or activity, which involves the movement of the rigs and equipment for drilling which require construction of access roads and movement of 100 – 150 trucks and truckloads that usually inconvenience the community. It recommends that there is need community awareness on road safety.

Devold (2013) asserts that in the past, surface features such as tar seeps or gas pockmarks provided initial clues to the location of shallow hydrocarbon deposits, but today, a series of surveys, starting with broad geological mapping through increasingly advanced methods such as passive seismic, reflective seismic, magnetic and gravity surveys give data to sophisticated analysis tools that identify potential hydrocarbon bearing rock as "prospects." Azzouz (2008) states that logging and coring wells to measure the permeability, porosity and other properties of the geologic formation (s) are carried out during gas and oil exploration. He further asserts that well completion is sometimes considered first stage of drilling or development phase that normally affect the environment and terrestrial lives.

The studies cited above indicate that oil and gas exploration involve varying activities which depend on the geographic location, the level of technology and technical expertise available, the time frame among other factors. Explorations for oil and gas resources in Butiaba Sub County were officially commissioned over two decades ago and since then, the activities have been ongoing. However, limited documentation of the information on the specific exploration activities is available and yet understanding these would help to understand the likely effects on the environment and thus prescribe apt mitigation measures. The present study was therefore undertaken to profile the major oil and exploration activities that oil and gas companies are undertaking in Butiaba Sub County.

2.3 Effects of Oil and Gas Exploration Activities on People's Livelihoods

Livelihood refers to a set of activities that involve securing water, food, medicine, shelter; and the capacity to acquire the above necessities by individuals, a group or community using endowments for meeting requirements of people's households on a sustainable basis with dignity

(Ncube, 2012). The activities are usually carried out repeatedly to maximize an angler's livelihood that depends on the fishing and availability of fish in waters and a farmer available on land.

Cordaid (2016) notes that land and water are among the most important resources for communities, which don't only provide a place to live and source of livelihood, but for many communities, they are also directly related to their culture and identity. It further indicates that oil and gas or mining projects will always require access to land and water for example, for drilling sites, mine, camps for housing workers and equipment as well as access roads.

According to the 20 years of NAPE's environmental advocacy in Uganda (2016) document, land constitutes the main asset from which people or communities are able to derive their livelihood and that land represents a very valuable economic asset source of identity and culture. The document further states that in Uganda, many investments have resulted in dispossession, deception, violation of human rights, and destruction of livelihoods. It continues to note that land in rural areas comes under multiple pressure because of large-scale commercial farming, and mineral resource extraction.

Considerable evidence from oil producing countries such as Nigeria, Gabon, Angola, Sudan, Chad and others in Africa clearly indicate that oil is a resource of both great opportunity and peril (Boohene, 2011). It is an opportunity because it brings huge revenue for the country's economic development indicated by social services such as schools, hospitals and roads. On the other hand, it is a problem when the revenue is misused hence causing conflicts. Uganda is one of the African countries that have been infested with corrupt officers; yet according to Boohene (2011) indicates that countries whose officers are corrupt cannot receive anticipated benefits

from oil and gas exploration. This is due to the fact that multinational companies which might have led to development become insolvent to serve the interest of the business entrepreneurs so grassroots people remain poor.

Ofuoku, Emuh, and Agbogidi (2008) studied the social impact of oil production on smallholder farmers in oil-producing communities of the Central zone of Delta State, Nigeria. However, they were rather interested in environmental problems experienced in the communities. Using data collected from a sample of 120 respondents with the use of questionnaires, they identified soil erosion, noise pollution, bush burning, land degradation/pollution, water pollution, air pollution, massive deforestation and acid rain as the major environmental problems experienced in the study area.

Studies conducted from West African countries by Olaniyi (2011), Jike (2010) and Fiorella et al. (2015) show that one of the social-economic effects of oil exploration to the nearby communities are on cultural practices, specifically ways in which cultural practices are rendered problematic in the face of changes resulting from the discovery of oil. For example, Jike (2010) found that most men in Mali and Ghana did not wish the intercourse between foreigners and the African women. However, the African women from both countries found sexual intercourse with the company workers lucrative because African men could not provide such amount of money.

Besides, it was found out that oil and gas exploration lead to the destruction of structures that once provided livelihoods for women in oil- producing communities, which puts an undue burden on women in these communities forcing them to turn to commercial sex (Olaniyi, 2011; Jike 2010; Fiorella et al., 2015).

In relation to the above, Obi (2001) noted that oil exploration leads to decline in farming and fishing as viable economic activities, it increases propensity for women to choose commercial sex work for income generating purposes. Commercial sex brings disastrous consequences to women's livelihood. This is because women are usually the most gender involved in agriculture as the source of income. The influx of foreign oil workers who are often paid large sums of money as expatriates makes the profession of commercial sex work potentially more lucrative in such communities. In Nigeria for example, small girls from Lagos and other parts of Nigeria found the activity lucrative for every day and night with the white men and staff (Olaniya et al., 2015). According to Olaniya et al. (2015), the effects of such sexual intercourse on women are many starting with the unwanted or unplanned pregnancies, abortion and death. These have been witnessed in Nigeria in the delta region despite efforts by the women activists to intervene.

Boohene (2011) gives more examples in Ghana and Kenya respectively, that commercial sex work was not a new invention but increased in the due course of oil and gas exploration. With the emergence and spread of potentially deadly sexually transmitted infectious diseases such as HIV/AIDS, women still have very little ability to negotiate safer sexual practices. Be it as commercial sex work, women are more at risk for sexually transmitted infections including HIV/AIDS or teenage mothers who are left to care for children all on their own (Jike et al., 2010). This study therefore established the extent to which such issues have been happening in Butiaba Sub County since gas exploration started in the region by foreign companies. The study sought to establish whether such issues have been happening in Butiaba Sub County, to what magnitude and how can it be ameliorated since gas exploration started in that region by foreign companies, According to the E&P/UNEP (1997) document, oil and gas exploration and production operations have the potential for a variety of impacts on the environment and that the

impacts depend upon the stage of the process, size and complexity of the project; the nature and sensitivity of the surrounding environment and the effectiveness of planning, pollution, mitigation and control techniques.

Regarding human, socio-economic and cultural impacts, the E&P/UNEP (1997) document, indicates that the exploration and production operations are likely to induce economic, social and cultural changes and the extent of these changes is especially important to local groups, particularly indigenous people who may have their traditional lifestyle affected. In this, the document further notes the effects may include land use patterns such as agriculture, fishing, logging, and hunting, as direct consequences through land take exclusion and secondary consequence by providing new access route, leading to unplanned settlement and exploitation of resources.

The document Cordaid (2016) notes that the oil drilling and testing the well process during exploration in which the establishment of the amount of oil and how fast it will flow is done involves the process of burning which creates a thick smoke, thus affecting the environment.

Related to the above, Omorede (2016) states that oil resource exploitation, which involves various chemical and seismic wave generations, is a major source of environmental degradation, particularly through liquid discharges and oil spills as well as gas flaring. He further contends that petroleum consists of complex mixtures of aliphatic, alicyclic and aromatic hydrocarbons may detrimental to the atmosphere when released during exploration. In his foreword to the document “when oil, gas or mining arrives in your area” Hetty Burgman notes that oil, gas, and mining projects, given their scale, intensity and duration have a profound impact on local communities, their health, safety and environment; economic livelihoods and social relations.

In cordaid (2016), it is further indicated that some impacts of the extractive industry can be positive such as employment and business opportunities; access to housing, health care and others, although these are not guaranteed. It is also noted that potential negative impacts resulting from extractive projects could include the degradation of the environment and impacts on the local culture and ways of life, which could have long lasting impacts on communities (Ogwang & Vanclay, 2019). Cordaid 2016) categorises the negative impacts into health related, cultural and traditional life and community related impacts. Health impacts emerge where there is increased prevalence of HIV/AIDS arising from influx of people as well as increased illness because of land, water and air pollution. Cultural and traditional life related issues are those impacts related to reduced land access and loss of ability to hunt, gather or live traditional ways of life as well as damage of sites of cultural significance. Community impacts are those emerging from increased tension due to uneven distribution of resources as well as increased conflict over resources. Other economic impacts include higher cost of local goods and housing; loss or change of traditional livelihoods; reduced food or fish production due to environmental degradation or limited access during seismic survey activities as well as environmental impacts, which includes soil and water degradation; noise and air pollution; loss of ecosystem; and impacts on wild life habitats.

On the positive impacts, Cordaid (2016) identifies these as establishment of health care facilities, improved health awareness as well as capacity of health care workers as health-related positive impacts; increased access to services including schools, water and sanitation, as community based positive impacts and direct employment for community members and indirect employment due to economic growth and contracting business opportunities.

Regarding the impacts on land, Cordaid (2016) continues to indicate that oil and gas as well as other mining projects often lead to displacement of people living in the proposed project area. Two forms of displacements are noted, physical displacement, which occurs when community members are forced to leave their land or homes; and economic displacement, which occurs when community members are forced to lose assets or access to assets such as farm or grazing land, clean water and others, which lead to loss of income or livelihood.

Various human activities on the surface associated with mineral exploration and development have been detrimental to the environment that supports those very activities Omorede (2014). Omorede (2014) notes that oil exploration and exploitation have over the last four decades impacted disastrously on the social and physical environment of the Niger Delta oil bearing communities, massively threatening subsistent peasant agricultural economy and environment as well as the entire livelihood and basic survival of the people. Omorede cites Sarowiwa (1991) who maintained that over time the environment in Ogoni (Nigeria) and other oil producing communities has been completely devastated by decades of reckless oil exploration and ecological welfare by Shell and other multinationals.

Lange et al. (2014) claims that oil and gas exploration does not only negatively affect human beings but also the survival of different mammals, birds, reptile and fish become highly doubtable. Due to oil and gas exploration activities, which sometimes cause noise, both animals and birds are scared and migrate to distant areas yet this affects the lives of people who depend on them. The ecological linkage between wildlife and people's livelihoods is disrupted by oil and gas explorations in an area.

Walter (2014) observed that in the experience of petroleum and gas exploration activities, the main issues of community concerns are; “noise, road damage and road safety, visual impact and more noise” with the addition of excessive light at night, vibration, dust, and stock disturbance. A number of approaches were developed and used to minimize these impacts. He adds that local authorities worked to develop uniform approaches to District planning and companies recognized that communication, consultation and consistency of compensation are vital to community acceptance.

Oil and gas exploration activities such as drilling increase destruction of the environment. The use of explosives like air guns to generate acoustic energy during seismic surveys, and oil exploration is a serious environmental hazard (Marful-Sau, 2009; Weilgart et al., 2016). Furthermore, seismic noises adversely affect the behaviour of wildlife and impair the hearing of local population. Fishermen are affected greatly in such a situation as the area experiences reduced fishing activities. Other forms of aquatic life in both marine and fresh water including rivers in the communities and coastal villages suffer devastation during seismic surveys (UNEP, 2011). Ogwang and Vanclay (2019) argues that irrespective of their purpose, large projects require land and sometimes very large tracks of land which in most cases cause displacement. They continue to indicate that if this is not well managed, resettlement can have severe consequences for the local communities and can create human rights impacts.

Majer et al. (2002) noted that the geological hazards due to instability of soil and rock masses, landscape degradation, radiation hazards and extensive destruction of vegetation for access by seismic crew have been assessed by various scholars. The damage is noted to affect a large number of flora and fauna. The visible signs of this environmental degradation are; decrease in

fishing activities, damage to marine flora and fauna; loss of biodiversity; deforestation; coastal and marine erosion and flooding as presented by (Oloruntegbe et al., 2009). Fishing which is the main occupation of the rural people who live near water bodies with underlying oil resources become a useless activity (ITOPF, 2013).

According to Batool and Hussain (2016), the activities from industries that contribute to pollution and continuous flaring of gas from oil create health hazards and render fishing and farming activities almost impossible in Nigeria. Akpoborie and Akporhonor (2008) also noted occasional death of fish, destruction of agricultural crops and pollution of waters, which seriously affect families and communities. According to Akpoborie et al. (2008) in a study about activities of different Multinational Corporations, and the associated hazards of spillage and gas flaring, in Nigeria and Ghana asserted that such activities degrade environment and leave communities desolated and unable to meet their livelihood needs.

Albert and Igbokwe (2014) noted that the management of natural resources in the aftermath of oil and gas exploration increases the abuse of the environment. Epstein et al. (2000), also shows that it increases small activities among neighbouring communities and results into environmental and ecological disasters, abject poverty, diseases, illiteracy, hunger, unemployment and stagnation. Exploration activities of oil by prospecting companies subject the land to erosion and flooding, oil spillage, marine resources systematically depleted, traditional occupation (farming and fishing) are endangered and communities economically impoverished. These serve as precursor to conflicts and violence in most oil and gas areas.

The study by Ihayere et al. (2014) states that, oil and gas exploration activities world over have destructive environmental impacts and such activities involve environmental pollution processes.

There are various reports, which indicate that oil and gas exploration activities bring a number of effects on environment by exposing it to oil leakages and spills, gas flaring and deforestation because of the creation of access routes to new areas (Kumar et al., 2013). Hurtig et al. (2002), and Oviasuyi et al. (2010), noted that gas flaring occurs in most oil producing countries and their emissions pollute the air and releases unacceptably high levels of carbon dioxide into the atmosphere. In Nigeria for example, two independent studies revealed that the total petroleum hydrocarbons in the streams located there are between 360 and 680 times the European Community permissible levels (Watts, 2001: 196), Sala Martin &Subramanian, 2003; ERA/CJP, 2005). Further, studies show that oil spills are far more frequent in the global south than in the global north (Agbefu, 2016). Of emission associated with oil and gas exploration activities produce gases which contain toxic by-product; which contribute to global warming and acid rain that is detrimental to soil hence affecting crop farming.

Elenwo et al. (2015) expressed that the environmental pollution associated with oil exploration has serious implications on the survival of species in communities near oil reserves. The neighbouring communities through livelihood activities like hunting and wood fuel collection usually depend on the native plant and animal species. According to (UNCTAD, 2007), oil spillage massively pollutes water bodies thereby threatening fisheries and reducing tourism, harming birds' life and severely affecting ecological ocean life.

Environmental pollution caused by oil drilling results into a destruction of livelihoods in local communities making it difficult for the present and future generations to make a living (United (Nations Report, 2013; Uyigue, 2009; Menibarini, 2004). Rwakakamba and Lukwago (2016) also claim that farming and fishing activities that are the mainstay of these economies literally

come to a standstill with the exploration of oil and gas. This is because oil and gas exploration normally affect women as their farms go off with exploration. Areas where production of food crops such as cassava, pepper and others are affected, the livelihoods of people in such areas tend to face the consequence (Turner and Brownhill, 2005).

The construction of the Chad-Cameroon oil pipeline by ExxonMobil, Petronas and Chevron left a 30-meter-wide gap through the forest; this led to destruction of the environment According to (UNCTAD, 2007; Ihayere et al., 2014). The effect of this was the loss of land and access to resources upon which Bagyeli livelihoods have traditionally been based (Nelson, 2002). Similarly, in the Philippine oil exploration is indicated to have affected fish population as some local fish are disappearing which threatens the livelihood of over 200,000 anglers (World Rainforest Movement Bulletin, 2009). The present study focuses on the effects oil and gas sector before the sector enters into oil and gas production stage.

Agbefu (2016) asserted that explosions from pipelines have also resulted in injuries and deaths of people in most local communities and because the products of oil industry are mostly combustibles and explosives, accidents such as fires and explosion have serious effects on the people and the environment from which people's livelihoods are derived. In October 1998, a pipeline leakage in Jesse village in the Niger Delta ultimately resulted in an explosion in which over 700 people, mostly women and children, were reported to have died due to defective pipelines. The catastrophe also affected farmlands, fishing grounds and vegetation, which negatively affected livelihoods. Whereas the Niger Delta incident of 1998 was associated with effects of oil and gas exploitation, the present study considered effects associated with oil and gas exploration activities.

Furthermore, Oviasuyi et al. (2010) notes that oil exploration increases the risks and dangers associated with women undertaking their reproductive roles. These risks and dangers arise because of the predisposition to peculiar diseases in communities where oil exploration takes place. This coupled with poor antenatal care and malnutrition makes the lives of pregnant women in these communities particularly precarious. Research shows that pregnant women living close to oil reserves have a higher mortality risk for both themselves and that of their unborn children. In addition, Hurtig and Sebastián (2005) and Sharma et al. (2013) affirm that women living in communities near oil fields are at a 2.5 higher risk of spontaneous abortion than other women are. A study by Sigal (2016) also noted that cancer was observed in Ecuador in the population under 10 years in which both males and females exposed to oil exploration were most affected by this problem. This means that oil and gas exposes one to risks of cancer. The present study however, looked at the effects of oil and gas exploration activities on people's livelihoods rather than people's health, as it was the case with Sebastián (2005) and Sharma et al. (2013).

According to Vokes (2012), oil activities result into induced in-migration, which leads to population increase. This has many implications, the cost of living will increase, the limited available social services will be over-stretched, and the very poor will not be able to access these services. The Tilenga Project ESIA acknowledged that, because the various projects have different timelines, a high population growth would continue to be experienced for many years. Further, the cumulative population growth would exacerbate project impacts, especially access to land and shelter. The increasing demand would result in inflation, including in the price of land and housing (International Alert, 2013). An implication of this is that the project affected persons who have been paid cash compensation will find it very difficult to find replacement land elsewhere, as the prices will likely increase beyond the levels of compensation they were paid, as

was experienced by the people displaced by the Kabaale Industrial Park. The present study therefore sought to find out the extent to which the oil companies have helped in re-establishing the people through compensation and resettlement accordingly to limit the negative effects.

Besides that, the same report asserts that, there is increasing demand for land, with increasing land speculation in the region. While some owners may consider they will benefit from what they perceive to be high prices they have been (or might be) paid for their land, the majority of landowners are illiterate and potentially lack understanding of the full implications of selling their land. They likely do not have access to legal or Para-legal support in the land transaction process, thus they are easily swindled. A further problem is that most land is communally owned, and without land title. Land speculation pushes land prices up and encourages the commercialization of land.

The International Alert report (2013), further notes that transition to formal land tenure inevitably means that cash-poor households will opt to sell and will then become excluded from owning any assets and from continued access to land. The cumulative land take for the developments in the area means that there will be less land available for local communities, which might lead to food shortages and to undesirable living conditions, at least for the poorest. Therefore, the government has to ensure that any land take should not lead to impoverishment; rather it should lead to the betterment of the lives of project-affected persons.

According to the department of fisheries resources annual report (2010/2011) of the Ministry of Agriculture, Animal Industry and Fisheries, in the Albertine Graben, there is an overlap of natural resources namely oil and gas; fisheries; wildlife; water; forest and agricultural resources and that this pattern presents both economic opportunities and environmental challenges due to

negative impacts associated with development of the oil and gas sector.

According to Baumuller et al. (2011), the negative impacts of oil and gas on the livelihoods are particularly problematic in underdeveloped areas where local communities rely heavily on the natural resources for their survival. The authors quote cases in the Niger Delta region and the fishing communities in Angola where they specifically cite Austinho (2005) who indicates that communities in Angola rely almost exclusively on fishing, as a source of livelihood and that fish is central in the Angolan diet. They further indicate there are negative impacts of the oil and gas industry on local fishing livelihoods that are already threatened by unsustainable and illegal fishing.

According to Kyasimire et al. (2015), along the shores of L. Albert, communities are mainly dependent on fisheries, with large sections of the population relying on fishing and fish mongering. The Africa Crop Science Journal (2014) document similarly indicates that crop farming, livestock production, and fishing as the main economic activities in Buliisa District. Further according to Buliisa District Local Government Report (2012), the dominant livelihood activity in Buliisa District is, by far, agriculture, with over 45% of the population depending on subsistence farming as their main source of livelihood. The rest of the population depend on fishing (20%), livestock rearing (15%), trading (10%), and employment income (6%). Other sources of income include growing of traditional cash crops such as cotton and tobacco as well as food crops like cassava, Irish potatoes, sweet potatoes, maize, beans and ground nuts, although these are increasingly becoming cash crops (BDLG, 2012).

The Buliisa District Local Government Report (2012) further indicates that livelihoods of people in Buliisa District who depend on the resources of Lake Albert have lately been significantly

adversely affected by diminishing fish catch numbers. The reason for this is the decreasing fish stocks in the lake which, according to the District Fisheries Officer, has been caused by among other things, the following: immigration (including Congolese fishermen who come and fish and then return to their country); use of wrong fishing gear (including mosquito nets which trap fish eggs); light fishing; poor enforcement of fishing regulations. There is therefore need for urgent intervention, if the current situation is to be improved.

According to Buliisa District development Plan (2015/2016), the District Development goal, was "to enable the rural poor women and men to transform their lives and livelihoods so as to reduce by 10% the proportion of the people living in extreme poverty by the end of 2016". Women play a major role in productive pursuits in Buliisa District, including crop and livestock production; fishing-related activities (fishing, fish smoking/drying/processing, and fish trading). Indeed, they contribute 60-70% of the labour for agricultural production and fishing; but they also have a number of other income sources, including selling millet, sweet potatoes, maize, goats, onions, groundnuts, rice, poultry and handicrafts. The Buliisa DDP affirms that: "Women have proved themselves interested in and capable of taking on an entrepreneurial role that enhances family income and well-being" (BDLG, 2015/2016).

The Buliisa District Hazards, Risk and Vulnerability Profile (2016) document indicates that both environmental degradation and other oil and gas related hazards have a high overall impact and mostly affected Buliisa District Sub-Counties, including Butiaba. However, oil and gas exploration activities are also associated with positive impacts. According to Vokes (2012), due to different businesses, which open in the areas of oil and gas, the populations tend to increase through migration from one place to another and therefore people get enough market for their

products especially fish, crop and animal products, charcoal and firewood. The present study also examined the positive contributions of oil and gas exploration to people's livelihood activities.

2.4 Mitigation against the Negative Effects of Oil and Gas Exploitation Activities

The extractive industry is associated with both positive and negative impacts (Cordaid, 2016). Creation of employment and business opportunities, increased access to housing and healthcare facilities are for example possible when communities and local leaders work together through consultations and partnerships with government and extraction companies. The Government should therefore have relevant laws and regulations governing mineral exploration and exploitation but also ensure compliance by the companied involved benefiting the community in terms of livelihoods (Cordaid, 2016). The laws and regulations put in place should be those related to environmental and social protection. The legal framework should provide for the necessity of all companies to carry out environmental and social impact assessment to identify potential negative impacts of the projects and take necessary measures to mitigate such impacts. The laws governing mineral development in Uganda too require companies to undertake necessary precautions to identify potential negative impacts and mitigation measures (National Oil and Gas Policy for Uganda, 2008; National Environment Management Act, 2005). However, most of these legislations apply more to projects at implementation phase and less at explorations and prospecting phase.

Projects may involve displacement of people who will need to be resettled elsewhere. Cordaid (2016) notes that project developers carefully plan and carry out resettlement of the displace persons in a way that minimize harmful impacts on affected communities. Consideration needs to be given to vulnerable groups such as women, children, the elderly and people with

disabilities. Since resettlement usually has severe social impacts on affected people and their livelihoods, international standards require that companies and governments apply more stringent standard of informed consultation and participation; or free prior and informed consent in the case of indigenous people (Ogwang and Vanclay, 2019; Cordaid, 2016). All projects should adhere to international best practices, which among other things require that involuntary resettlement be avoided or at least minimized, and that, all affected people should be fully and fairly compensated and have an opportunity to be involved in the resettlement process. Project developers are expected to inform the affected communities, sufficiently early about the resettlement process including eligibility and entitlement frameworks with compensation and livelihood restoration packages people (Ogwang and Vanclay, 2019).

Vegetation cover is the most commonly affected component of the environment by mineral exploration and exploitation and yet communities depend on it for a variety of livelihood benefits. Programs for revegetation are thus called for whenever there is mineral exploration and exploitation projects commissioning (Bvis, 2019). Trees help to mitigate climate change effects by removing excess carbon from the atmosphere. Currently the earth's forests and soil absorb 30% of the atmospheric carbon emissions, particularly through forest productivity and restoration (Bvis, 2019).

Gwayaka (2018) while talking about policy matters notes that the Petroleum Exploration and Development Act 2013 provides for access to some oil and gas related information. He further posts that under section 151, the Minister of Energy and Mineral Development has a direction to make some categories of information available to the public. Furthermore, some policies in place that relate to oil and gas matters include; The National Oil and Gas Policy (2008); the Oil and

Gas Revenue Management Policy (2012); and the National Environment Management Policy (1994), among others.

Gwayaka (2018), further notes that in 2011 government developed the National Communication Strategy for the oil and gas sector in Uganda, which in part II, subsection 2.3.2, sets out objectives such as: Meet information needs of the public through regular information, dissemination, exchange and sharing, which objective focuses on providing information to citizens, and to stakeholders who require such information. Communication is done through radio talk shows organized especially by local leaders and NGOs, which cover issues related to land degradation, land acquisition and grabbing.

According to the 20 years of NAPE's environmental advocacy in Uganda (2016) document, NAPE has continued to work with host communities in the oil region through education, sensitization workshops on oil issues and its impacts on the environment and livelihoods as well as human rights so that they (communities) can position themselves to benefit from oil development. It is further indicated in the document that NAPE in collaboration with other national and international NGOs pressured government to come up with a national oil policy before going in production, which policy and a comprehensive legal framework to oversee and monitor the processes related to oil exploration, is now in place.

According to the Ministry of Environment and Mineral Development for Uganda (MEMD, 2008) report, to ensure that oil and gas activities are undertaken in a manner that conserves the environment and biodiversity, the Oil and Gas policy was enacted with guiding principles which include; using finite resources to create lasting benefits to society, efficient resource management, transparency and accountability, competitiveness and productivity, protection of

the environment and conservation of biodiversity, spirit of co-operation, capacity and Institution Building.

Coupled with the above MEMD (2008) states that, the Oil and Gas Policy outlines activities that the government of Uganda should do in order to achieve the above objectives and they include strengthening the institutions with a mandate to manage the impact of oil and gas activities on the environment and biodiversity; develop physical master plans, environmental sensitivity maps and oil spill contingency plans for the oil and gas producing region and any transport corridors. The Oil and gas policy of Uganda has linkages to the Country's key policy frameworks and also articulates its impacts to them as outlined by the government. They include the Poverty Eradication Action Plan (PEAP), the Plan for Modernization of Agriculture (PMA) and the country's drive for industrialization, in respective sections of the policy document (MEMD, 2008).

The development of oil and gas sub sector in Uganda is expected to contribute significantly to the early achievement of the above goals and plans by enhancing the country's capacity to invest in productive sectors of the economy, development of new economic and social infrastructure, increasing power generation capacity and the general enhancement of energy security through production and refining of oil (Kashambuzi, 2011).

According to Kashambuzi (2011), in order to maintain the environmental regulations in compliance with the Oil and Gas policy requirements, NEMA authorized six firms to set up petroleum waste treatment and disposal facilities in the country. Two of these firms, Environmental Source and Luwero Industries have constructed facilities in Hoima and Nakasongola respectively are now licensed to operate these facilities and these will manage the

drilling waste which was in the past been containerized and monitored at designated sites prior to authorization of the final disposal place. The study examined how the government has held responsibilities to preserve the environment for the case of helping people.

In addition, the Ministry of Environment and Mineral Development (2015) developed environmental and biodiversity tools as part of the efforts to ensure appropriate environmental management for the oil and gas sector in the country, an Environment Sensitivity Atlas (ESA) for the Albertine Graben was developed in 2009 and updated in 2011. The ESA describes the different levels of sensitivity in the different parts of the Graben with a view to guiding the oil and gas activities in the area.

More still, an Environment Monitoring Plan (2012 to 2017) for the Albertine Graben that defines the key monitoring indicators together with an enforcement and compliance monitoring strategy have been developed, including guidelines for operation of oil companies in protected areas (MEMD, 2015). The study established how aquaculture has developed within the communities as an alternative to fishing activity after fishermen have been stopped from using the lake.

A Strategic Environment Assessment (SEA) for Oil and Gas activities in the entire Albertine Graben was prepared and approved by Government in July 2015. The SEA will be used to ensure that environmental concerns are captured in Government's plans, programs& policies. A National Oil Spill Contingency Plan is also being developed for use in the (unlikely) event of an oil spill (MEMD, 2015: Goffe, Valeriya, 2015). Management plans for the protected areas within the Albertine Graben such as Murchison Falls National Park, Queen Elizabeth National Park and Budongo Forest have been updated to provide for the ongoing and planned oil and gas activities within these areas of high biodiversity (MEMD, 2015).

According to the Ministry of Environment and Mineral Development (2008), a multi-institutional environment monitoring team was instituted to manage the environmental and socials effects of oil and gas sector developments. The team is led by the National Environment Management Authority (NEMA) and composed of the Uganda Wildlife Authority (UWA), the Fisheries Resources Department, the National Forestry Authority, the Directorates of Environmental Affairs and Water Resources Management in the Ministry of Water and Environment, the District Local Governments and the Directorate of Petroleum. However, limited information is available on environmental compliance and mitigation interventions in Butiaba Sub County for the oil and gas exploration activities.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter presents the procedure followed while carrying out the study. It covers description of the study area, research design, study population, sample size, sampling techniques, data collection methods and instruments, data analysis, ethical considerations and study limitations.

3. 2 Study Area

3.2.1 Location

The study was conducted in Butiaba Sub County, Buliisa District, formerly a county under Masindi District delineated in 2006. The administrative units in the District include 30 parishes and 125 villages. The Sub County is located in the Albertine rift valley, between latitudes 1º 49′ and 08.0″ North and longitudes 31º 19′33.0″ and 33º 24′ East (Figure 3.1). The sub county is located approximately 57-kilometres west of the district headquarters and 270 kilometres, Northwest of Kampala city, Uganda's capital. Buliisa District's western margin hosts Lake Albert whose basin has been discovered to be rich in oil and natural gas deposits. Its neighbours include Nebbi District to the North, Masindi District to the East, and Hoima District to the South. Buliisa District also houses the Budongo Forest Reserve, Murchison Falls National Park and Bugungu Wildlife Reserve all fall under Buliisa. The District comprises of six sub-counties (i.e Biiso, Kihungya, Butiaba, Buliisa, Kigwera, Ngwedo) and one town council (Buliisa) which is the main urbanised area. This study concentrated on Butiaba Sub County comprising of 4 parishes and 21 villages.

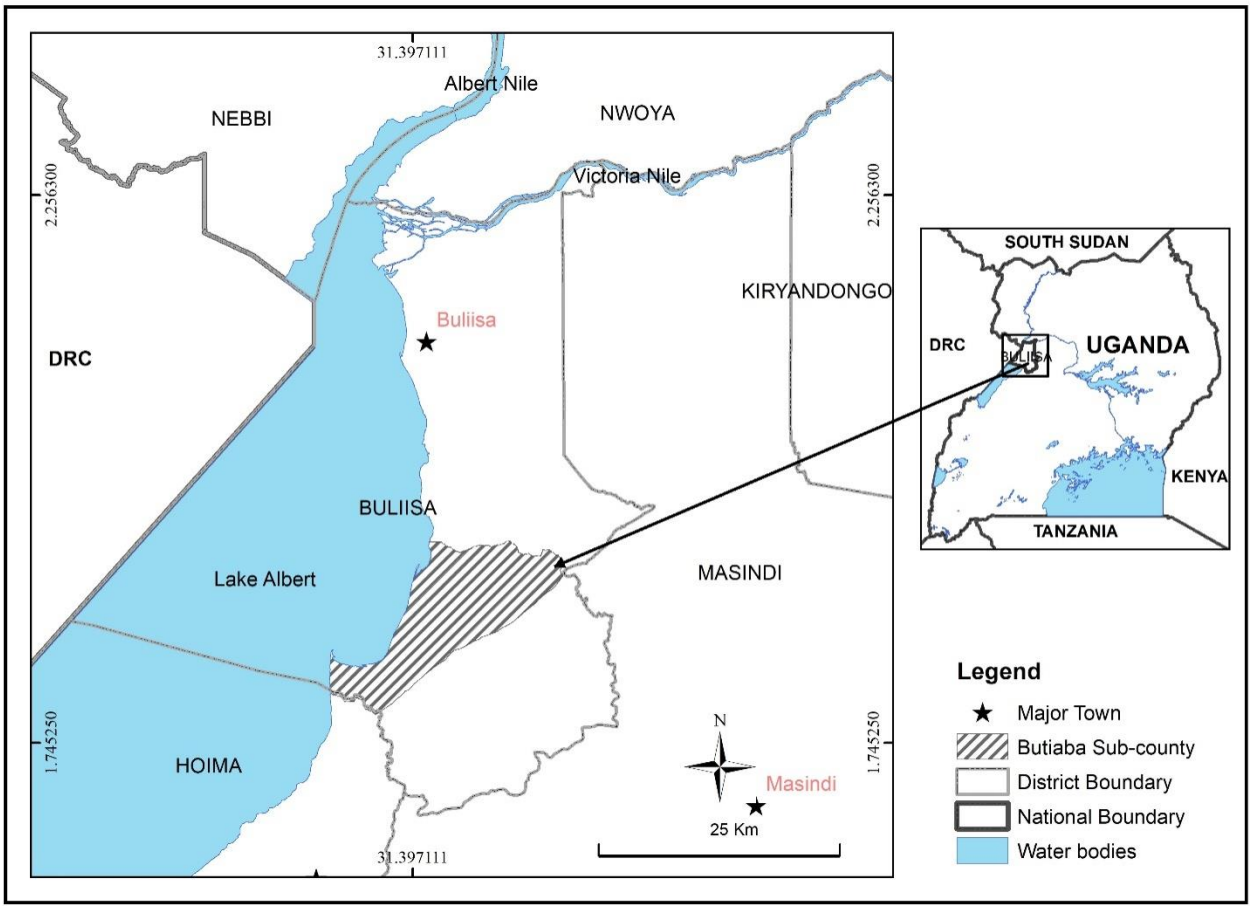

Figure 3.1: Location of the study area

3.2.2 Topography

The study area falls under the Central plateau of Uganda with an altitude of about 680 – 1400 meters above sea level. Lake Albert at 682 meters forms the lowest elevation. Steep slopes and broad valleys characterize the central plateau in Buliisa generally. The western fringes of the District lie in the western rift valley a part largely covered by Lake Albert and the Escarpment. The South-Eastern part of Buliisa particularly in Kihungya and Biiso sub-counties is dominated by highlands ranging from 1000 to 1200 m.a.s.l.

3.2.3 Geology and soils

The study area falls under the Albertine Graben, which is a Cenozoic sedimentary rift basin, developed on the Precambrian orogenic belts of the African craton. Available geological and geophysical data suggest that the Albertine Graben has undergone substantial tectonic movements and sedimentary layers of approximately 6 km thickness have been deposited in fluvial deltaic and lacustrine environments. The rocks are mainly classified as Pre-Cambrian basement and sedimentary rock formations (PEPD, 2008). Ferralitic soils cover a vast part of Buliisa District. The soils are mainly yellowish-red clay loams on sedimentary beds. There are also dark brown, black loams (Bugangari series) found along the axis of the warp. These two types of soil are of low to medium productivity. The soils of recent origin that consist of quartzite debris are found along the escarpment. Their depth depends on the vegetation cover and land use. They are suitable for coffee and maize (Harrop, 1960). Rivers and valley beds mainly have greyish-black sands, which are base deficient and acidic. These alluvial soils are of low productivity (Geologic survey of Finland, 2014).

3.2.4 Vegetation

The vegetation in Buliisa where the study area falls is classified into forest, savannah, grassland and swamp. Forest vegetation includes Budongo high tropical forest while savannah vegetation consists of perennial grasses, scattered trees and shrubs. The dry savannah lies contiguous to Lake Albert, turning into wet savannah grassland towards Butiaba escarpment. Water logged valleys are occupied by swamp vegetation (Langdale-Brown et al., 1964). Murchison Falls National Park and Bugungu game reserve fall under the grassland and woodland vegetation in the study area.

3.2.5 Climate

Buliisa district receives a bimodal rainfall pattern with totals of approximately 800 mm in the Lake Albert flat, rising rapidly further away to the east above the escarpment to between 1250 - 1500 mm per annum before tapering off to 1000 mm in the eastern border areas of the District. The rains peak between March & May and September & December (Buliisa district SoER, 2015). Temperature in the study area is largely a result of altitudinal differences. The high altitudes in Biiso and Kihungya sub counties are cooler while the low altitude areas in Butiaba, Buliisa, Kigwera, Ngwedo sub counties, and Town Council are dryer and hotter. The differences in temperature between the altitude zones phenomenon has resulted into the indignant people migration from lower to upper Buliisa with better and more appealing weather conditions. Buliisa district also experiences moderate to strong and dusty winds, increasing in the afternoon for most part of the year.

3.2.6 Population

Buliisa District had a total population of 113,569 people in according to the National Population and Housing Census (2014). Most of the people in Buliisa District reside in rural areas (106,284 (93.6%) compared to (7,285 (6.4%) who reside in urban centers (UBOS, 2016). The gender distribution was reported to be males: 58,076 (51.1%) and females: 55,493 (48.9%). About 95.1% (108,059) of the population form the household population and only 4.9% (5,510) is Non-household. Butiaba Sub County (in which the study was conducted) had the highest population of 29,181 people while Buliisa town council had the least population of 7,285 people.

3.2.7 Land use and economic activities

Buliisa district is primarily rural and most people are engaged in agricultural activities. Crop husbandry is the leading agricultural activity followed by livestock keeping. Most commonly grown crops include cassava (staple food), maize, beans, Pineapples, Citrius (Oranges), cotton, tobacco, Mangoes, groundnuts, banana (Busingiro and Akimi), in Biiso and Kihungya sub-counties respectively. Animals reared include cattle, goats, sheep, pigs (Small scale), chicken, and ducks. Animals in most parts of the district are communally grazed and their movements are rarely controlled. Fishing is widely done in the district and the major source being Lake Albert, which has economically viable fish species such as Bracynus nus (Ragogi), Neobola bredoi (Muziri), Lates abertianus (Nile perch) and Oreochromis Niloticus (Tilapia) (SoER, 2015). Buliisa District has wildlife both in Protected Areas and outside Protected Areas. The Protected Areas in Buliisa with wild are Bugungu wildlife reserve, Part of Murchison Falls National Park, part of Budongo Central Forest Reserve and a number of wetlands. Sub counties of Ngwedo, Kigwera, Buliisa, Butiaba and Biiso that border the protected areas share 20% annual revenues accrued from park gate collection. The recent discovery of oil and gas in Albertine Graben, where Buliisa District is part, has led to rapid growth and development of infrastructure such as settlement camps, oil related access roads, waste consolidation sites, as well as employment and housing opportunities for both the locals and external workers. Local community members have been employed as drivers, casual labourers and community liaison officers for instance. The discovery of oil has however been received with mixed feelings as a number of both benefits have been registered at exploration, appraisal and development stages. This is what the current study attempted to analyze.

3.3 Research Design

This study adopted a cross sectional survey design involving collection of data from the target respondents in a single moment as according to Creswell (1994). Full scale oil and gas exploration activities in Buliisa were commissioned in about a decade ago and as such, their foot print on welfare activities are fresh in the minds of the residents that they could not warrantee other study designs. The effects could be studied in a single field survey and would not change within the medium term. The cross-sectional survey design was implemented following both quantitative and qualitative approaches. The quantitative approach was justified on grounds that some effects of oil and gas exploration are quantifiable and presented statistically while qualitative data is because the study also collected respondents' views, opinions and comments whose interpretation and presentation suits bests using narratives. Qualitative data involved analysis of data in form of statements as obtained from key informants while quantitative data involved the use of statistical technics to collect, analyse and communicate study findings in form of frequencies and percentages. This allowed for triangulation of results, which enhanced the validity, and reliability of the study.

3.4 Target Population

Respondents for this study comprised of oil and gas company workers, District officials and local leaders, as well household heads in Butiaba Sub County. All house households in Butiaba Sub County formed the main target population since exploration activities in the area affect their livelihoods either positively and/ or negatively. The other target respondents were those involved in making decisions on development activities in the area including oil and gas exploration. Generally, 5533 household heads, 10 oil and gas company workers, 15 local leaders and 5

District officials, yielding a study target population of 5,563 members.

3.5 Sample Size

The sampling process in this study commenced with the selection of Butiaba Sub County from Buliisa District as one of the main accessible Sub Counties in the Albertine region with hydrocarbon deposits and thus host to a number of exploration activities in the area. To overcome biasness, all the four (4) parishes in Butiaba Sub County were considered purposely for the study. These are, Booma, Bugoigo, Piida and Walukuba. From these, a sample of 360 out of 5333 (Butiaba Sub County household number according to UBOS, 2016) households were targeted as the fast and main category of respondents. According to UBOS (2016), Butiaba Sub County had a total population of 29181 people living in 5533 households in 2014. Since this study targeted livelihoods of households, 360 households were selected to make up the sample size following Krejcie & Morgan (1970)'s table for sample size determination (Appendix I). Given an average of 5 (five) villages in each of the four (4) parishes (according to data from Local Council chairpersons in the area), the households' sample size (360) was to come from 20 villages, picking 18 households from each village. The number of households (18) per village here was deduced by dividing the target household number (360) by the total number of villages in the four parishes (.i.e 360/20 = 18). Household heads were then selected to represent their households. The area sampling strategy adopted in this study is shown in Figure 3.2. The second category of respondents included key informants that is, 10 oil and gas sector workers, 5 District officials and 15 local leaders from the villages in Butiaba Sub County thus summing up to a total target sample of 390.

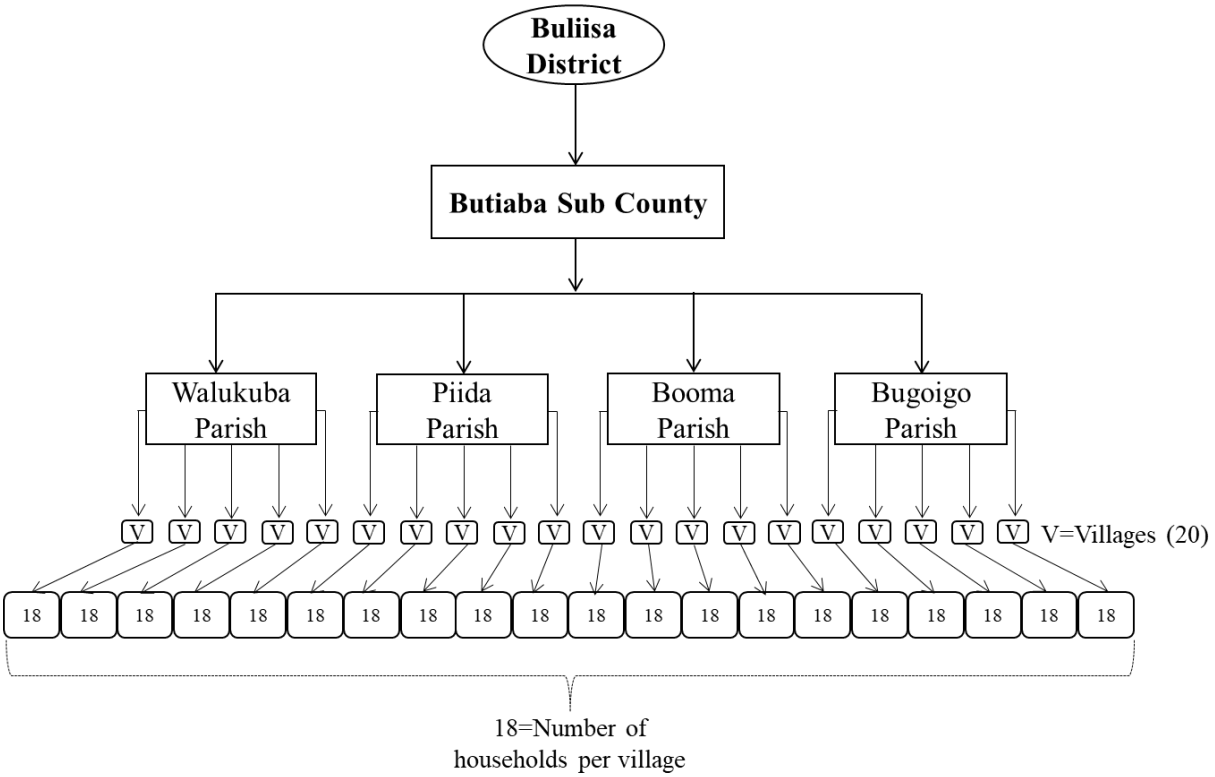

Figure 2.2: Study area sampling strategy

3.6 Sampling Techniques

After defining the study population and sample size, the next step was to decide on how to arrive at the required representatives of the study population. To do this, two sampling techniques were employed, that is simple random and purposive sampling techniques.

3.6.1 Simple random Sampling

Simple random sampling was used to select household heads in each of the villages in the four parishes of Butiaba Sub County. This category of respondents was targeted because they are the inhabitants of Butiaba Sub County at the grass root level 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. The villages in each parish were identified and enumerated following contact with local area leaders. A number was assigned to each of the villages in the four parishes. The names and numbers of villages were written on pieces of paper, folded and placed in a box. The papers were shuffled and a single paper was drawn out at a time until 20 villages were selected. The same simple random sampling procedure was followed to select the 18 households from each village. In each household, the household head was considered for inclusion into the sample.

3.6.2 Purposive Sampling

Purposive sampling was used to select the 10 oil and gas sector workers, 5 District officials and 15 local leaders using purposive sampling. The targeted oil and gas sector workers included the human resources officer, field supervisors and exploration sites engineers. Whereas the District officials targeted included, the District environmental officer, District Agriculture officer, District fisheries officer, District planner and the District natural resources officer. These were considered knowledgeable in oil and gas exploration activities and how the activities have affected people's livelihoods in Butiaba Sub County. The opinions of employees in oil and gas sector were sought because they are experts in the field of oil and gas exploration. The district officials were selected on the criteria of involvement in land and environment resources management decisions' making. The technical nature of this district team links them directly to implementation policies governing oil and gas exploration activities in Buliisa District. The local leaders (village chairpersons) on the other hand were included in the study because they link the community to higher governments and vice versa. The key informants selected were presumed to have accurate information about the implementation of oil and gas policies in their areas of

jurisdiction, information deemed vital in analysis of pre and post oil and gas exploration activities effects in Butiaba Sub County. The sampling frame adopted in this study is illustrated in Table 3.1.

Table 3.1: Sampling frame

Category	**Target population**	**Sample size (n)**	**Sampling Techniques**
Oil and gas employees	10	10	Purposive
District officials	5	5	Purposive
Local leaders	15	15	Purposive
Household heads	5533	360	Simple random
Total	**5563**	**390**	

However, out of 390 expected respondents, 310 participated in the study representing 79.4% response rate. A response rate of 50% is adequate, 60% is good and whilst that above 70% is very good for analysis and reporting of study findings according to Mugenda and Mugenda (2003).

3.7 Data Collection Methods

Data was collected from both primary and secondary sources. Primary data was collected from households in Butiaba Sub County, Buliisa district officials in natural resources management and planning offices, local leaders (local council/opinion leaders). To these, questionnaires were presented and interviews conducted. In addition, direct observation and photography of the exploration activities, livelihood activities and infrastructural developments in the study area was

undertaken. Secondary data was collected from review of existing documents in line with the objectives of the study. Key documents reviewed included oil and gas sector policies and sector performance reports available in online repositories, Hoima public library, Buliisa District Local Government archives and newspapers. It also involved reviewing recent Journals publications and oil sector bulletins.

3.8 Data collection instruments

Data collection in this study involved the use of questionnaire, interview guides, observation checklist and documentary review guide.

3.8.1 Questionnaire

The questionnaire was used to collect both quantitative and qualitative data from household heads on the oil and gas exploration activities taking place in their areas, the effect of oil and gas exploration activities on their livelihoods and the mitigations measures being put in place in Butiaba Sub County. The questionnaire was non-structured with mainly pen-ended questions requiring respondents to give responses by writing short notes (Appendix II). 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 were also used because of the ease with which they can be coded thus facilitating easy statistical analyses. These specifically targeted household heads in the study area. The questionnaire copies were 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 were conducted with district officials, oil and gas sector employees and local leaders using interview guides (Appendix III & IV). Interview were used to collect data on oil and gas exploration activities, their effects on people's livelihoods and the mitigation measures put in place to overcome the adverse effects. 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. Besides the social encounter with respondents created willingness to offer correct and more information due to anonymity presented by oral responses compared to written responses. The responses to the interview guide questions were recorded in a field notebook and later on, the data obtained was used to reinforce responses obtained from households using questionnaires.

3.8.3 Observation checklist

The observation checklist was used to collect data on the visible aspects of the study that is oil and gas exploration infrastructure and livelihood activities and the interaction between these two. In addition, evidence of mitigation measures of adverse effects of oil and gas exploration was pried by observation in the field. Generally, observations were done in line with the study objectives (Apendix V) with focus on exploration activities and their effects on people's

livelihoods in Butiaba Sub County. To keep a record of these, a digital camera (Sony-12 MP) was used to take landscape pictures, which were included in chapter 4 of this report. This method was also used to collect data for reinforcement and accuracy assessment of that collected using questionnaire and interviews. This is because information from observations emerges from what is actually happening rather than from pre-conceived notions. This enables collection of first-hand information concerning the subject of investigation in the study area.

3.8.4 Documentary review guide

This method was used to collect secondary data in form of already published information by other scholars, agencies, NGOs and others. This was done by reviewing some of the published materials on the oil and gas exploration and how it affects people's livelihoods. Documentary review enabled the examination of past trends of policies within the oil and gas sector. Secondary data collection gave clear information to support the data gathered from the field. More still, it helped to obtain high quality data with reference to the other findings the researcher obtained. Data collected by documentary review was synthesised and integrated with field data and used for writing different sections of this report.

3.9 Data Analysis

Data analysis involves the application of techniques to test the research hypotheses and or answer the stated research questions (Gay, 1996). This study involved collection of both quantitative and qualitative data, thus requiring different techniques of analysis.

3.9.1 Quantitative data analysis

Data collected using questionnaires was coded and analysed using statistical techniques. With the help of a computer program, Statistical Packages for Social Scientists (SPSS) version 23.0, Multiple Response Analysis (MRA) preceded data coding. Data coding involved transformation of responses into numeric data that is, 1, 2 …etc. MRA was used for analysis because most of the questionnaire items required multiple responses, which were measured on a dichotomous scale. The technique was thus considered suitable for analysis of such data as according to Johnson & Wichern (2006)'s recommendations. MRA involved computation of frequencies, percentage of cases computed as percent of each item out of the total responses/cases and relative percentage computed as a proportion of all items that respondents answered under given them on the research tools thus percentage of responses in relative terms. Relative percentage enabled comparison between and among the study variables.

To characterize the dominant oil and gas exploration activities taking place in Butiaba Sub County in terms of procedures undertaken, intensity, and spatial coverage, Multiple Correspondence Analysis (MCA) 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. In the study, MCA was used to compare the strength of the dependent variables (oil and gas exploration activities) to establish what accounts for variation in the oil and gas exploration activities when they are grouped/combined. This was meant to reduce on the data dimensions without losing any information on the variation in the factor correspondences and determine the most dominant

activity in terms of percentage of explained variance (Abdi & Valentin, 2007). The results were shown as percentage of variance in a tubular form and visualized on a 'scree' plot.

3.9.2 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 meant to identify common responses in line with the objectives of study. Presentation. Qualitative data analysis involved use of descriptions as either direct quotations or narratives of the responses from the interviews. The emerging findings were used to reinforce and or explain the results obtained from quantitative data analysis. The methodological procedure taken to collect data is summarised in Table 3.3.

Table 3.2: Summary of the Methodological framework

OBJECTIVE	**DATA COLLECTION METHOD/ TOOL**	**TYPE OF DATA COLLECTED AND ANALYSIS**
OBJECTIVE I Identifying and characterising the oil and gas exploration activities	-SAQ to key informants from oil and gas company and District officials -Observation and documentation using a checklist	Qualitative and quantitative data; presented and analysed using narratives, tables, figures and frequency counts and percentages. Multiple Correspondence Analysis (MCA)

OBJECTIVE II Examining the effects of oil and gas exploration activities on people's livelihoods	-Interview guide to indigenous people, and local leaders -Observation and documentation using checklist -SAQ to key informants from District officials, local leaders and community members	Qualitative and Quantitative data with descriptive and interpretive analysis
OBJECTIVE III Analysing the measures to mitigate negative effects of oil and gas exploration activities	-SAQ to informants from oil company, District and local leaders -Interview guide to local people -Observation and documentation using checklist -Literature review	Qualitative and Quantitative data with descriptive and interpretive analysis Documentation

3.10 Ethical considerations

This study was conducted following ethical procedures governing social research studies. An introductory letter was obtained from Kyambogo University, introducing the researcher to the respondents as seeking assistance in conducting the survey. Consent was sought from respondents before questionnaire were handed to them or before interviews were conducted. Attention was also given to the rules governing photography in the area of study for the observable elements of the study. The questionnaire contained an introductory statement requesting for the respondent's cooperation in providing the required information for the study. The respondents were further assured of the confidentiality of the information provided and that the study findings were meant for academics' research purposes only. Plagiarism was avoided by acknowledging secondary information sources through referencing.

3.11 Limitations of the Study

A number of challenges were encountered while undertaking the field survey that somehow affected the study findings. The busy work schedules of most of the key informants derailed the process of collecting their views and opinions regarding the subject of investigation. Most of the local area leaders, oil and gas companies' technical staff and district officials were not available on several attempts to meet and schedule interview sessions with them. This made it difficult for the researcher to accomplish her work in the planned time. This however was overcome by requesting for contacts from their office attendants and making interview schedule by phone call.

Some of the respondents demanded to be paid before filling the questionnaires and or attending the interviews sessions. Since these demands were not met, their attitude changed. Some ended up concealing some information and others avoided committing enough time for the interviews. This however, was overcome by re-emphasising to the respondents that the research was for academic purposes and was meant to enable the researcher complete a study program rather than derive commercial gains, which necessitate payment.

CHAPTER FOUR

PRESENTATION, ANALYSIS, INTERPRETATION AND DISCUSSION OF RESULTS

4.1 Introduction

This chapter covers presentation, analysis and discussion of the research findings. A survey was carried out to gather views and opinions of households, oil and gas company officials, government and non-government organisations workers and local leaders in Butiaba Sub County in Buliisa District. The study involved administering questionnaires, conducting of interviews, making observations and profiling observable phenomena from the field. The questionnaire required mainly open-ended responses. Numeric responses were recorded while descriptive responses were corded as dichotomies for computation of descriptive statistics and analysis of the findings. The data are presented, analysed, interpreted and discussed following the order of the study objectives outlined in section 1.3 of chapter one.

4.2 Identification and characterization of oil and gas exploration activities taking place in Butiaba Sub County

The study investigated the oil and gas exploration activities that are taking place in Butiaba Sub County and characterized them by virtue of their prominence.

4.2.1 Oil and gas exploration activities taking place in Butiaba Sub County

Interviews with Oil and gas Company workers and direct field observations revealed that exploration activities covered a number of areas in Butiaba Sub County, which yielded three oil wells that is, Tai-Tai in Watembo; Lanya in Sonsio and Ngege in Bugoigo with Tai–Tai already

drilled and tested. There is an oil pad (PEARL) constructed for the Tai–Tai well. There is also a mapped area for the oil pipeline covering villages such as Booma, Tugombili, Walukuba, and Kamagongero.

To identify the oil and gas exploration activities taking place in Butiaba Sub County, respondents were asked to state the **exert** activities and the number of times they have ever witnessed them in their area and a summary of their responses is presented in Table 4.1.

Table 4.1: Oil and gas exploration activities in Butiaba Sub County

	Activity	N (of 297)	Percent	Relative percentage
1	Surveying	209	70.4	21.7
2	Site clearance	129	43.4	13.4
3	Seismic probing	120	40.4	12.5
4	Mapping	172	58	17.9
5	Land acquisition	87	29.2	9.0
6	Construction works	91	30.6	9.5
7	Drilling for oil & gas samples	154	52	16

Table 4.1 indicates that, out of the total 297 respondents reached in the survey, 70.4% cited surveying as one of the oil and gas exploration activities taking place in Butiaba Sub County, 43.4% indicated site clearance, 40.4% said oil and gas companies are involved in seismic probing, while 58.3% of the respondent cited mapping of the oil fields as one of the activities oil and gas companies are involved in. 29.2% of the respondents mentioned land acquisition while 30.6% indicated construction works for oil and gas sector infrastructure. 52% of the respondents

stated oil sample drilling as another activity-taking place in the oil exploration areas in Butiaba Sub County.

These results signify that oil and gas companies in Butiaba Sub County were more involved in surveying compared to other oil exploration activities. Apart from surveying, the respondents also identified mapping as another major exploration activity in the study area. This was followed by oil and gas sample drilling and testing followed by site clearance and lastly seismic probing. Construction works and land acquisition are indicated as the least engaged-in activities by oil and gas companies. Although in agreement in as far as surveying is concerned, the findings above diverge a bit from the observation by Ukoli (2005) who noted that the major oil and gas exploration activities involve surveying, exploratory well drilling and seismic data acquisition. The findings on oil exploration activities taking place in the study area are however, in contention with Devold (2013) who noted that surface features such as tar seeps or gas pockmarks provided initial clues to the location of shallow hydrocarbon deposits.

4.2.2 Characterising the dominant oil and gas exploration activities in taking place in Butiaba Sub County

To characterise the dominant oil and gas exploration activities taking place in the study area, the responses on each of the oil and gas exploration activities were analysed for percentage of variance towards all the oil and gas exploration activities as a group, using the MCA in SPSS and the results are presented in Table 4.2 and Figure 4.1 below.

Table 4.2: Dominance of oil and gas exploration activities taking place in Butiaba Sub County

Activity	Percentage of variance	Dominance descriptors	Ranking
Surveying	22.763	Most dominant	1
Site clearance	13.292	Fourth dominant	4
Seismic probing	12.923	Fifth dominant	5
Mapping	17.997	Second dominant	2
Land Acquisition	5.957	Least dominant	7
Construction works	11.715	Sixth dominant	6
Drilling for oil & gas samples	15.353	Third dominant	3

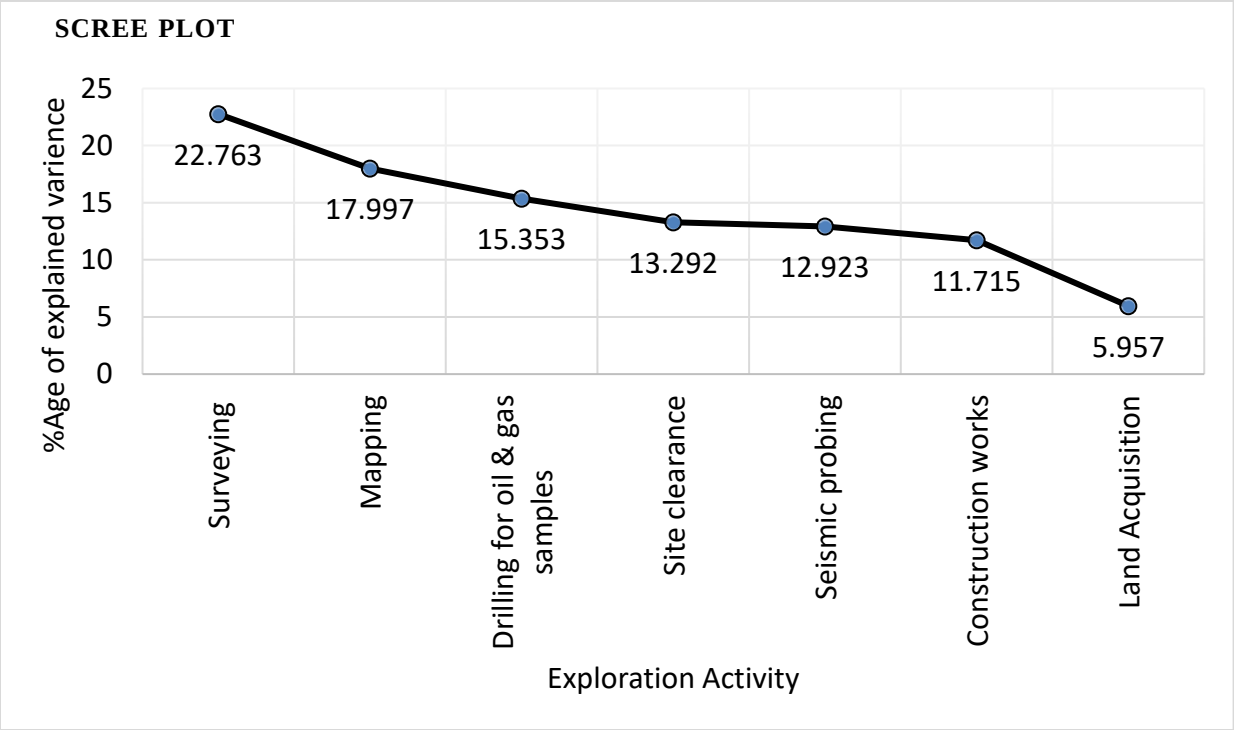

Figure 3.1: Scree plot showing dominancy of oil and gas exploration activities in Butiaba Sub County

Results in Table 4.2 and Figure 4.1 show that surveying accounting for 22.8% variance in oil and gas exploration activities was the most dominant oil and gas exploration activity in the study area, while mapping (18%), drilling for oil and gas samples (15.4%), and site clearance (13.3%) were rated as second, third and fourth dominant exploration activities respectively. Seismic probing (13%), construction works (12%) and land acquisition (6%) were ranked as in positions; 5, 6 and 7 respectively in terms of dominance.

Surveying for oil and gas as an exploration activity involved finding oil fields and bringing oil up from the ground; which activity required looking for clues; search for underground or under water oil and gas reservoirs, careful observation of ground conditions, taking notes of different information and the evaluation of survey data. The work involved geoscientists looking for places with possible existence oil, signs that indicated the presence of hydrocarbons underground and as well as determining the best places to drill.

The results above signify that currently the exploration activities undertaken in Butiaba Sub County are mainly those concerned with ascertaining data about existence of the mineral deposit than mineral development. This means, issues that resulting from these activities are not attended to or given due diligence. The results imply that most activities of oil and gas companies in Butiaba Sub County aim at ascertaining economic viability of the oil and gas resource development. Thus, great levels of uncertainty surround the activity and less attention is given to whether the community benefits or not though these activities also are still part of initial industry investment. At such a stage, nothing is certain about catering for the community wellbeing from the revenues accruing from oil and gas exploitation investment in the region.

Furthermore, activities such as surveying and mapping require perquisite technical expertise (Cordaid 2016**)** and thus local sources of labour supply may not meet these demands. This makes the community members to fail to secure employment that would improve on peoples' livelihoods. Although surveying and mapping are major exploration activities, they take long temporal intervals, but cover larger spatial extents thus affecting more people negatively.

Land acquisition and construction were characterised as the least dominant exploration activities in Butiba Sub County. Although these are directly linked to people's welfare, the results show that they are being undertaken on a small scale. Through land acquisition activities, the communities benefits from increased land transactions and proceeds given the fact that value for land rises. Construction of support infrastructure like roads, housing, safe water and power supply for oil and gas companies does not only satisfy the employment needs of the community members whose skills match the requirements but also serve amenity needs of the whole community.

The current study findings are however; in contention with Devold (2013)'s argument that surface features such as tar seeps or gas pockmarks provided initial clues to the location of shallow hydrocarbon deposits. It was established that the methods in use in Butiaba Sub County involve mainly surveys, mapping, and seismic probing to identify potential hydrocarbon bearing rock and other prospects.

4.3 Effects of oil and gas exploration activities on people's livelihoods in Butiaba Sub County

To determine the effects of oil and gas exploration activities in the area, the study examined the major livelihood sources that people in the area were/are engaged in before and after commissioning of oil and gas exploration activities were compared. Further scrutiny involved analysis of the positive and negative effects due to oil and gas.

4.3.1 Livelihood activities carried out before and after oil and gas exploration activities started in Butiaba Sub County

The respondents were asked to indicate the livelihood activities they were engaged in before and after oil and gas exploration was commissioned in the area and the results were computed into frequencies and percentages as presented in Table 4.3.

Table 4.3: Livelihood activities before and after oil and gas exploration activities started in Butiaba Sub County

	Livelihood	**Before**			**After**		
	Activity	**Number of people engaged**	**%**	**Relative %**	**Number of people engaged**	**%**	**Relative %**
1	Crop farming	264	88.9	21.9	182	65.2	16.2
2	Livestock farming	172	57.9	14.3	128	45.9	11.4
3	Fishing	200	67.3	16.6	109	39.1	9.7
4	Flora & fauna resources' harvesting	73	24.6	6.1	87	31.2	7.8

5	Trade and commerce	136	45.8	11.3	150	53.8	13.4
6	Sand mining & stone quarrying	158	53.2	13.1	171	61.3	15.2
7	Casual employment	126	42.4	10.5	159	57	14.2
8	Formal employment	74	24.9	6.2	136	48.7	12.1

Table 4.3 shows that 88.9% of the respondents were engaged in crop farming before oil and gas exploration. Further still, 57% were involved in livestock farming, 67.3% in fishing, 24.6% in flora and fauna resources' harvesting, 45.8% in trade and commerce, 53.2% in sand mining and quarrying, 42.4% in casual employment and 24.9% were under formal employment as their livelihood activities before commissioning of oil and gas exploration in Butiaba Sub County. In terms of proportion of respondents amongst the various forms of livelihoods before oil and gas exploration, the table reveals that those involved in crop faming represented 21.9%, livestock farming 14.3%, fishing 16.6%, flora and fauna resources' harvesting 6.1%, trade and commerce 11.3%, causal employment 10.5% while formal employment represented 6.2%. These results imply that before oil and gas exploration activities, people in the study area were majorly dependant on crop farming, fishing, livestock farming and sand mining and quarrying. Trade and commerce, casual employment, formal employment, followed while flora and fauna resources' harvesting were indicated to be the least relied-on sources of livelihood.

Table 4.3 further shows the livelihood activities people of Butiaba engaged in after oil and gas exploration activities were commissioned. The table reveals that, 65.2% of the respondents were undertaking crop farming as their major livelihood activity, 45.9% were engaged in livestock farming, 39.1% in fishing, 31.2% in flora and fauna resources harvesting, 13.4% in trade and

commerce, 61.3% in sand mining and quarrying, 57% in casual employment while 48.7% were operating under formal employment. In terms of proportions amongst the various forms of livelihoods after oil and gas exploration, those engaged in crop faming represented 16.2%, those involved in sand mining & stone quarrying represented 13.1%, livestock rearing 11.4%, fishing 9.7%, flora and fauna resources' harvesting 7.8%, trade and commerce 13.4%, sand mining and quarrying 15.2%, causal employment 14.2% while those in formal employment represented 12.1%. The results here show that after oil and gas exploration activities in Butiaba Sub County, people were majorly engaged in crop farming, sand mining and stone quarrying, casual employment in the oil and gas industry activities, followed by trade and commerce, formal employment, livestock rearing, flora and fauna resources' harvesting and fishing being the least engaged in livelihood activity.

The findings above are in line with what the Buliisa District Local Government report (2012) revealed that agriculture, with over 45% of the population depending on subsistence farming, was the main source of livelihood in Buliisa District. It further reports that the rest of the population depended on fishing (20%), livestock rearing (15%), trade and commerce (10%), and formal employment income (6%) and that, the agricultural sector mainly included growing of traditional cash crops such as cotton and tobacco as well as food crops like cassava, Irish potatoes, sweet potatoes, maize, beans and groundnuts according to the report.

The trend of people's livelihoods before and after commissioning of oil and gas exploration activities is depicted in Figure 4.2.

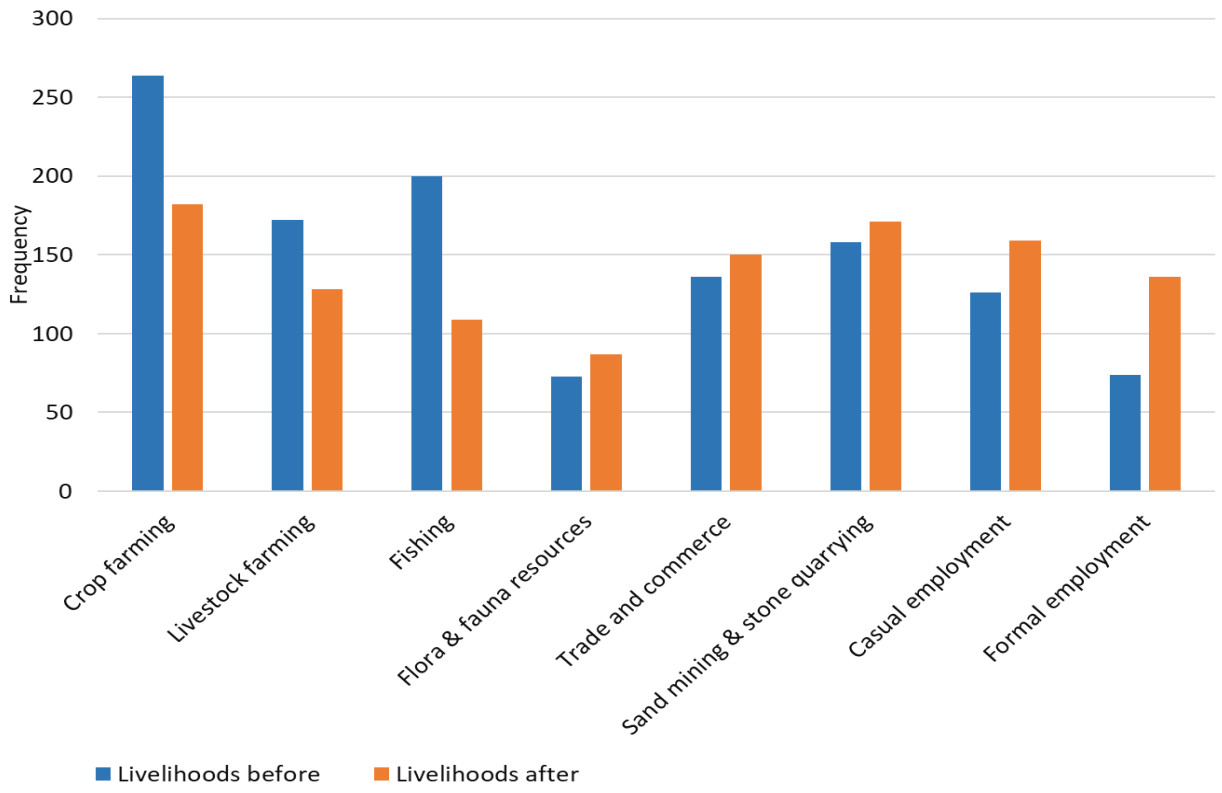

Figure 4.2: Livelihood activities practiced before and after oil and gas exploration

Figure 4.2 reveals changes in engagements in the different livelihood activities of people after oil and gas exploration came into existence in the area of study. It reveals that whereas crop farming, livestock farming and fishing declined in engagement, flora and fauna resource harvesting, trade and commerce, sand mining and quarrying, casual employment and formal employment experienced a gain in engagement.

The results in Table 4.4 reveal the percentage changes in the number of people engaged in various livelihood activities after the commissioning of oil and gas exploration activities in Butiaba Sub County.

Table 4.4: Percentage change in Livelihood activities after oil and gas exploration activities started in Butiaba Sub County

	Livelihood Activity	**Number of people involved before (X_1) (of 297)**	**Number of people involved after (X_2) (of 297)**	**Percentage change** $\%\Delta = \frac{X2 - X1}{X1} x100$
1	Crop farming	264	182	-31.1
2	Livestock farming	172	128	-26.0
3	Fishing	200	109	-46.0
4	Flora & fauna resources' harvesting	73	87	19.2
5	Trade and commerce	136	150	10.3
6	Sand mining & stone quarrying	158	171	8.2
7	Casual employment	126	159	26.2
8	Formal employment	74	136	84

Table 4.4 reveals that the number of people who were engaged in crop farming declined from 264 to 182 representing a -31.1% change. The number of those engaged in fishing declined from 172 to 128 representing –26% change and those engaged in livestock rearing declined from 200 to 108 representing –46% change respectively. On the other hand, other forms of livelihoods registered increase in engagement that is, the number of people engaged in flora & fauna resources' harvesting increased from 73 to 87 representing 19.2% change. People engaged in trade and commerce increased from 136 to 150 representing 10.3% change, those engaged in sand mining and stone quarrying increased from 158 to 171 thus 8.2% change, those engaged in casual employment increased from 126 to 159 representing 26.2% change and formal employment increased from 74 to 136 representing 84% change.

The results above reveal that after commissioning of oil and gas exploration, the biggest percentage decline was witnessed in fishing while the smallest percentage decline in engagement was realized in livestock farming. The biggest percentage increase in engagement on the other hand was in observed in formal employment while the least was in flora and fauna resources' harvesting. The trend of people's livelihood before and after oil and gas exploration showing the decline and gains in engagement is depicted in Figure 4.3.

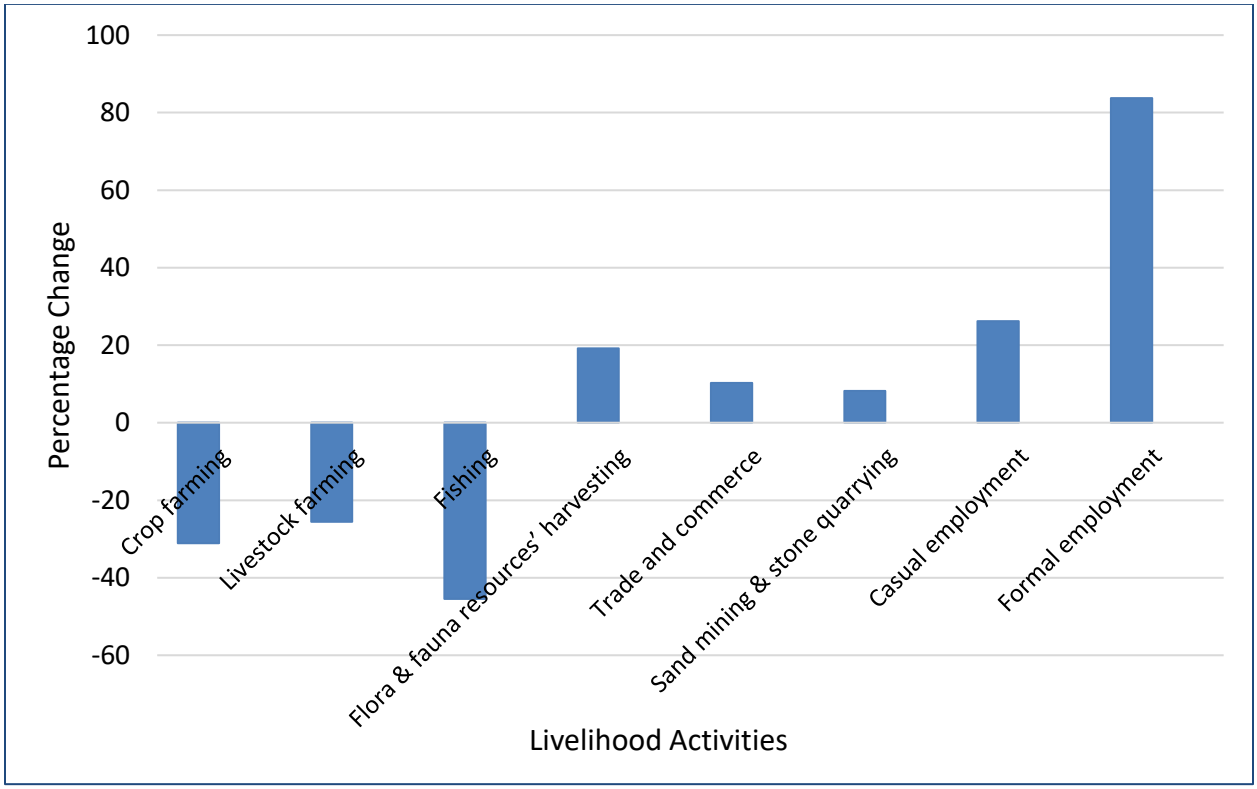

Figure 4.3: Percentage change in livelihood activities after oil and gas exploration

The results above reveal that oil and gas exploration activities affected some livelihood activities positively and others negatively. Formal and casual employment experienced major positive changes, which means oil, and gas exploration provided more jobs to skilled, semi-skilled and non-skilled workers in Butiaba Sub County. Fishing and farming on the other hand experienced

major negative changes since the commissioning of oil and gas exploration activities. This implies that oil and gas exploration activities in Butiaba Sub County interfered with fishing as well as farming activities by way of constraining access to a land for farming and or water bodies that served as fishing grounds before oil and gas exploration. Aryeh & Oijie (2013) posted similar results. In their study (Aryeh & Oijie, 2013), it was discovered that, oil and gas exploration activities caused shifts in livelihood sources not only in the surrounding communities (Half Assini and Efaso) but also in the whole of Ghana.

4.3.2 Positive effects of oil and gas exploration activities on people's livelihoods in Butiaba Sub County

In line with the second objective of the study, respondents were tasked to state the benefits they have realised following the commissioning of oil and gas exploration activities in Butiaba Sub County. The results obtained thereof are presented in Table 4.5.

Table 4.5: Livelihood benefits from oil and gas exploration activities in Butiaba Sub County

Effect		Number of people benefiting (out of 297)	Percent	Relative %
1	Access to safe water	139	47	13.4
2	Access to health care	102	34.3	9.8
3	Access to food	171	58	16.4
4	Access to land for agriculture.	86	29	8.3
5	Access to market for agricultural output.	200	67.3	19.2
6	Access to transport.	172	58	16.5
7	Connection to hydroelectric power.	94	32	9.0
8	Access to telecommunication.	76	26	7.3

Table 4.5 reveals that oil and gas exploration has positively benefited the people of Butiaba Sub County. 47% of the respondents had realised improved access to safe water; 34.3% experienced improved access to health care; 32% of them had had access to hydroelectricity power, 29% had accessed land for farming, while 26% had realised improved access to information as a result of oil and gas exploration taking places in Butiaba Sub County.

The livelihood benefits that benefited over 50% of the respondents include improved access to market for agricultural output (68%), improved transport (58.5%) and improved access to food (58.2%). In terms of proportions, the highest percentage was for access to market (19.2%), followed by improved transport (16.5%), and access to food (16.4%). The lowest percentages were for access to information (7.3%), access to land (8.3%), access to power (9%) and access to

health care. These results imply that oil and gas exploration activities in Butiaba Sub County have benefited people's livelihoods in terms of increased access to market for agricultural products, given the fact that a majority of the people (88.9%) were engaged in agriculture more so crop farming; improved transport and improved access to food.

The results also show that despite limited access to land for agriculture and general decline in agriculture in the area (as shown in this study), access to food had improved. This can be explained by the fact that improved transport and access to market for agricultural products has enabled people to access the food that is in the market from different sources rather than growing their own.

The major positive effects from oil and gas exploration activities identified according to the above findings include improved access to market for agricultural produce, access to food, improved transport largely, and to a small extent increased access to power, development of small-scale industries, access to water, improved health care facilities, access to information, access to land and development of schools' infrastructure. The first three elements of peoples' welfare had response ratings above 50% whereas those that proceed had response ratings below 50%. This signals that there is improved infrastructure and social amenities as well as improved standard of living due to oil and gas exploration activities.

It was also discovered that business and market opportunities had increased due to oil and gas exploration thus transforming people's standard of living. Whenever infrastructure development comes up in an area, demand for various goods and services increase and as such a number of retail businesses such as mobile money, shops, restaurants, boutiques among others emerge. This is because of influx of people either working or looking for jobs in the project. The incomes of

the people involved in such business therefore increase resulting into improved welfare. This has been the case in Buliisa. Residents report that there has been rising demand for fish and charcoal. Cattle farmers were also reported to have benefited from the high demand for meat cattle in the area. It was also noted that, oil and gas exploration activities have led to employment opportunities especially to those people who are engaged in providing casual labour mainly in the exploration activities. The key informants noted that oil and gas exploration has directly and indirectly created employment opportunities and that the youth in particular have benefitted.

4.3.3 Infrastructural developments due to oil and gas exploration activities in Butiaba Sub County

The study established that a number of social economic activities and sprung up in the area due to commissioning of oil and gas exploration activities in Butiaba Sub County. The results in line with this are summarized in Table 4.6.

Table 4.6: Infrastructural developments experienced due to oil and gas exploration activities in Butiaba Sub County

	Infrastructure	**N (of 297)**	**Percent**	**Relative %**
1	Schools	48	16.1	9.5
2	Hospitals	66	22.2	13
3	Roads	114	38.3	22.5
4	Small scale industries	105	35.3	20.8
5	Water supply	66	22.2	13
6	Hydro Electric Power extension	107	36	21.1

Source: Field data 2019

The results in Table 4.5 indicate that oil and gas exploration activities promoted development of some infrastructure from which people in Butiaba Sub County can derive social amenities that improve on their livelihoods. The respondents revealed that there were infrastructural developments in the area in terms of schools (16.1%) hospitals (22.2%), roads (38.3%), small-scale industries (35.3%), water supply (22.2%) and Hydro Electric power extension (36%) which came up as a result of oil and gas exploration in the area. Some infrastructure such as roads,

Hydro Electric power extension and small-scale industries were relatively more developed. These are directly linked to oil and gas exploration activities and therefore benefit much more from it than the least developed ones, which included schools, water supply, and hospitals. These results imply that oil and gas exploration activities have been beneficial in terms of infrastructural development, and some of the infrastructural developments observed in the field are shown in Figure 4.4.

Figure 4.4: A= Masindi-Buliisa road under construction to support oil and gas exploration activities, B=A primary school being upgraded to support education in Bugoigo, CD= Buliisa Health Centre IV under renovation funded by Tullow Oil Company Uganda.

As far as infrastructure development is concerned, the study revealed that there has been development of Hydro Electric Power in the area. That is the establishment of a mini dam power at Waaki, construction of Waiga Bridge, Butiaba airfield and roads such as Wantembo–Waaki road and other access roads within Walukuba. A health centre has been constructed in Kigoya, to take care of health needs of the people. Oil and gas exploration companies have carried out renovation of some of the primary school buildings such as Bugoigo, Nyamukuta, and Walukuba. Oil and gas exploration companies like Tullow with the Tullow Oil Link School Improvement Project (TOLSIP) was identified as one of the leading companies in the improvement of the primary schools and training teachers in management of discipline among learners in Butiaba Sub County. Apart from renovating schools, Tullow Uganda Operations Pty Ltd has constructed new blocks in some health canters such as Kigoya and Buliisa health centre IV to add support to Government of Uganda. This renovation accounts for the results on increased access to health care services in Butiaba Sub County.

The above results reflect the arguments by Boohene (2011) who while referring to some African oil producing countries such as Nigeria, Gabon, Angola, Sudan and Chad indicates that oil is a resource of both great opportunity because it brings huge revenue for the country's economic development indicated by social services such as schools, hospitals and roads. The findings further concur with those reported by the Vokes (2012), which state that due to different businesses, which open up in the area of oil and gas, the populations tend to increase through

immigration and therefore market for products like fish, crop and animal products, charcoal and firewood widen. However, the study results show that whereas oil and gas exploration activities have contributed positively to peoples' livelihoods in Butiaba Sub County. Most healthcare and school infrastructure were however, just renovated and three new structures established. This means that only those people who had access to the formerly existing hospitals and schools are being served whilst areas formerly without these remain unsaved hence no significant improvement in peoples' wellbeing. The findings also relate Dowokpor (2015)'s findings that fishing communities in Ghana were benefiting from oil companies' Corporate Social Responsibilities projects including infrastructural development and contribution towards community development activities.

4.3.4 Negative effects of oil and gas exploration activities in Butiaba Sub County

To ascertain the negative effects of oil and gas exploration, which directly or indirectly affect people's livelihoods, respondents were asked to state how oil and gas exploration activities had negatively affected their livelihoods. The responses were enumerated and are summarized in Table 4.7.

Table 4.7: Negative effects of oil and gas exploration activities in Butiaba Sub County

Effect		Number of people affected (out of 297)	Percent	Relative %
1	Reduction in food crop farming	167	56	10.4
2	Reduction in cash crop farming	169	57	10.5
3	Grazing land loss	177	60	11.0

4	Reduction in Fishing	217	73	13.5
5	Decline in flora and fauna resources	160	54	10
6	Land conflicts	175	59	10.9
7	Displacement of people	200	67	12.5

Source: Field data 2019

Table 4.7 indicates that 56% of the respondents had experienced reduction in food crop farming; 57% realised reduction in cash crop farming, 60% had lost their grazing land; 73% witnessed reduction in fishing; 54% a decline of flora and fauna resources harvesting. Further, 59% of the people encountered increase in land conflicts whilst 67% had experienced land displacements. The results above imply that oil and gas exploration activities have largely been associated with negative effects on people's livelihoods. The results from interviews with key informants too did not differ so much from what was revealed by quantitative data analysis. During an interview session with the District Agriculture Officer, he had this to say,

> *Cotton production has reduced from 80% to 2% as a result of oil and gas exploration activities. Likewise, fish production has reduced from 10 tonnes to 3 tonnes per boat per month while the fish prices have increased. The cost of a kilogram of Nile perch for example, has risen from Shillings 5,000 to Shillings. 7,500.*

The study also found out that oil and gas exploration activities made it impossible for some people living in the area to access their livelihood locations. That is, where they used to derive livelihoods, such as hunting grounds, and firewood collection. It was revealed that Tai -Tai exploration area initially had a road that linked people to the lake but with oil and gas exploration in place the road was blocked making the fishing ground inaccessible.

Findings from one of the key informants in one of the villages in Butiaba Sub County, revealed that, in villages such as Walukuba and Tugo-mbili, people lost grazing land, crawls, cotton and maize gardens, and houses due to exploration activities. The villages affected by mapping for the oil pipeline include Booma, Tugo-mbili, Walukuba, and Kamagongero. Another chairperson of one of the villages revealed that about eight and nine households in Booma and Wantembo among others were affected by clearance for the pipeline project and those displaced were unhappy because they had not been compensated.

The vehicles that collected wastes from the exploration areas were also noted to have a negative impact of creating a lot of dust and noise, which affect roadside businesses. These were noted to move in a convoy of over 10, which affects other road users.

The Buliisa District Local Government report (2012) shows that people who depend on the Lake Albert have been adversely affected by diminishing fish catch numbers. The District fisheries officer's views however, differed slightly from the current study because to him most people relocated to the Lake for the fishing activity after they were removed from other activities and yet in this study, it was shown that those engaged in fishing has reduced. However, in either way, fishing is affected negatively because when the number of people engaged in fishing increases, the fish catch reduces hence negatively affecting the welfare of those involved (Obi, 2001). This explains the increase in the fish prices in the study area as it was noted during an interview session. Besides, wastes from oil and gas exploration when deposited in water bodies cause death of aquatic life and thus reduces on fish stocks (Oboi, 2001; Menibarini, 2004; Uyigue, 2009; UN, 2013). Menibarini (2004) and Uyigue (2009) and argue that environmental pollution caused by oil drilling results into a destruction of livelihoods in local communities making it difficult for

the present and future generations to make a living. Rwakakamba and Lukwago (2016) also state that farming and fishing activities that most oil and gas endowed economies formerly depended on literally come to a halt with the commencement of exploration and exploitation activities. The results are also related to Dowokpor (2015)'s study findings who established that oil and gas exploration activities posed great harm to the livelihoods of fishermen in Ghana through loss of access to fishing grounds.

Negative effects were recorded in terms of decline in formal and informal employment and trade and commerce. This shows that, after commissioning of oil and gas exploration, a drastic shift occurred in labour from fishing and crop farming to casual employment in oil and gas industry and sand and quarrying. Besides, the results also signify that oil and gas exploration activities possibly interfered with these forms of livelihoods in terms of space since they occur on water (former fishing grounds) and farmlands although crop farming maintained its position among the major sources of livelihoods.

Butiaba Sub County lies on the shores of Lake Albert thus more people ought to be engaged in fishing however, this study shows that, this was the case before oil and gas exploration. The means that some exploration works are taking place on the water body or on the former fish landing sites thus blocking community access to the lake. There was general consent that crop growing and livestock farming had registered a reduction as well as fauna and flora resources harnessing activities like firewood collection and hunting.

The study also established that local farmers were manipulated by intermediaries into selling of their land at less-than-replacement prices. Sometimes, they were threatened or intimidated into selling their land. Land speculation and its displacement has knock-on effects in that people

pushed out of higher-value land encroach upon more marginal land, creating inflation at lower levels, with poorer people becoming completely priced out of the land market. Respondents also indicated that as a result of the project-induced in-migration, the population of Butiaba Sub County is steadily increasing and this has many implications which include rising of the cost of living, available social services being over-stretched, yet this affects people most especially the poor. These get challenges in accessing the needed services.

Interviews with key informant established that oil and gas exploration in Buliisa has brought about increase in sexual immorality. It was noted that there had emerged commercial sex, which was previously non-existent in Butiaba Sub County. Road construction workers and oil and gas exploration industry foreign workers are involved in commercial sex activities with girls and women in the community. This girls and women engage in commercial sex activities with the hope of improving their welfare. Since the oil and gas exploration workers are perceived to have financial resources, the girls and women in the community are easily lured into sex with them. It was also noted that even the native men are also involved with some girls and women because of increased income got from working with the oil and gas companies. Such activities of moral decadency are associated with family breakdown in the short run and spread of HIV/aids in the end, which adversely affect the very welfare that people sought to improve.

This finding is in line with Obi (2001) who indicates that oil and exploration increase the propensity for women to choose commercial sex work for income generating purposes. He argues that commercial sex brings disastrous consequences to women's livelihood because they are usually the most gender involved in agriculture as the source of income. The influx of foreign

oil workers; often well paid as expatriates makes the profession of commercial sex work potentially more lucrative in such communities.

Air and water pollution were also mentioned as another negative effect arising out of oil and gas exploration activities. Across the Albertine region there is air and water pollution emanating from exploration activities. Respondents indicated that pollution affect plants, animals and human beings. Apart from water from the lake, which was restricted during exploration, indigenous people were made to use water from the open wells for domestic purposes and for watering their animals. Test-well drilling as an exploration activity aimed at establishment of the amount of oil and how fast it will flow; involve the process of burning which creates a thick smoke thus contributing to environmental pollution (Cordaid, 2016). Omede (2014) who states that oil resource exploitation, which involves various chemical and seismic wave generation, is a major source of environmental degradation, particularly through liquid discharges and oil spills as well as gas flaring, corroborates this statement. He further notes that petroleum consists of complex mixtures of aliphatic, alicyclic, and aromatic hydrocarbons, which are detrimental to the atmosphere during oil and gas exploration processes and so affect the environment.

4.4 Mitigation of adverse effects of oil and gas exploration activities in Butiaba Sub County

The study sought to evaluate the mitigation measures that have been put in place by oil and gas companies, government and Non – Governmental organizations against the negative effects of oil and gas exploration. A number of measures were identified and evaluated.

4.4.1 Mitigation measures

An analysis was done on existing mitigation measures against the negative effects of oil and gas exploration activities to people's livelihoods in Butiaba Sub County. The questionnaire items required respondents to state the measure they have witnessed in their areas and the responses are presented in Table 4.8.

Table 4.8: Mitigation Measures against negative Effects of Oil and Gas Exploration

Measure		N (of 297)	Percent	Relative %
1	Tree planting	163	55	17.1
2	Resettlement & compensation	133	45	14
3	Sensitization	123	41.4	12.9
4	Contaminated water treatment	98	33	10.3
5	Industrial waste management	107	36	11.2
6	Monitoring noise and radiation levels	124	42	13
7	Community dialogue	79	27	8.3
8	Exploration site restoration	126	42.4	13.2

Source: Field data 2019

Results in Table 4.8 show that 55% of the respondents indicated tree planting as one of the mitigation measures against the effects of oil and gas exploration. 45% indicated resettlement and compensations, 41.4% indicated sensitisation, 33% indicated treatment of contaminated water treatment, 42% indicated monitoring noise and radiation levels, 27% indicated community dialogue while 42.4% indicated site restoration. In terms of proportion of all the mitigation measures, tree planting represented 17.1%, resettlement and compensations 14%, sensitisation 12.9%, wastewater treatment 11.2%, monitoring noise and radiation levels 13.2%, community dialogue 8.3%, and exploration sited restoration 13.2%. The findings indicate that tree planting was the main mitigation measure employed to overcome side effects of oil and gas exploration activities in Butiaba Sub County since less than 43% of the respondents disagreed with the stated

fact. Community dialogue for conflict resolution is shown as the least (27%) applied mitigation and yet this study indicated land disputes and displacements as some of the major negative effects of oil and gas explorations in Butiaba Sub County. The results here show that whereas there are attempts to mitigate the negative effects of oil and gas exploration activities, much of the efforts are far below average as revealed by the rankings of respondents that were below 50%.

4.4.2 Organisations/agencies responsible for implementation of the mitigation measures

Further scrutiny was done in terms of which organisation (s) undertake which mitigation measures. The results in line with this are shown in Table 4.9.

Table 4.9: Organizations Responsible for Mitigation Measures against negative Effects of Oil and Gas Exploration

	Measure	Oil and gas companies		Government		NGOS		Local community	
		N (of 297)	%	N (of 297)	%	N (of 297)	%	N (of 297)	%
1	Tree planting	45	15.7	74	24.9	222	74.7	265	89.2
2	Resettlement & compensation	219	73.7	202	68	-	-	-	-
3	Sensitization	22	7.4	53	17.8	217	73.1	-	-
4	Contaminated water treatment	266	90.2	41	13.8	297	-	-	-
5	Industrial waste management	273	91.9	22	7.4	-	-		-
6	Monitoring noise and radiation levels	268	90.2	-	-	-	-	-	-
7	Community dialogue	271	91.2	14	4.7	11	3.7	130	43.8
8	Exploration site restoration	297	100	-	-	-	-	15	5.1

Source: Field data 2019

Table 4.9 shows that the task of mitigating the negative effects of oil and gas exploration activities is largely borne by oil and gas companies and the government. The most dominant roles for oil and gas companies include; exploration site restoration (100%), industrial waste management (91.9%), community dialogue (91.2%), contaminated water treatment (90.2%), monitoring of noise and radiation levels (90.2%), resettlement, and compensation (73.7%). The least dominant of the mitigation measures engaged in include; community sensitisation (7.4%) and tree planting (15.7%). This means that these two mitigation measures are given the least attention by oil and gas companies since they do not benefit much from them as a company.

Government as a stakeholder in oil and gas industry is also responsible for implementation of some mitigation measures that is, industrial waste management 7.4%, community dialogue 4.7%, contaminated water treatment 13.8%, sensitisation 17.8%, and tree planting 24.9%. The most important role played by government is resettlement and compensation (68%). These findings imply that government has left much of the responsibility of mitigation of negative effects of oil and gas explorations to the companies involved rather than playing a leading role (Stammler & Wilson, 2006).

Non-government organisations were indicated to mainly handle the responsibility of tree planting (74.2%), community sensitisation (73.1%) and community dialogue (3.7%) being the least of activities engaged in. This signals that NGOs only handle a small percentage of mitigation activities in the oil and gas sector in Butiaba Sub County.

The community in which oil and gas exploration activities are under taken in Butiaba Sub County also participate in mitigating the negative effects mainly through tree planting (89.2%) and community dialogue (43.8%). This means that the community in Butiaba Sub County is only

involved in mitigation measures, which they directly benefit from, or those that directly relate to their livelihoods. Whereas these results do not indicate actual implementation of the mitigation measures by various organisations, they reflect the perception of the respondents on what the distribution of roles in implementation of mitigation measures against the negative effects of oil and gas exploration activities.

From the analysis, tree planting was discovered as the main mitigation measure being implemented. Resettlement and compensation, exploration site restoration and monitoring noise and radiation levels, sensitisation, industrial waste management, contaminated water treatment and community dialogue being the least applied measure followed this. The results show that apart from tree planting and sensitisation, less than 50% of the respondents indicated that the above mitigation measures were being implemented in Butiaba Sub County. The dominancy of tree planting implies that residents have adopted it as a livelihood activity irrespective of oil and gas exploration effects. However, adopting tree planting as a way of mitigating effects of oil and gas exploration activities is a good move whether for livelihood improvement or just as a mitigation measure since trees are effective in removing excess carbon from the atmosphere as observed by (Bvis, 2019). Forest restoration to can contribute towards cutting atmospheric carbon emissions, as forest productivity is renewed as observed by Bvis (2019). Tree planting is highly encouraged in Uganda as well because of associated benefits as outlined in various policy and legal documents (e.g. National Environment Management Policy, 1994; National Forest Policy 2008; National Oil and Gas Policy for Uganda, 2008).

It was established that only 46% of the respondents argued that resettlement and compensation as mitigation against land displacements was being implemented. This is because resettlement and

compensations of the affected persons is done unsatisfactorily. The study shows that the local communities are not happy with the way compensation is done. Some respondents indicated that they actually received nothing as compensation for their land. It should be noted that land in Buliisa is communally owned, which presents challenges in identifying proper methods of compensating the people. It was discovered in the current study that sensitisation and community dialogue were not widely implemented. These findings largely subscribe to the (Cordai, 2014; Ogwang and Vanclay, 2019) that since resettlement usually has social impacts on people and their livelihoods, companies and government or project developers need to inform the affected communities adequately and early about the resettlement process including giving information on eligibility and entitlement frameworks with compensation and livelihood restoration packages.

The study indicated that much of the responsibility of implementing mitigation measures against negative effects of oil and gas exploration is placed in the hands of companies involved. These are indicated to be largely responsible for resettlement & compensation, contaminated water treatment, industrial waste management, community dialogue, monitoring noise and radiation levels, and exploration sites' restoration. Oil and exploration companies were however revealed to play a minor role in tree planting, and community sensitisation. Government is responsible for mostly resettlement and compensation and to a very small extent tree planting, community sensitisation, water treatment, industrial waste management, sensitisation and community dialogue. The government is not involved in activities of monitoring noise and radiation levels and exploration sites' restoration. NGOs are responsible for tree planting and community sensitization largely and to a lesser extent community dialogue. NGOs are not widely engaged in resettlement and compensation, contaminated water treatment, industrial waste management,

resettlement and compensation, monitoring noise and radiation levels and exploration sites' restoration. On the other hand, the community participates in tree planting and community dialogue puts some little effort in exploration site restoration. The community is not involved in resettlement and compensation, contaminated water treatment, industrial waste management, and monitoring noise and radiation levels.

These results signify unbalanced and uncoordinated role sharing in the mitigation of the adverse effects of oil and gas exploration. Whereas oil and gas companies are the main contributors to the negative effect of oil and gas exploration, the responsibility of managing these effects should be the responsibility of all the stakeholders for the objective of sustainability to be realised. It should be noted that oil and gas companies operate as business entities with profit maximisation motive thus; they have no regard for mitigation activities that increase costs of operation and undermine profits. The government holding back on key responsibilities like site restoration and general environmental management implies reduced trust from the masses that look to it for stewardship of environmental resources and their management. Never the less, the oil and gas companies such as Tullow and Total E & P as well as PEARL were reported to have been able to engage the communities and local leaders in giving information and sensitizing them. Some NGOs like LAKWADO, RDP and others have been playing some role of educating the communities as well.

Environmental Advocacy in Uganda (NAPE, 2016) has also continued to work with host communities in the oil region through education and sensitization workshops on oil issues and its impact on the environment and livelihoods as well as human rights so that the communities can position themselves to benefit from the oil development.

CHAPTER FIVE

SUMMARY CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents a summary of the major findings, draws conclusions and makes recommendations following the study objectives in line with the effect of oil and gas exploration activities on people's livelihoods in Butiaba Sub County.

5.2 Summary

This study was undertaken to establish the effects of oil and gas exploration activities on people's livelihoods in Butiaba Sub County, Buliisa District. The key findings of the study are as follows.

Oil and gas companies in Buliisa District are majorly involved in surveying, mapping and drilling of test wells as exploration activities. The other exploration activities undertaken on a small scale include site clearance, seismic probing, land acquisition and construction of support infrastructure.

Oil and gas exploration activities have negatively affected people's livelihoods in Buliisa Sub County. There was a marked decline in major livelihood activities including fishing, agriculture and access to forest/wildlife/wetland resources' harvesting. Oil and gas exploration activities have spurred increase in displacements and land conflicts in the Albertine region. However, there have been some benefits emerging from oil and gas exploration activities, which include; infrastructural development that is construction of Hoima-Biiso-Butiaba road, Waiga Bridge,

Butiaba airfield, Waaki Hydro power dam, and renovation of Kigoya health center and Bugoigo, Nyamukuta, and Walukuba primary schools.

Whereas there is existence of a number of measures to deal with the negative impacts of oil and gas the efforts are so minimal as compared to the rate at which oil exploration activities are taking place. Tree planting was the major mitigation measure being employed mainly by the community and NGOs to mitigate the negative effects of oil and gas exploration activities in Buliisa District. There is not much done especially in ensuring that the local communities are well informed about the future effects oil and gas production. The major roles of mitigation have been placed in the hands of oil and gas companies and yet these tend to be more profit driven. From this study, is evident that the government has distanced its self from the major roles despite its key position in the sector.

5.3 Conclusions

From the study findings, it is clear that, oil and gas exploration in Buliisa majorly involves surveying, mapping and drilling of test wells. These exploration activities have affected people's livelihoods positively although in some instances negative impact have resulted.

There is limited provision for mitigation of the adverse effects of oil and gas exploration activities as tree planting is the major mitigation measure employed by the community and NGOs in Butiaba Sub County. Oil and gas exploration companies and the government are less involved in the mitigation of the negative effects of oil and gas exploration activities on people's livelihoods in Butiaba Sub County. The findings from this study will act as reference material to various organisations both private and state operated here in Uganda while reviewing policies

and regulations on the oil and gas sector before the production phase ensues to ensure the adverse effects of the activities on people's livelihoods are minimised.

5.4 Recommendations

Considering the findings and conclusion drawn, the following recommendations are suggested.

Non-intrusive methods of obtaining data on the location, quantity and quality of the oil and gas deposits should be promoted for oil and gas exploration. Aerial surveys and mapping activities with minimal physical presence on the ground should be encouraged by the oil and gas exploration companies.

The benefits accruing from oil and gas exploration should be enhanced for example the community should take advantage of the widened market for agricultural output created by increased influx of people, by increasing their farm productivity using modern farming methods. The community leaders should help landowners to develop their land into rental settlements and commercial centres from which they can derive livelihood.

There is a need to enhance the implementation of mitigation measures such as resettlement and compensation of the affected community members, community sensitisation, and environmental management to save the main forms of livelihoods threatened by oil and gas exploration activities. There is need for coordination in the implementation of all mitigation measures, following an integrated resources management approach to achieve the goals of sustainable development. All stakeholders in the oil and gas sector should be involved in all key stages of the oil and gas resource development. NEMA should take the lead role in coordinating issues related to environmental impact mitigation instead of leaving it to oil and gas companies.

Future research focus should be on assessing effects of oil and gas exploration on land resources from which people derive their livelihoods, using remote sensing and GIS. This can bring into perspective, the spatial and temporal distribution of the effects of oil and gas exploration on people's livelihoods.

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APPENDICES

APPENDIX I: MORGAN & KREJCIE (1970) SAMPLE SIZE DETERMINATION TABLE

Population (n)	Sample (s)	Population (n)	Sample (s)	Population (n)	Sample (n)
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

Source: Amin (2005)

APPENDIX II: QUESTIONNAIRE FOR HOUSEHOLDS IN BUTIABA SUB COUNTY

My name is Kyosimire Sylivia a student of Kyambogo University. I am carrying out an academic research on the ***Effects of Oil and Gas Exploration Activities on Livelihoods of People in Butiaba Sub County, Buliisa District.*** The purpose of this questionnaire is to solicit your response on the above topic. There are no wrong answers and all information given will be used for this piece of work academically only and will be treated with strict confidentiality. Do not include your name. Thank you in advance.

SECTION A

ONGOING OIL AND GAS EXPLORATION ACTIVITIES

1. What are the major oil and gas exploration activities taking place in Butiaba Sub County?

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SECTION B

LIVELIHOODS IN BUTIABA SUB COUNTY BEFORE AND AFTER OIL EXPLORATION ACTIVITIES

2. Which were your main livelihood sources, (a) before and (b) after oil and gas companies started exploration activities in Butiaba Sub–County?

   a) Livelihood activities before oil and gas exploration

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b) Livelihood activities after oil and gas exploration

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SECTION C

EFFECTS OF OIL AND GAS EXPLORATION ACTIVITIES

3. How have oil and gas exploration activities affected your livelihood sources positively?

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4. State the infrastructural developments that have taken place due to oil and gas exploration activities in Butiaba Sub County

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5. How have oil and gas exploration activities negatively affected your livelihood sources?

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SECTION D

MEASURES TO ADRESS NEGATIVE CONSEQUENCES OF OIL AND GAS EXPLORATION

6. (a) Are there measures that have been or are being put in place to address the negative effects of oil and gas exploration activities in Butiaba Sub County? Yes ☐ No ☐

(b) If Yes, what are the measures being put in place?

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11. List the organizations in Butiaba Sub County and the mitigation measures they are undertaking against the negative effects of oil and gas exploration activities?

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Thank you for your cooperation

APPENDIX III: INTERVIEW GUIDE FOR LOCAL, OPINION AND CULTURAL LEADERS AS WELL AS THE NATIVES (MALE AND FEMALE) OF BUTIABA SUB COUNTY

What were the major sources of livelihood of the people in Butiaba Sub- County, Buliisa District **before** the oil and gas exploration activities?

1. What were the major sources of livelihood of the people in Butiaba Sub- County, Buliisa District **after** the oil and gas exploration activities?
2. Have there been changes in the people's livelihood in Butiaba Sub County after the oil and gas exploration activities? If Yes, what are the changes that have occurred?
3. Have the oil and gas exploration activities negatively affected the livelihood of the people in Butiaba Sub County? If Yes, explain what effects are.
4. Are there specific effects that you know of in the areas of crop farming, animal rearing, fishing, trade, forest resource harnessing?
5. Has there been a shift from agriculture activities to another source of livelihoods? If Yes, what are the new activities that have improved the livelihoods of the people; which activities that have replaced agriculture?
6. State the extent to which oil and gas exploration has affected plant life?
7. What have the stakeholders of oil and gas exploration done to maintain green cover?
8. Is there a relationship between exploration of oil and land conflicts in Butiaba?
9. What nature of land conflicts has the Sub County experienced as a result of oil and gas exploration?
10. How has an oil and gas exploration activities endangered livelihood in Butiaba Sub-County?
11. What are the developments that have come up as a result of oil and gas exploration activities in Butiaba Sub County?
12. What efforts have been put in place by different NGOs and CSOs to mitigate the negative effects of oil and gas exploration activities in Butiaba Sub -County?
13. Give and describe the effort put in place by the government of Uganda to mitigate negative effects of oil and gas in Butiaba Sub County.
14. Was there resettlement exercise in Butiaba Sub County? If Yes, how did the exercise benefit the indigenous people?
15. Give recommendation in reference to oil and gas exploration activities?

Thank you for your cooperation

APPENDIX IV: INTERVIEW GUIDE FOR DISTRICT OFFICIALS, OIL AND GAS COMPANY WORKERS, AND LOCAL LEADERS

1. What are the exploration activities in Butiaba Sub County that the oil and gas companies have engaged in?
2. Give the names and number of the test wells that have been drilled.
3. Are there any benefits derived from the oil and gas exploration activities so far?
4. Is there any way the oil and gas exploration activities have affected the people negatively? If yes what have been the effects so far?
5. Are there specific livelihoods that have been affected by the exploration activities?
6. What measures have been or are being undertaken to deal with the negative effects of the oil and gas activities?

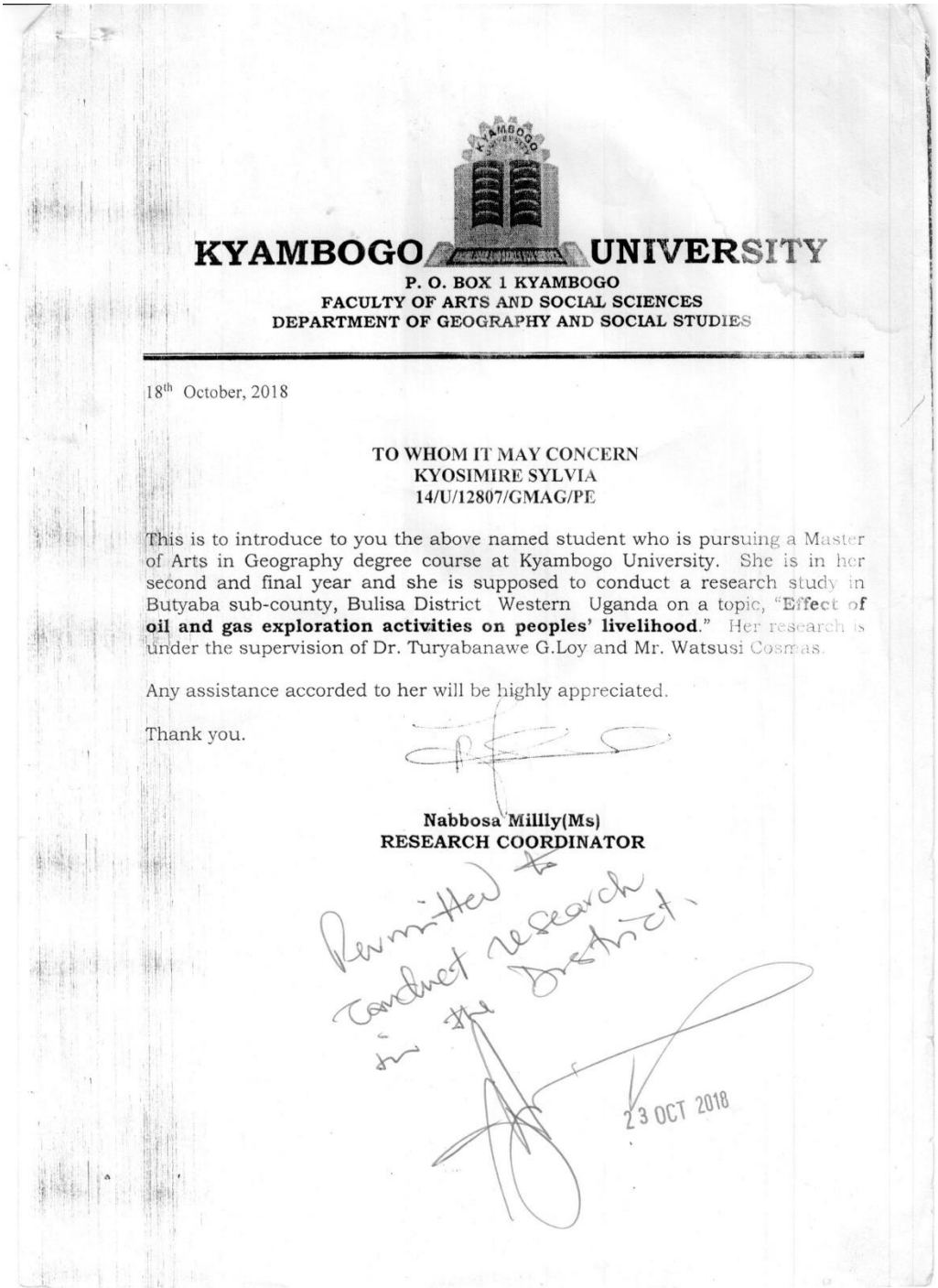
Thank you for your cooperation

APPENDIX V: OBSERVATION CHECKLIST ON EFFECTS OIL AND GAS EXPLORATION

1. The number of constructed oil and gas wells
2. Affected lake water by oil and gas exploration activities
3. Social developments such as schools, health centers, roads and piped water, bore holes, open springs among others that are related to oil.
4. Household structure development related to oil and gas exploration
5. The nature of gardens related to oil and gas exploration
6. Small scale businesses related to oil and gas exploration
7. Small scale industries related to oil
8. Green cover/environment relation to oil and gas exploration activities

APPENDIX VI

INTRODUCTION LETTER



KYAMBOGO UNIVERSITY

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FACULTY OF ARTS AND SOCIAL SCIENCES
DEPARTMENT OF GEOGRAPHY AND SOCIAL STUDIES

18th October, 2018

TO WHOM IT MAY CONCERN
KYOSIMIRE SYLVIA
14/U/12807/GMAG/PE

This is to introduce to you the above named student who is pursuing a Master of Arts in Geography degree course at Kyambogo University. She is in her second and final year and she is supposed to conduct a research study in Butyaba sub-county, Bulisa District Western Uganda on a topic, "**Effect of oil and gas exploration activities on peoples' livelihood**." Her research is under the supervision of Dr. Turyabanawe G.Loy and Mr. Watsusi Cosmas.

Any assistance accorded to her will be highly appreciated.

Thank you.

Nabbosa Millly(Ms)
RESEARCH COORDINATOR

Permitted to conduct research in the District.

23 OCT 2018