

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY

COLLEGE OF HUMANITIES AND SOCIAL SCIENCES

FACULTY OF SOCIAL SCIENCES

DEPARTMENT OF ECONOMICS

**AN ASSESSMENT OF SOCIO-ECONOMIC AND ENVIRONMENTAL IMPACTS OF
OIL AND GAS OPERATIONS: A CASE STUDY OF THE HOST COMMUNITIES
UNDER WESTERN AND CENTRAL COASTLINES OF GHANA**

**A THESIS SUBMITTED TO DEPARTMENT OF ECONOMICS IN PARTIAL
FULFILMENT OF MASTER OF SCIENCE ECONOMICS (ENERGY AND
NATURAL RESOURCE OPTION)**

BY

HERMAS, ABUDU (PG: 2758314)

MAY, 2016

DECLARATION

I, Hermas, Abudu, declare that this submission is my own work towards the MSC and that to the best of my knowledge, it contains no material previously published by another person nor material which has been accepted for the award of any other degree of the University, except where due acknowledgement has made in the text

STUDENT: HERMAS, ABUDU

Signed

Date.....

SUPERVISOR: MR. JONATHAN QUARTEY

Signed.....

Date

SECOND INTERNAL SUPPERVISOR: DR. JOHN BOSCO DRAMANI

Signed

Date.....

HOD, DR. YUSSIF, HADRAT

Signed

Date.....

ABSTRACT

The goal of this work is to assess perceived income decline of fishermen and farmers as results of oil and gas operations over the five years period (2010-2015) in coastal host communities under Western and Central coast of Western Region, Ghana. It is also, the objective of the study to examine apparent environmental problems (oil spills, gas flaring and other effluents) of oil and gas operations on host communities.

This research followed contemporary research procedures, thus primary source was applied to obtain data for the targeted aims. Recall data approach was used for data collection process. An interactive Dummy Variable technique was employed to estimate the elasticity of oil and gas operations on fishermen and farmers income for both current and future terms. The Model total effect revealed that a percentage (1%) increase in oil and gas operations, all else equal, the fishermen average monthly income will decline by 1.86%. However, Interactive dummy variable technique actual shows that farmers do not experience any decline in income levels caused by petroleum activities on host communities. Some finding were that, majority of folks whose properties affected by oil and gas operations were not compensated for and those who received compensations were not comparatively compensated for and hence they bemoaned the payments.

There is destruction of main traditional economic venture: fishermen are almost out of business and some farm lands, sacred vegetation are cleared. There is also high cost of living in some host communities: increased cost of goods and services and decreased income level of fishermen.

Finally, there is an improved level of health, water and educational infrastructures in some host communities. The questionnaire method establishes that, oil spills, gas flaring and effluent have not engulfed host communities at the time of this research.

ACKNOWLEDGEMENTS

Wisdom according to the Bible is of spirit and the application of it through knowledge.

This work wouldn't have been of success without Almighty God guidance and directions. My deepest appreciations therefore goes to Heavenly Father God, as it is said in John Chapter five verse 30 ;I cannot of my own self do nothing, the way i conceive ideas and knowledge is the help of God.

Furthermore, I thank my Supervisor, Mr. Jonathan Quartey, of Economics Department for his excellent environment and directions. He has been very supportive since the day I began working under him as Lecturer and Supervisor.

I thank Paul Kofi Baidoo, Martin Cudjoe, Assemblyman of Sanzule, Beyin, Anochie, Atuabo and Omanhene of the Western Traditional Council for aiding me during data collection stage and Evelyn Bankam for her assistance in data process. May, the good Lord bless them for their knowledge and other resources expended on this research.

Finally, I thank my boss, Victor Kojo Dzorvakpor for his advice and good environment granted me during this research at the office.

TABLE OF CONTENTS

KNUST

| | |
|-----------------------------------|-----|
| DECLARATION | II |
| ABSTRACT | III |
| ACKNOWLEDGEMENTS | IV |
| LIST OF TABLES | IX |
| LIST OF FIGURES | XI |
| APPENDIX | XII |
| CHAPTER ONE | |
| 1 INTRODUCTION | 1 |
| 1.1 BACKGROUND TO THE STUDY | 1 |
| 1.2 STATEMENT OF PROBLEM | 4 |
| 1.3 OBJECTIVES OF STUDY | 6 |
| 1.4 RESEARCH QUESTIONS | 7 |
| 1.5 SIGNIFICANCE OF STUDY | 8 |
| 1.6 SCOPE OF STUDY | 8 |

| | |
|---|----|
| 1.6.1 Geographical location of Oil and Gas and Economic Activities of Residents | 9 |
| 1.7 LIMITATIONS OF STUDY | 10 |
| 1.8 ORGANIZATION OF STUDY | 11 |
| CHAPTER TWO | 12 |
| LITERATURE REVIEW | 12 |
| 2.1 INTRODUCTION | 12 |
| 2.2 THEORETICAL FRAMEWORK..... | 12 |
| 2.3 EMPIRICAL STUDY OF OIL SPILLS, GAS FLARING AND EFFLUENTS | 14 |
| 2.3.1 Oil Spills and Gas Flaring as a Source of Socioeconomic Impact | 15 |
| CHAPTER THREE | 18 |
| RESEARCH METHODOLOGY | 18 |
| 3.1 INTRODUCTION | 18 |
| 3.2 DATA COLLECTION TECHNIQUE | 18 |
| 3.3 QUANTITATIVE AND QUALITATIVE METHODOLOGY | 19 |
| 3.4 POPULATIONFRAME, SIZEAND SAMPLING TECHNIQUE | 20 |
| 3.5 ECONOMETRIC MODEL AND VARIABLES DISCUSSION | 21 |
| 3.5.1 Mathematical Specification | 21 |
| 3.6 ANALYTICAL FRAMEWORK | 22 |
| 3.6.1 Data Processing | 22 |

| | |
|---|----|
| 3.6.2 Data Analysis..... | 23 |
| 3.6.3 Data Presentation | 24 |
| CHAPTER FOUR | 25 |
| FINDINGS, PRESENTATION, ANALYSIS AND DISCUSSIONS OF DATA | 25 |
| 4.1 INTRODUCTION | 25 |
| 4.2 DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS | 25 |
| 4.3 SOCIO-CULTURAL DYNAMICS OF RESPONDENTS | 30 |
| 4.3 ENVIRONMENTAL DYNAMICS OF RESPONDENTS | 34 |
| 4.4 ECONOMIC DYNAMICS OF RESPONDENTS | 41 |
| 4.5.1 SCHOLARSHIP SUPPORT SCHEMES | 57 |
| 4.5.2 HEALTH SUPPORT PROJECTS BY KOSMOS ENERGY AND ENI | 57 |
| 4.5.3 ROAD INFRASTRUCTURE PROJECTS BY GHANA GAS COMPANY; | 58 |
| 4.5.4 WATER PROVISION PROJECTS BY KOSMOS ENERGY; | 58 |
| 4.5.5 EDUCATIONAL INFRASTRUCTURE BY TULLOW GHANA, AND GNPC; | 59 |
| 4.5.6 CREATION OF ALTERNATIVE ECONOMIC VENTURES AND EMPOWERMENT; | 60 |
| CHAPTER FIVE | 67 |
| SUMMARY OF FINDINGS, CONCLUSIONS AND POLICY RECOMMENDATIONS | 67 |
| 5.1 INTRODUCTION | 67 |

| | |
|----------------------------------|----|
| 5.2 SUMMARY OF FINDINGS | 67 |
| 5.3 CONCLUSION | 68 |
| 5.4 POLICY RECOMMENDATIONS | 69 |
| REFERENCE | 72 |

APPENDIX A:

| | |
|---|----|
| APPENDIX B: QUESTIONNAIRES AND MAPS | 81 |
|---|----|

LIST OF TABLES

| | |
|---|----|
| Table 4.1: Districts of Respondents..... | 25 |
| Table 4.2: Sex of Respondents | 26 |
| Table 4.3: Age of Respondents | 27 |
| Table 4.4: Marital Status of Respondents | 27 |
| Table 4.5: Household Size of Respondents | 28 |
| Table 4.6: Educational Status of Respondent | 29 |
| Table 4.7: Occupation of Respondents | 29 |
| Table 4.8: Impact of Oil and Gas Operations on Socio-cultural values | 30 |
| Table 4.9: Inductive Content Analysis for Oil and Gas on Host Communities | 32 |
| Table 4.10: Involuntary Resettlement, Land or Water Take Over. | 33 |
| Table 4.11: Gas Flaring and Oil Spill in Host communities | 34 |
| Table 4.12: Oil and Gas Waste and Effluent | 35 |
| Table 4.13: Respondents experience on outbreak of skin, upper respiratory, and urinal tract | |

| | |
|---|----|
| infections attributable to oil and gas operations | 36 |
| Table 4.14: Oil and Gas on Biodiversity | 37 |
| Table 4.15: Oil and Gas Impact on source of Drinking Water | 38 |
| Table 4.16: Alternative Source of Drinking Water | 39 |
| Table 4.17: Planting of Trees by Oil and Gas Companies | 40 |
| Table 4.18: Average Monthly Income Level of Fishermen and Farmers in 2010 | 41 |
| Table 4.19: Average Monthly Income Level of Fishermen and Farmers in 2015 | 42 |
| Table 4.20: Comparative Analysis of Fishermen and Farmers average income for 2010 and 2015 | 43 |
| Table 4.21: Results of Estimated Model | 44 |
| Table 4.22: Monthly Rent in 2010 | 46 |
| Table 4.23: Monthly Rent in 2015 | 47 |
| Table 4.24: Oil and Gas Impact on Properties | 48 |
| Table 4. 25: Type of Properties Affected by Oil and Gas Operations | 49 |
| Table 4.26: Impact of oil and Gas Operations on Production Level | 50 |
| Table 4.27: Compensation Payment | 53 |
| Table 4.28: How Compensations Were Expended | 54 |
| Table 4.29: Developmental Infrastructure, Social Amenities and Other Services by Oil and Gas Companies in Host Communities; positive externalities of oil and gas on host communities | 55 |
| Table 4.30: Oil and Gas Fields, Blocks /Concession and Companies that operate them in Host Communities | 61 |

Table 4.31: Cumulative Imputed Impact Analysis on Host Communities 64

LIST OF FIGURES

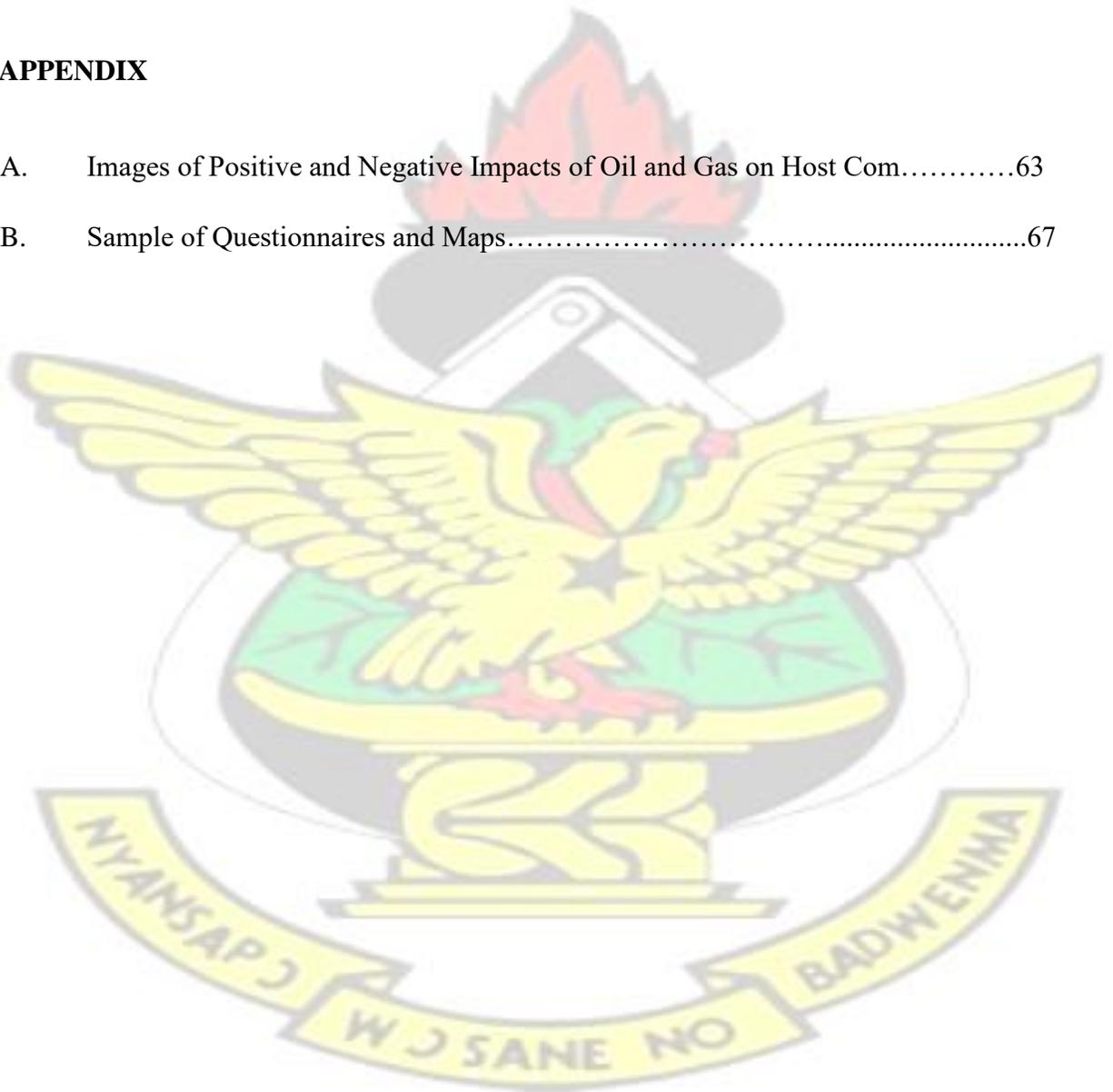
Figure 4.1: Losses Recorded by farmers and fishermen on monthly basis as a Result of Oil and Gas operations in their communities. 51

Figure 4.2; fishermen and farmers income and revenue variations and net effect over the period, 2010-2015..... 52

APPENDIX

A. Images of Positive and Negative Impacts of Oil and Gas on Host Com.....63

B. Sample of Questionnaires and Maps.....67



CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND TO THE STUDY

For the last five years (2010-2015) Western Region has experienced some level of oil and gas operations in the form of explorations, drilling, development, production, and transportation. These operations without any doubts have generated substantial revenues for both the government of Ghana and operating companies. Oil revenue according to PIAC Report (2014) was about GHc3 billion cash or 21% of Gross Domestic Product. According to Palley (2003) African oil producing countries derived revenues from this resource and yet has not helped to improve the quality of life of their citizens especially those living very close to the drilling sites. Palley (2003:54) further argues that natural resource curse most often “occurs because the income from these resources is often misappropriated by corrupt leaders and officials instead of being used to support growth and development.

Furthermore, oil and gas operations in the Western Region however have impacted on the environment and socioeconomic activities of host communities, especially on their main economic ventures. Thus oil and gas operations or activities are impacting negatively on host communities: pollution of water sources, increased temperature, dusty-air, taken away arable lands and loss of local economic ventures which serve as sources of livelihoods to indigenes. According to Omajemite, (2008) oil industries in Niger Delta have introduced pollutions as liquid discharges and oil spills into air, land, and water components of the environment. Environmental degradation theory states that oil spills and gas activities has worsened the economic level of people by destroying the once abundant fishing grounds and decreasing

availability of quality agricultural lands thereby furthering impoverishment of those affected (Kingston,2011).

There must therefore, be a remarkable balance between revenues of oil and gas to owners and project managements on one side and the negative externalities on host communities on another hand. Encouraging and maintaining a healthy environment for society has always and recently become a global concern, more so at the wake of climate change. Healthy and equitable environment is imperative to promoting good health and wellbeing of host communities. Environment further guarantees sustainable development, typically in the industrial districts of Western and Central coastlines of Ghana. Improving environmental regulations and policies in oil and gas sector can aid and strengthen confidence in coastal host communities and much more, mitigate the burdens of negative environmental problems and socioeconomic impacts.

History of oil and gas exploration and experimental studies in Ghana especially along its Coast started in 1896 (GNPC, 2009), and finally discovered large deposit of crude oil and natural gas estimated 1.8 billion barrels of crude oil and 800 billion cubic feet of natural gas in 2007 in the Western Region of Ghana (please see Map 1: Ghana Offshore Activity Map at Appendix). Ghana crude oil occurs alongside natural gas, and Ghana has more gas reservoirs than crude oil. Exactly in June 2007, Kosmos Energy of the United States, in partnership with Anadarko Petroleum Corporation, Sabre Oil and Gas Ltd, the EO Group, Tullow Ghana Limited and Ghana National Petroleum Corporation (GNPC) broke the news of the discovery of large deposits of crude oil to the Government of Ghana as in (Joe, 2013). The field was later named „Jubilee Fields“ and currently another field called Tweneboa Enyenra Ntomme („TEN Project“) and newest discovery known as Sankofa and

Gye Nyame Project are all under the study environment. Jubilee Test drilling commenced a few months leading to commercial production in the fourth quarter of 2010 for crude oil and in the first quarter of 2015 for natural gas. However, „TEN“, Sankofa and Gye Nyame Field's developments are ongoing in 2015 at Western and Central Coastlines of Ghana. According to GNPC Repot,(2013) more explorations are on-going along these coasts. This therefore meant that more oil and gas will come on board in host communities in the near future.

The operations of oil and gas under Western and Central Coastlines of Ghana have created rivalry in the use of the sea and land within the area under consideration. Thus, agriculture and oil and gas operation alike depends on the environment to produce goods for consumption and energy processing. Both industries are almost impossible to co-exist without one not impacting negatively on the other; conflicting demands on water and land resources For example fishermen have been prohibited in coastal host communities from fishing within an exclusive zone of exploration sites. This is hampering core sources of livelihoods (agricultural activities) in the area. The implications are that fishermen get low catch and hence low income. Also they have to sail long distance for days in search for fish or fish at unapproved areas .Farm lands have been claimed by some onshore activities in coastal communities, for instance Atuabo Gas Plant and some Offshore Receiving Facilities at Sanzule claimed about 1000 acres of land. It suffices to note that, farmers can shift to different areas to farm or divide the operational zones between oil and gas and farming operations. Such however is not the case for fishing activities and so defining property rights for the use of the sea is almost impossible.

Furthermore, oil and gas operation has long been known to come with huge environmental consequences. For example in Nigeria, according to sunnewsonline.com 2016, gas flaring has caused huge environmental and economic damage to the Oguta host community, Nigeria.

According to United Nations Law for the Sea, fishermen also ought to get equity in the resources of the Ocean. Also African Charter on Human and People's Rights states among other Clauses that; no person shall be deprived of their wealth or natural resource or damaged properties must be compensated. Unfortunately, in Ghana there are no specific policy instruments to addressing adverse impacts on host communities in terms of their economic livelihoods, social and environment. These host communities over the last five years or so have myriad of problems which are not yet been told to policy makers for redress.

1.2 STATEMENT OF PROBLEM

According to Palley (2003) impacts of petroleum resource operations on host communities in Africa have posed challenges to several nations. Countries such as Angola, Cameroun, Equatorial Guinea and Nigeria have been drilling some crude oil and gas on their continental shelves over some years now and yet local residents along the site of drilling have become poorer thereby making people developed hostile attitudes towards the operations of the oil and gas companies.

Ghana in the Sub Region for the pasted five years has been engaged in oil and gas operations. The Fiscal Framework on Upstream Operation especially the petroleum exploration and production law passed in 1984 and Petroleum Revenue Management Act 815, 2011 do not

enjoin oil and gas companies and government alike to adequately factor the livelihoods and environment of local residents into the agreements. As a result, Ghana Maritime Authority as required by section 285 of the Ghana Shipping Act of 2003 Act 645, has issued warning to all Maritime and Vessels operating in the country territorial waters to maintain a safe distance of (500 meters radius around Jubilee FPSO and 5 Nautical miles around TEN Project FPSO). (Please see image 4 at Appendix A). In other words fishermen have been prohibited from fishing within these exclusive zones. These may impact negatively on fishermen and environment of host communities and if not checked by policy makers would further lead to exclusions of more people from their sources of livelihoods without the necessary compensation mechanism arrangements. Consequently, fishermen as well as farmers are complaining that their income level since 2010 continues to decline over the period, reasons attributable to oil and gas operations on their environs. They further alarm if this trend continues in the near future could lead to loss of their main economic unit, which would worsen poverty situation in their local communities.

Furthermore, host communities have perceived their environment is being endangered by oil and gas pollution in the form of oil spills, gas flaring, effluents and destruction of vegetation. For instance, some host communities in the Ellembelle District claimed there are certain large weeds on the seashore purported to have come as a result of oil and gas operations, which are polluting their environment and affecting fishing activities. Also indigenes of host communities have further complained to their Chiefs that oil and gas companies are not paying compensations for their damaged crops and other properties as a result of oil and gas operations. On that basis, host communities' people are asking questions that remain not answered by policy makers; what benefits or harmonizing efforts are there for adversely

affected host communities?. By close of 2015, it seems not clear with respects to the type of social support systems that would be made accessible to these host communities who are adversely impacted by the oil and gas operational activities.

However, much works have not been done on the oil and gas operations and its socioeconomic and environmental impacts on host communities under the study area. This work seeks to fill this gap. This study therefore, became essential following several concerns and problems of host communities which have not yet been communicated to policy makers in the country. The study seeks to explore how government and policy makers will deal with environmental pollutions and negative externality problems as well as socioeconomic problems to including non-payment of compensations to adversely affected host communities.

1.3 OBJECTIVES OF STUDY

General Objective

This study assessed socio-economic and environmental impacts of oil and gas operations. A case study of local host communities“ under Western and Central coastlines of Western Region, Ghana

Specific Objectives

1. To examine the effect of oil and gas operations on the social outcomes of the host communities.

2. To estimate the impact of oil and gas operations on the income levels of fishermen and farmers
3. To examine the impacts of oil and gas operations on the environmental outcomes of the host communities

1.4 RESEARCH QUESTIONS

General Question

1. What are the socio-economic and environmental impacts of oil and gas operations on local host communities under Western and Coastlines of Ghana?

Specific Research Questions

1. What are the effects of oil and gas operations on social outcomes of host communities?
2. What are the impacts of oil and gas operations on fishermen and farmers income levels?
3. What are the impacts of oil and gas operations on the environmental outcomes of the host communities?

1.5 SIGNIFICANCE OF STUDY

The work has ability to enlighten and create awareness of coastal host communities: how it would affect host communities' income (economics), social and environment. This study would contribute immensely to students, experts, and academia in the industry for future works especially petroleum resources and its causal impacts on host communities in Ghana.

More specifically, the study has assessed and recommended both economic and environmental measures that could be implemented to make sure that host communities are not adversely short change by the events of petroleum resources operations.

Furthermore, legislatures for the area and government could adopt this scientific work to become a blue print to enable them table their people's developmental needs and challenges in Parliament for redress.

Finally, the study recommended policies which could be adopted by the industrial- law-makers to protect natural biodiversity, support social equity and other policy options as alternative economic ventures for the local host communities. These will bring responsible oil and gas operational practices to ensure balance benefits and costs for the host communities and oil and gas companies for both present and future generations.

1.6 SCOPE OF STUDY

The domain of this work is narrowed to oil and gas operating communities and neighborhoods under Western and Central Coastlines of Western Region, Ghana. Rational is that Western Region is the largest oil and gas producing zone currently. Oil and gas producing District Assemblies are Sekondi-Takoradi, Shama, Ahanta West, Nzema East, Ellembelle and Jomoro. The largest Oil and Gas Fields as well as Gas Processing Plants are located at Ellembelle, Jomoro, Nzema East, and Ahanta West. The four Districts were used for the study, based on purposive sampling method; the researcher selected six communities from Ellembelle District environs, two communities for Ahanta West District environs, two communities for Nzema East District environs, and two communities for

Jomoro District environs. The six communities from only Ellebelle District can't be construed as bias because, the two largest oil and gas fields („TEN Project“ and „Sankofa Gye Nyame Project“) including the only Gas Processing plant (Ghana Gas Company) in the country are located in this place and hence the discretion to select six communities (see Map 2 and image 1 of oil and gas activities and area of influence at Appendix A).The twelve communities include Beyin, Atuabo, Anochie, Sanzule, Ekabaku, and Baku. The rest are Axim, Esiam, Nkroful, Apowa, Aboadi and Kegyina.

1.6.1 Geographical location of Oil and Gas and Economic Activities of Residents

The study area is a tropical forest with the highest rainfall in Ghana, Fisheries Research Report, (2009).It can be found at the South-Western part of Ghana, thus bounded to the West by Cote d'Ivoire (See Map1 at Appendix A).

The main economic units of livelihoods for host communities in study area are basically, fishing and farming. Above sixty-five percent of economically active populations in the study area are engaged in agriculture (including fishing) and agro-processing (CRC, 2013). And that fishing and farming livelihoods in these coastal districts are interlinked. Thus farming season (raining season) income from fishing is used to purchase farming inputs whilst investments shift back to fishing during the fishing season. Baseline study of Jubilee project shows that the study area is the highest rainfall area in Ghana and hence has highest fish catch, with about 2000-2500 Canoes operates within the area, (Finegold et al., 2010). Ellebelle District alone ranks second as far as Marine fishing in the country is concern (CRC/FON, 2010). The fishing industry in Ghana is based on resources of the Marine and to a less extent, inland or freshwater fisheries and aquaculture (Bank of Ghana, 2008).

Marine fishing is an important traditional economic activity of the Coastline communities in Ghana contributes over 80% of the total fish catch. More so, Artisanal fishing in particular contributes about 70-80% of the total annual volume of Marine fish catch in the country (Bank of Ghana, 2008). The significance of fisheries sector in the socioeconomic development of Coastal communities in the Western Region and the country as a whole can't be underestimated. With a 202 km long Coastline, six coastline districts namely; Jomoro, Nzema East Municipality, Ahanta West, Sekondi-Takoradi Metropolis and Shama, and perhaps 20-30% of the country's landing sites, of the Western Region produces Marine fish destined for market throughout Ghana and beyond (deGraft-Johnson et al., 2010; Finegold et al., 2010; Gordon et al., 2011). Fishing communities in the study space according to CRC/FON (2010) are homogeneous as portrayed by socio-cultural characteristics.

1.7 LIMITATIONS OF STUDY

This work suffers from unavailability of baseline (2010) data, comprising variables under investigation. However, in the non-existence of baseline data for critical variables to be compared with end-line (2015) data for example, rent and income level of farmers and fishermen. The researcher applied a recommended scientific approach called reconstruction data technique (recall data); the respondents recalled what the variables or issues were in the past. This technique has widely received prominence by so many Authors and Researcher in both social and pure Sciences on Impact assessment. Finally, this study could not also collect samples of water, soil and air for laboratory investigations to affirm or

refute perceived existence or otherwise of oil spills and flaring in coastal host communities, due to resource (time and funds) constraints

1.8 ORGANIZATION OF STUDY

The work is categorized into five chapters. The first chapter dealt with introduction where the background was also a part. The rest in the first chapter are statement of problem, objectives, research questions, significance, organization, limitation and scope of the study. Chapter two considered the theoretical framework; socioeconomic problem theory, environmental degradation and environmental externality theories. The empirical study includes oil spills, gas flaring, effluents and socioeconomic problems. Chapter three summarizes research methodology which includes data collection technique, quantitative and qualitative methodology, population frame, size and sampling techniques, econometric model and discussion of variables and analytical framework. Chapter four presented findings, data analysis and discussions.

Finally, chapter five recapitulates conclusions and policy recommendations.

CHAPTER TWO

LITERATURE REVIEW

2.1 INTRODUCTION

The main focus was on oil and gas extraction on Livelihoods opportunities and environment of local host communities. The theoretical and empirical frameworks were based on

environmental degradation theory, environmental externality theory and socioeconomic problem theory.

2.2 THEORETICAL FRAMEWORK

Three theoretical frameworks which are considered appropriate in this study would bring out relevant problems caused by oil and gas operations on the environment and socioeconomic of host communities. The theories are „Environmental Degradation“ theory, Socioeconomic Problems theory and Environmental Externality theory. The

„Environmental Degradation“ theory assumes that oil spills and gas activities has worsened the economic level of people by destroying the once abundant fishing grounds and decreasing availability of quality agricultural lands thereby furthering impoverishment of those affected (Kingston,2011) .

Socioeconomic Problem theory may refer to a combination of economic and social theories. The activities of the oil industry has often resulted in a different multitude of social, environmental, and economic problems such as environmental pollution, occupational dislocation, rural-urban drift, unemployment and poor human health (Elis 1994;Amadi and Tamuno 1999; Ugbomeh2007; and Omajemite 2008).Oil and gas pollution causes damage to human health, agricultural land and fish ponds. Also arable farmlands have been lost to oil pollution as a sizable farmland in the Niger-Delta Region have been rendered barren due to oil spillage and leakages(Elis1994).

Environmental Externality theory, states that externality are benefits or cost generated as an unintended outcome of an economic activity that do not accrue directly to the parties

involved In the transaction and when no compensation takes place. They manifest themselves through changes in the physical-biological or a group confers to others positive effects or reward. A technological spill over is a positive externality which occurs when the firm's invention not only benefits the firm but also enters into the society's pool of technical knowledge and benefits the society as a whole. On the other hand, pollution is a negative externality which occurs for instance, when a factory discharges its untreated effluents in a river, the river is polluted and consumers of the river bear cost in the form of health cost or/and water purification.

Pigou (1920) externality theory deals with the problem of smoke emission by a factory damaging nearby business or residents. His solution for correcting the negative externality is to impose a per unit tax on output to the factory generating the negative externalities. The per unit tax should be equal to the difference between the social marginal cost and the private marginal cost corresponding to the social optimal output, the output satisfying the condition, the price equals the social marginal cost. Imposition of such a tax will raise the output price and reduce the demand thereby helps in internalizing the environmental cost to some extent in the decision of producers and consumers of the product. Negative externality theory has been described earlier, arises when the welfare of one party is adversely affected by the action of another party and the loss in welfare is uncompensated for due to a lack of liability to third parties who suffered the damages. The negative externality theory as proposed by Pigou is very much relevant to this research. In this instance government Ghana should not rely only on economic incentives to dealing with environmental pollution, economic challenges or those adversely affected groups in host communities but must also critical regulate via law in addressing negative consequences.

2.3 EMPIRICAL STUDY OF OIL SPILLS, GAS FLARING AND EFFLUENTS

Christiana (2014), have recognized three foremost sources of oil pollution on the environment which include, Oil spills, Gas Flares and Effluent and waste discharges.

According to research conducted by Christiana (2014) in Ogoni, host community in Nigeria between 1993 and mid- 2007, there has been a recorded 35 incidences of oil spills. The major causes of the spill incidences in Ogoni community includes Pipelines and flow lines leakage or blowouts, blowouts from well-heads due to poor maintenance and damage and spills from flow stations. Oil spills involve the release of dangerous hydrocarbons such as benzene and Poly-nuclear Aromatic Hydrocarbons into the soil and water sources.

According to (Barclay,2010) an oil tanker christened Exxon Valdez which was bound for long beach, California, spilled an estimated minimum of 250,000 barrels of crude oil (250,000 barrels) on March 24, 1989 when it hit Prince William Sound's Bligh Reef. This disaster is arguably, one of the most overwhelming human- induced environmental disasters in the annual of history. The damage done by the spill could hardly be estimated as the region is the habitat for several species including salmon, sea otters, sea birds and seals. The oil on board Exxon Valdez was produced from the Prudhoe Bay oil field. The spill left an oil trail of 2,100 miles of coastline and 28,000km² of Ocean.

One environmental consequences caused by gas is its flaring. Oil and gas or petroleum operational activities" is one anthropogenic source which contributes to environmental pollution especially in local host communities. The by-products from the operations of these activities final end up on the farm lands, water bodies which usual trigger or poison the water

and environment at large. Take for example, during onshore construction activities the airborne emission will be polluted from the exhaust of heavy equipment and vessels. The main pollutants generated are NOX, CO, dust, and SOX. Earth dust is generated during excavation and backfilling activities, and during the earth works related to the onshore pipeline and onshore receiving facility floating, production, storing and offloading construction and installing activities. Other source is dust emissions usual when the traffic movement of trucks, minivans and heavy equipment along the working strip. Some includes discharges include waste water or civil wastewater are pumped into the sea by oil and gas companies.

2.3.1 Oil Spills and Gas Flaring as a Source of Socioeconomic Impact

Socioeconomic impacts are a multifaceted phenomenon in that; it has social, cultural, political, religious, health and economic dimensions. Thus, it may include but not limited to; creation jobs, business avenues, training or improved technology, improved access to infrastructure and social amenities.

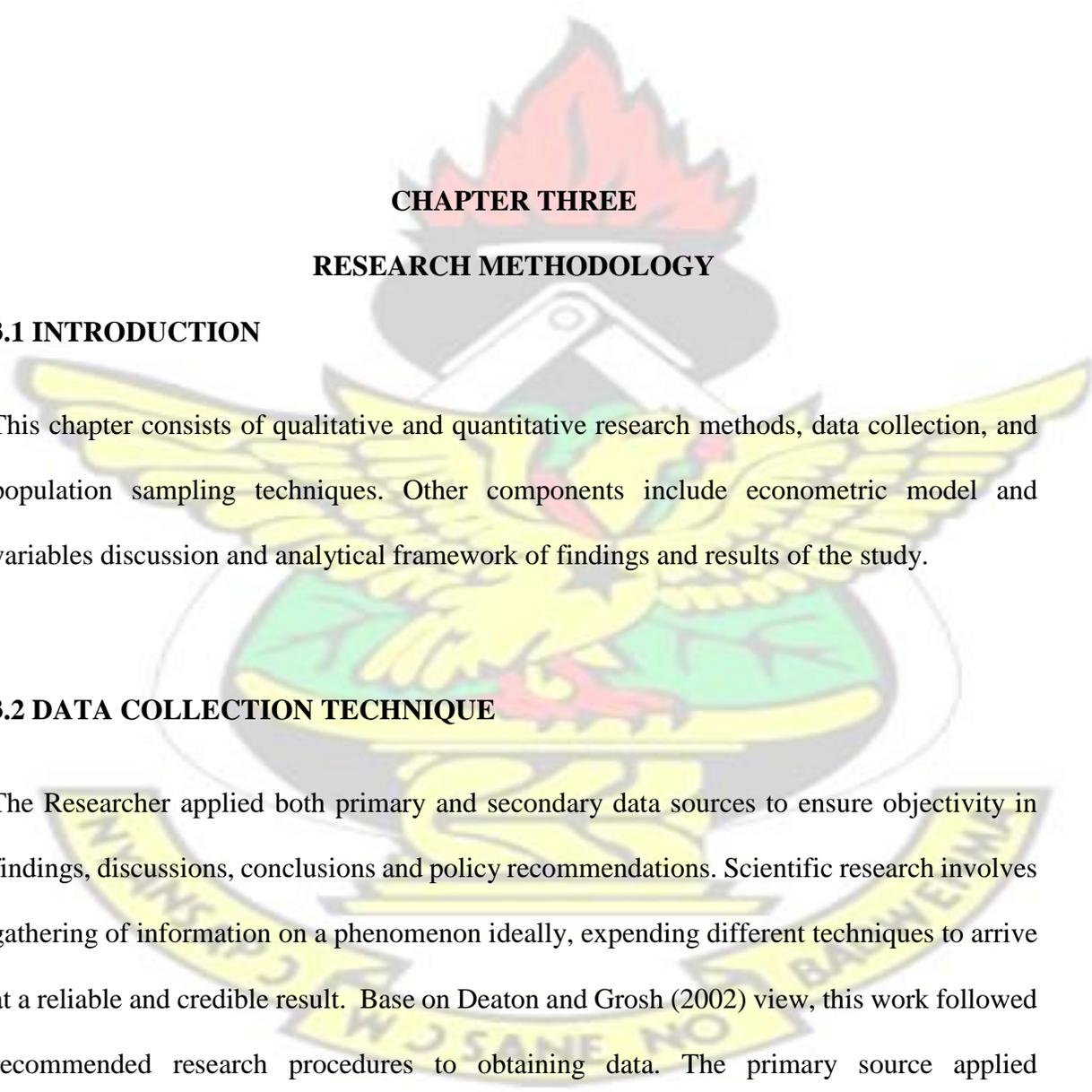
Socioeconomic impacts further includes alterations of cultural values, increased in crime rate, social injustice, prostitution, group's conflicts, increased population, dislocation of employment increased in consumer price index of the local communities and ill-health related problems like skin, upper respiratory and urinary tract infections. There is a sort of transmission mechanism that takes place when oil and gas impacts on environment. Thus in the words of Christiana, 2014 revealed in Ogoni community, a combination of the effects of oil spill and acid rain resulting from gas flaring has been soil degradation which affects crop yield and harvest. Fish are driven away from in-shore or shallow waters into deep-sea as a

result of flaring. The ultimate result of this is the poor crop yield as the soil has been rendered infertile and poor fish catch, as most fish has been driven into deep waters and the Ogoni people do not have the fishing gadgets to go into deep-sea fishing.

Another socioeconomic implication according to Christiana (2014) of oil pollution is that having destroyed biodiversity, it has also rendered the agricultural sector, which is the largest employer of labour in Ogoni community, unprofitable.

Socio-culturally, the Ogoni people live in closely knit communities and are more endogenous. However, oil and gas operations in the community have led to the disintegration of customs, traditions and social values, such as respect for our elders. In a recent research report released by a group of scientists from the Faculty of Pharmacy, University of Lagos, it was found that water samples collected from the sea, river, bore holes, lagoons, beach and so on from the Niger Delta region – especially in Delta and River States, indicates that more than 70% of the water in the Niger Delta contains a chemical called Benzopyrene, with a high concentration of 0.54 to 4ug per liter, far above the World Health Organization (WHO) recommendation of 0.7ug/l for drinking water.

KNUST

The logo of Kenyatta University of Science and Technology (KNUST) is centered in the background. It features a yellow eagle with its wings spread, perched on a green shield. Above the eagle is a red and orange flame. The entire emblem is set against a white background with a faint circular border.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 INTRODUCTION

This chapter consists of qualitative and quantitative research methods, data collection, and population sampling techniques. Other components include econometric model and variables discussion and analytical framework of findings and results of the study.

3.2 DATA COLLECTION TECHNIQUE

The Researcher applied both primary and secondary data sources to ensure objectivity in findings, discussions, conclusions and policy recommendations. Scientific research involves gathering of information on a phenomenon ideally, expending different techniques to arrive at a reliable and credible result. Base on Deaton and Grosh (2002) view, this work followed recommended research procedures to obtaining data. The primary source applied

questionnaire interview tool, which is suitable for this at least to assess what people know or perceive about oil and gas impacts on their livelihoods and environment.

Individual and focus group technique was used. Thus structured and semi-structured questionnaire: face-to-face interviews were applied to explore the details of the issues. On this score three different questionnaires (see Appendix B) were administered to stakeholders to elicit information from them based on their knowledge and perceptions on the problems. They include the following; households, regulatory agencies (e.g. EPA), and District Assemblies. This strategy was utilized to achieve balance and multi-consultative stakeholder overview of the phenomenon under consideration.

Another primary data collection technique in this work was participant observation. This social science research involves human behavior; it was therefore prudent to make use of participant observations (fishermen group) on the issues under investigation in order to give fair but accurate findings especially on their attitudes, feelings, and emotions.

Meaning, the researcher personally took part in a community Workshop organized by Tullow Ghana Limited to collate host communities concerns and challenges or problems. The Researcher used the Workshop technique to support the interview method. It is costly for the Researcher to organize this Workshop and hence became a participant for data collection.

Finally, secondary data source was obtained from publications by oil and gas companies with regards to their production level and projections, and their Environmental Impact Assessment Statements were carefully analyzed in order to acquire total crude oil and gas produced from all the wells and fields in host communities.

3.3 QUANTITATIVE AND QUALITATIVE METHODOLOGY

The work applied both qualitative and quantitative research approaches. Qualitative technique was used to explore and gain understanding of underlying perceived opinions of host communities on oil spills, gas flaring and other effluents. Qualitative technique provided deep-insight into the problems. It uncovered trends in thoughts and dived deeper especially into environment and social problems. Also, the quantitative technique was applied to quantify the perceived declined income level of farmers and fishermen.

Numerical data generated was applied on the econometric model. Thus, measurable data (rent, income level) were collected and estimate the pattern of decline income levels in host communities over the period, 2010-2015.

3.4 POPULATION FRAME, SIZE AND SAMPLING TECHNIQUE

The researcher applied normal population sampling technique procedure in data collection. The term population, as applied here, implies the total number of a group of people (for example people of a local host community). All the four Districts have a total population of about 404,651 according to 2010 Population and Housing Census; Ahanta West District has a total population of 106,215, Ellembelle 87,501, Nzema East 60,828 and Jomoro has 150,107. The researcher applied random and purposive random sampling techniques for the sample size, 190 respondents. Different sampling procedures were used to arrive at a number that reflects true representation of the total population. This study used purposive random sampling method in that; it was only fishermen, farmers and some key informants who have

exclusive information especial on income levels of the host communities. Thus the researcher considered respondents who have in-deep knowledge on issues under investigation.

Also, random sampling technique was equally employed since socioeconomic and environmental impacts affect everybody in the local host communities without any segregation. The researcher here fore, selected twelve communities in four Districts Assemblies which are impacted adversely by oil and gas operations under the study area. Some communities are more impacted than others due to their proximity to the operational sites of oil and gas. The Researcher avoided bias by randomly sampling households which are close to the offshore and onshore operational sites. In this instance, the study considered 47, 15, 78 and 50 households from the four District Assemblies (Ahanta West, Jomoro, Ellembelle and Nzema East) respectively. The rationale for selecting seventy-eight households from Ellembelle District for example was informed by how the communities are affected (see Map2 at Appendix).

Furthermore, other relevant stakeholders like District Assemblies, Regulators (e.g. EPA), opinion leaders (key informant) were directly contacted for interviews. Thus the Researcher interviewed (face-face) eight Assemblymen/women, one Chief Fisherman and four District Environmental and Sanitation Officers.

3.5 ECONOMETRIC MODEL AND VARIABLES DISCUSSION

Every model always tries to simplify its relationships that exist between the dependent and independent variables in a theory to enhance parsimony in research. This work applies

Interactive Dummy Variable Technique to estimate impacts of oil and gas operations on farmers and fishermen current income level.

3.5.1 Mathematical Specification

The income of both fishermen and farmers in 2015 is denoted by a random variable Y_i , called dependent variable of study. It depends on kindependent (or explanatory) variables denoted by $1, 2, \dots, k, EX_i, EX_{t+1}, EX_iDFA$. Where EX_i is independent variable presenting current crude oil produced, EX_{t+1} is future operations of oil and gas, and EX_iDFA is interactive effect of oil and gas on income level of fishermen and farmers. The behavior of Y_i can be explained by this relationship, $f(EX_i, EX_{t+1}, \dots, EX_iDFA, \beta_0, \beta_1, \dots, \beta_k)$ where f is well defined function and $\beta_0, \beta_1, \dots, \beta_k$ are the parameters which characterize the elasticity of oil and gas or contribution of $1, 2, \dots, k, EX_i, EX_{t+1}, EX_iDFA$, respectively.

Econometric Estimation

$$Y_i = \beta_0 + \beta_1 * EX_i + \beta_2 * EX_{t+1} + \beta_3 * DFA + \beta_4 * EX_iDFA + e_i \dots \dots \dots 3.1$$

Where Y_t , is the current (2015) income of both farmers and fishermen, β_0 is average income of fishermen and farmers, β_1 is the elasticity of oil and gas operational impact on farmers and fishermen income level, β_2 is the same as β_1 but in the future term, β_3 is the elasticity of Dummy variable, β_4 is the elasticity of interactive dummy variable (EX_iDFA_t) and e_t is also the error term and finally, DFA represents farmers =0 and DFA fishermen =1. The assumption is that, number of oil wells, transportation pipelines in every local community technically will determine the extent of socio-economic and environmental impacts on that host community.

3.6 ANALYTICAL FRAMEWORK

3.6.1 Data Processing

After data collection, researcher processed the data by editing, coding, classifying, and finally tabulating. Editing: Researcher examined the data careful collected from the field and eliminated all possibly errors that might have occurred. This was done to ensure data accuracy, consistency with facts gathered and arranged to facilitate coding and tabulation.

Coding: during this stage for example, the Researcher assigned values (0 and 1) for farmers and fishermen income respectively and used for the Interactive Dummy Model

Classification: data was classified into groups based on common characteristics. For instance, household, income and age size were grouped according to interval or range whilst issues of feelings and emotions were classified according to similar attributes.

Tabulation: the data obtained from the field was final orderly arranged into columns and rows in Microsoft Excel to generate statistical tables for further analysis. The Researcher applied both hand and computer tabulations. Generally accepted principles of tabulation was adopted by the researcher, thus every table was titled, numbered, sourced , footnotes, column headings etc. to enhance easy explanation and reference.

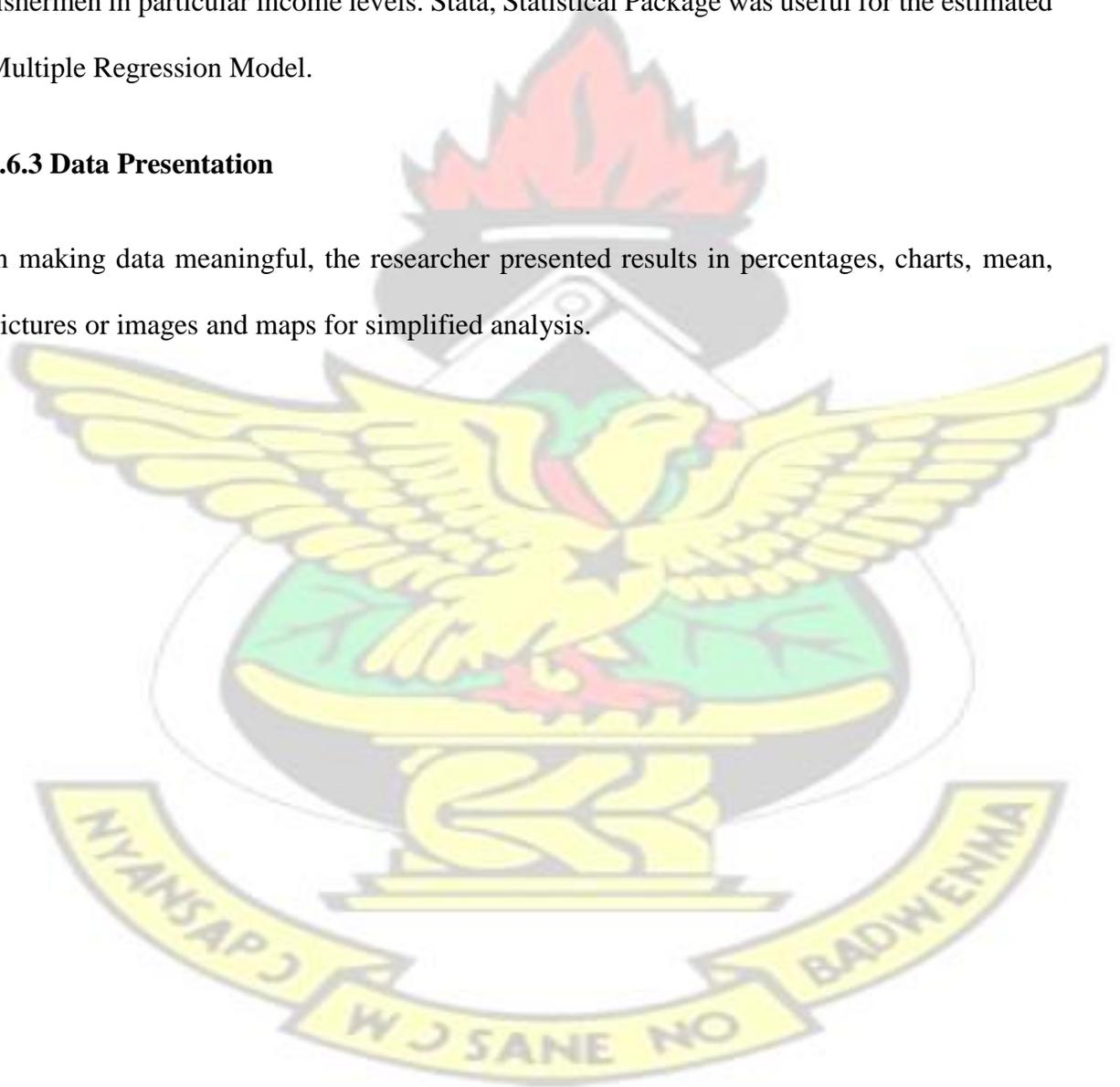
3.6.2 Data Analysis

This study applied both descriptive and inferential or statistical data analysis in that, the descriptive analysis summarized and observed results for the environment and sociocultural impacts with the help of Microsoft Excel in tables, frequency distributions, percentages,

charts and picture images. This was done to make strong interrelationship with inductive content approach. Also, the statistical analysis designed itself with computational and numerical methods e.g. Multiple Regression Model (Interactive Dummy) which estimated elasticity of unknown parameters, average or measurement along with searching for correlations that exist among oil and gas operations and its causal impacts on farmers and fishermen in particular income levels. Stata, Statistical Package was useful for the estimated Multiple Regression Model.

3.6.3 Data Presentation

In making data meaningful, the researcher presented results in percentages, charts, mean, pictures or images and maps for simplified analysis.



KNUST

CHAPTER FOUR

FINDINGS, PRESENTATION, ANALYSIS AND DISCUSSIONS OF DATA

4.1 INTRODUCTION

This chapter presents data from the questionnaire technique for the four District Assemblies under the Western and Central Coastlines of Ghana where oil and gas operations occur currently. The analyses were based on two research toolkits: inductive content analysis and causality principle for the methodologies in explaining oil and gas operations impacts on social, economic and environmental issues. Based upon these, the researcher made valid conclusions, forecast or informed policy recommendations in chapter five. This chapter is categorized into four areas; Demographics, Economics, Social and Environment.

4.2 DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS

Table 4.1: Districts of Respondents

| DISTRICTS | FREQUENCY | PERCENTAGE |
|----------------------------------|------------------|-------------------|
| AHANTA WEST | 47 | 24.74 |
| ELLEMELLE | 78 | 41.05 |
| JOMORO | 15 | 7.89 |
| NZEAMA EAST MUNICIPAL | 50 | 26.32 |

| | | |
|--------------|------------|------------|
| TOTAL | 190 | 100 |
|--------------|------------|------------|

Source: Field Survey Data, 2016

The researcher carefully selected 25%, 41%, 8% and 26% of respondents from the respective District and Municipal Assemblies. Bias can't be construed, because oil and gas activity Map of the study areademonstrates that all Districts do not have equal and immediate externalities of oil and gas operations in terms of socio-economic and environment. Ellebelle is the most affected District in terms of offshore and onshore operations of oil and gas currently, this therefore justified the 41% of respondents form that District Assembly.

Table 4.2: Sex of Respondents

| SEX | FREQUENCY | PERCENTAGE |
|---------------|------------------|-------------------|
| MALE | 129 | 67.89 |
| FEMALE | 61 | 32.11 |
| TOTAL | 190 | 100 |

Source: Field Survey Data, 2016

Out of the total Survey conducted, approximately 68% represents male whilst 32% was female. This composition was due to wiliness to respond and largely so because of economic ventures affected by the oil and gas operations. That is to say, traditionally both fishing and farming are domestic occupation of male.

Table 4.3: Age of Respondents

| AGE | FREQUENCY | PERCENTAGE |
|--------------|------------------|-------------------|
| 18-27 | 21 | 11.05 |
| 28-37 | 40 | 21.05 |

| | | |
|--------------|------------|------------|
| 38-47 | 54 | 28.43 |
| 48-57 | 31 | 16.31 |
| 58+ | 44 | 23.16 |
| TOTAL | 190 | 100 |

Source: Field Survey Data, 2016

Decision-making and the ability to engage in any meaningful economic venture must be contingent on age according to the Constitution of the Republic of Ghana. Ages range 38-47 dominated the number of respondents with 28% and 11% mark represented the least age range 18-27. The future of the host communities is in the hands of the youth and hence their willingness to partake in the questionnaire exercise administering; thus 60% took part.

Table 4.4: Marital Status of Respondents

| MARITAL STATUS | FREQUENCY | PERCENTAGE |
|-----------------------|------------------|-------------------|
| Married | 140 | 73.68 |
| Single | 33 | 17.37 |
| Divorced | 13 | 6.84 |
| Widowed | 4 | 2.11 |
| TOTAL | 190 | 100 |

Source: Field Survey Data, 2016

Marriage was the first institution decreed by God. In modern life style and current economic circumstance, people marry, divorce or be singled due to personal reasons and also when couples loss a partner. The study area characteristics were not different from this phenomenon. Out of the 190 respondents interviewed, 140 were married representing the uppermost 74% and least was widowed with 2%.

Table 4.5: Household Size of Respondents

| HOUSEHOLD SIZE | FREQUENCY | PERCENTAGE |
|-----------------------|------------------|-------------------|
| 1 - 5 | 43 | 22.63 |
| 6 - 10 | 52 | 27.37 |
| 11 - 15 | 68 | 35.79 |
| 16 - 20 | 27 | 14.21 |
| TOTAL | 190 | 100 |

Source: Field Survey Data, 2016

According to Robert S. Santley, Kenneth G. Hirth (1992) and Millon, (1976) large household size is no longer an indication of elite status in developed World as it was in the preceding Chieftdom of communal rituals and collaborative economic ventures. However, in most African societies, the local economic ventures still demand more labour for production of goods and services. In the study area, farming and fishing are still done with less modern technology and hence demand more hands which influences their family sizes. This play out in the household size of respondents: 11- 15 dominated the household size with 36% while 16-20 marked with least 14%.

Table 4.6: Educational Status of Respondent

| EDUCATIONAL LEVEL | FREQUENCY | PERCENTAGE |
|--------------------------|------------------|-------------------|
| BASIC | 106 | 55.79 |
| SENIOR HIGH | 61 | 32.1 |
| TERTIARY | 20 | 10.52 |
| POSTGRADUATE | 3 | 1.57 |
| TOTAL | 190 | 99.98 |

Source: Field Survey Data, 2016

Approximately 56% of the respondents had basic, 32% had Senior high, 10% had tertiary and 2% had postgraduate education. The dynamics of their level of education was imperative in comprehending oil and gas operations on their social, economic lives and environmental issues

Table 4.7: Occupation of Respondents

| OCCUPATION | FREQUENCY | PERCENTAGE |
|-------------------|------------------|-------------------|
| FISHING | 72 | 37.89 |
| FARMING | 40 | 21.05 |
| OTHERS | 78 | 41.05 |
| TOTAL | 190 | 99.99 |

Source: Field Survey Data, 2016

According to World Bank Doc. (1996), source of employment is a strong indicator of poverty or wellbeing. Whilst poverty affects households, whether headed by a female or not, it is most damaging where it affects the entire communities. This phenomenon exactly epitomizes the host communities of oil and gas operations, as it reduces the available operations of, “ Safety net” of the communities. Both fishing and farming form the core economic units (Agriculture) which represent 59% of the respondents and the remaining 41% denoting other occupations. Out of the total respondents 190, 112 were farmers and fishermen, where 66% belong to fishing and farming groups or associations.

4.3 SOCIO-CULTURAL DYNAMICS OF RESPONDENTS

Table 4.8: Impact of Oil and Gas Operations on Socio-cultural values

OIL AND GAS EFFECT ON SOCIAL AND CULTURE VALUES

| RESPONSES | FREQUENCY | PERCENTAGE |
|------------------|------------------|-------------------|
| YES | 101 | 53.16 |
| NO | 89 | 46.84 |
| TOTAL | 190 | 100 |

Source: Field Survey Data, 2016

An oil and gas operation has multifaceted effects, not excluding social and cultural values. 53% of the respondents were of the view that oil and gas operations in the local communities have affected them both positively and negatively, whilst 47% were in sharp contrast. Gesticulations provided by the majority group are;

Table 4.9: Inductive Content Analysis for Oil and Gas on Host Communities

| SOCIAL AND POSITIVE CULTURAL VALUE | AND POSITIVE EFFECT | NEGATIVE EFFECT | SHORT TIME | LONG TIME |
|--|----------------------------|------------------------------|-------------------|------------------|
| Chieftaincy and elders | | Quarrels among themselves | | |
| Sacred forest shrines | and | Cleared /decreased spirits | | |
| Burial /cemeteries | | Cleared/ancestral conflict | | |
| Immigration | | Pressure on social amenities | | |
| Social cohesion | | Breakdown | | |
| Crime rate | | Will increase | | |
| Our wives and husbands | and | Are being "chased" after | | |
| Conflicts | | Not yet | | Maybe |
| Immorality | | Teenage pregnancies/nudeness | | |
| Prostitutions | | Moderate | | |
| Inter-tribal marriage, Togetherness dialects | | | | |

Source: Field Survey Data, 2016

Table 4.10: Involuntary Resettlement, Land or Water Take Over.

| RESPONSES | FREQUENCY | PERCENTAGE |
|-----------|-----------|------------|
|-----------|-----------|------------|

| | | |
|-----|----|-------|
| YES | 28 | 14.74 |
|-----|----|-------|

| | | |
|----|-----|-------|
| NO | 162 | 85.26 |
|----|-----|-------|

| | | |
|--------------|------------|------------|
| TOTAL | 190 | 100 |
|--------------|------------|------------|

Source: Field Survey Data, 2016

85% of the interviewees said their communities have not experienced any resettlement and land or water take-over. On the other hand, 15% believed that the offshore and onshore operations of oil and gas are a form of farmlands and fishing water taken over by the companies in the host communities. A respondent said, a vivid instance is Atuabo Gas Processing Plant site, Onshore Receiving Facilities, Quantum Terminal, and Sanzule Gas Project had claim farm lands to including water or sea. All these had taken an estimated 1000 acres of arable lands and Jubilee Field alone had claimed over 500metres radius of water; where fishing activities is now prohibited.

4.3 ENVIRONMENTAL DYNAMICS OF RESPONDENTS

Table 4.11: Gas Flaring and Oil Spill in Host communities

| RESPONSES | FREQUENCY | PERCENTAGE |
|-----------|-----------|------------|
|-----------|-----------|------------|

| | | |
|-----|----|-------|
| YES | 20 | 10.53 |
|-----|----|-------|

| | | |
|----|-----|-------|
| NO | 170 | 89.47 |
|----|-----|-------|

| | | |
|--------------|------------|------------|
| | 25 | 13.16 |
| DON'T | | |
| KNOW | | |
| TOTAL | 190 | 100 |

Source: Field Survey, 2016

KNUST

The effects of liquid and solid pollution from oil and gas activities on the environment cannot be underestimated in the industry. As this have both direct and indirect impacts on the host communities in particularly. In this study, 70% of respondents were of the view and believed that at the moment oil and gas companies do not dump waste and effluent onto the sea and land. 17% of the respondents were in sharp opposing view: all of them were fishermen. Upon further interrogations, they contradicted themselves to say that the wastes are on seasonal basis, which any unbiased researcher will not conclude on.

Researcher went to the seashore for personal observation: the wastes were sea-weeds but not wastes from the operations of oil and gas. The four District Assembly Environmental Officers and Regional Environmental Protection Agency confirmed no; oil and gas companies do not dump wastes and other effluents into the water bodies and on lands. The Environmental Officers indicated that the companies are practically following the mitigation measures in their Environmental and Socioeconomic Impact Assessment Statements. The researcher could not take sample of the sea water for laboratory investigations. Finally, 13% of the respondents were open to say they don't have any knowledge on that issue.

Table 4.13: Respondents experience on outbreak of skin, upper respiratory, and urinal tract infections attributable to oil and gas operations

OUTBREAK OF SKIN, URINAL AND UPPER TRAC INFECTIONS

| RESPONSE | FREQUENC | PERCENTAGE |
|----------|----------|------------|
| YES | 8 | 4.21 |
| NO | 182 | 95.79 |
| TOTAL | 190 | 100 |

Source: Field Survey, 2016

It is logical to reason that pollution of oil and gas operations on source of drinking and air rational would lead to the above ailment or diseases in the host communities by using causality test principle. Prima face evidence from the field survey revealed that such sickness and diseases at the time of the work had not exited in host communities. Thus 96% of the respondents has not experienced or heard of such in their communities attributable to oil and gas operations. However, 4% were of the view that such ailments are eminent in their communities.

Table 4.14: Oil and Gas on Biodiversity

OIL AND GAS OPERATIONS ON BIODIVERSITY

| RESPONSES | FREQUENCY | PERCENTAGE |
|-----------|-----------|------------|
|-----------|-----------|------------|

| | | |
|-----------------------|------------|--------------|
| YES | 84 | 44.21 |
| NO | 97 | 51.05 |
| DON'T KNOW | 9 | 4.73 |
| TOTAL | 190 | 99.99 |

Source: Field Survey, 2016

Every stage of oil and gas operations –exploration via production to transportation can have detrimental effects on ecosystem, on land and on sea: as part of the sea-bed is degraded, coastal areas are cleared, under-water noise injures marine mammals at any time. In this regard, 51% of respondents clearly believed oil and gas operations at the time of the research don't affect biodiversity of their communities. This percentage constituted respondents typically from Ahanta West and Nzema East District Assemblies. Also, 44% of the respondents believed strongly oil and gas operations do affect their communities' biodiversity. Furthermore, 5% of the respondents don't have any knowledge about oil and operations on biodiversity of their communities. However, the researcher could not undertake laboratory investigations to determine extent of damage if any on the biodiversity (habitants and organisms) of the host communities.

Table 4.15: Oil and Gas Impact on source of Drinking Water

OIL AND GASEFFECT ON SOURCE OF DRINKING WATER

| RESPONSE | FREQUENC Y | PERCENTAGE |
|--------------|---------------|------------|
| YES | 19 | 10 |
| NO | 171 | 90 |
| TOTAL | 190 | 100 |

Source: Field Survey, 2016

90% of respondents across the four District Assemblies had indicated their communities were not affected by oil and gas operations in terms of their drinking water sources. However, 10% of the respondents in the host communities' drinking water sources were affected by oil and gas operations. Thus, Kegyina community under Nzema East Municipal Assembly source of drink water was affect by Ghana Gas Company Pipeline.

Table 4.16: Alternative Source of Drinking Water

ALTERNATIVE SOURCE OF DRINK WATER

RESPONSES FREQUENCY PERCENTAGE

| | | |
|--------------|------------|------------|
| YES | 42 | 22.1 |
| NO | 148 | 77.9 |
| TOTAL | 190 | 100 |

Source: Field Survey, 2016

78% of respondents believed they don't have any water source provided by the oil and gas companies in their communities. However, 22% had drinking water sources being provided by the oil and gas companies and even some water projects were still ongoing.

Water is an essential basic commodity of life in every civilized society. It is second listed in the basic need approach in measuring absolute poverty and also been a right according to United Nations General Assembly. World Water Day is celebrated annual on every March 22. Some host communities still do not have adequate drinking water sources. In the light of this, Kosmos Energy is one of oil and gas companies providing some host communities with safe drinking water at a rational fee across all the four District Assemblies. See image 3 at Appendix.

Table 4.17: Planting of Trees by Oil and Gas Companies

| RESPONSES | FREQUENCY | PERCENTAGE |
|------------------|------------------|-------------------|
| YES | 0 | 0 |
| NO | 190 | 100 |

Source: Field Survey, 2016

It is intriguing to note that, none of oil and gas companies in the host communities is planting trees- juxtaposing the impact of their operation on vegetation. Ghana Gas Company pipeline for instance cleared an area measuring about 20 meters wide right from Quantum Terminal at Anochie through to Prestea Station and to Aboadze Thermal Plant-

Takoradi (111km-20^{''''}). In the wake of sustainable development drive, ideally oil and gas companies sought to have planted or planting trees in some host communities at least to support ecosystem. *Image 4* at Appendix shows the total area cleared by Ghana Gas Company Pipeline which environmental sequences.

4.4 ECONOMIC DYNAMICS OF RESPONDENTS

The wellbeing or poverty level of a society can be determined by so many indicators taking into cognizance of different institutions and organization not excluding World Bank, UNICEF, UN and African Development Bank definitions. This research pivot itself with the following indicators having dealt with some under the social and environment realm; Income and rent level, employment level and availability of social infrastructure or social amenities since the operations of oil and gas started in the host communities under the four District Assemblies of Western Region of Ghana.

Table 4.18: Average Monthly Income Level of Fishermen and Farmers in 2010

| MONTHLY INCOME GHC-2010 | AVERAGE LEVEL INCOME GHC | FREQUENCY | PERCENTAGE |
|----------------------------|-----------------------------|-----------|------------|
| 100-500 | 250 | 59 | 52.68 |
| 600-1000 | 500 | 30 | 26.79 |
| 1100-1500 | 750 | 21 | 18.75 |

| | | | |
|-------|------|---|------|
| 1600+ | 1000 | 2 | 1.78 |
|-------|------|---|------|

| | | | |
|--------------|--|------------|------------|
| TOTAL | | 112 | 100 |
|--------------|--|------------|------------|

Source: Field Survey, 2016

In 2010, 52% of the respondents (fishermen and farmers) average monthly income was Ghc250, 27% was in the average of Ghc500, 19% was in the average GHc750 and 2% was in the GHc1000 average. Considering their earnings objectively, most of them could be classified as local marine fishermen and peasant farmers in host communities.

Table 4.19: Average Monthly Income Level of Fishermen and Farmers in 2015

| MONTHLY INCOME GHC-2015 | AVERAGE LEVEL INCOME GHC | FREQUENCY | PERCENTAGE |
|------------------------------------|---|------------------|-------------------|
| 100-500 | 250 | 94 | 83.93 |
| 600-1000 | 500 | 16 | 14.29 |
| 1100-1500 | 750 | 2 | 1.78 |
| 1600+ | 1000 | 0 | 0 |
| TOTAL | | 112 | 100 |

Source: Field Survey, 2016

Whilst looking at changes in the cost of goods and services like rent level over the period, it is also significant to look at income level of the main ventures in order to make objective and cogent analysis. Table 20 presents income levels of farmers and fishermen under oil and gas host communities. In 2015, 84% of the respondents (fishermen and farmers) average monthly income was Ghc250, 14% was in the average of Ghc500, 2% was in the average GHc750 and 0% was in the GHc1000 average.

Table 4.20: Comparative Analysis of Fishermen and Farmers average income for 2010 and 2015

COMPARATIVE ANALYSIS OF AVERAGE INCOME LEVEL

| INCOME LEVEL | 2010 % | 2015 % |
|---------------------|---------------|---------------|
| 100-500 | 52.68 | 83.93 |
| 600-1000 | 26.79 | 14.29 |
| 1100-1500 | 18.75 | 1.78 |
| 1600+ | 1.78 | 0 |

TOTAL

100

100

Source: Field Survey, 2016

Fishermen and farmers are worse-off in terms of average monthly income by the operations of oil and gas in the host communities: 84% of them in 2015 were in the average monthly income of GHc250 as against 52% in 2010. Whilst cost of living is increasing, the incomes of these two main economic ventures in the host communities are declining in both absolute and relative terms. The most affected economic venture is the fishing industries in the host communities. Alternatively, based on the declined output, income and increased in price of goods and services at host communities. Applying microeconomics comparative analysis in terms of compensated and equivalent variations; it revealed government, oil and gas companies ought to give these host communities an amount not less than an average of Ghc 300 per month. Their utility level has decreased drastically owing to price increases in goods and services and decrease in income level. This revelation is in sharp contraction with African Development Bank Report, (2014); it reported the impacts on fishermen in particular were moderate.

Table 4.21: Results of Estimated Model

| Variable | Coefficient | Std. Error | t-Static | Prob. |
|------------|-------------|------------|----------|--------|
| β_0 | 225.1320 | 80.45849 | 2.798114 | 0.0064 |
| EX_i | 0.237885 | 6.983383 | 0.034064 | 0.9729 |
| EX_{i+1} | 0.069291 | 0.142377 | 0.486669 | 0.6277 |

| | | | | |
|---------------------|-----------|----------|-----------|--------|
| DFA | 46.08208 | 60.97087 | 0.755805 | 0.4519 |
| EX _i DFA | -2.171031 | 2.528969 | -0.858465 | 0.3931 |

The constant term shows that if the three independent variables were equal to zero, this would have shown average monthly income of Ghc 225.13. Thus if oil and gas operations do not occur, fishermen and farmers average monthly income would be Ghc225.13 in current year.

The elasticity of oil and gas operations is positive, indicating if the operations of oil and gas increases by 1% will lead to 0.24% increase income in host communities in general, all else equal. The elasticity on future operations of oil and gas is equally positive. It is scientifically assumed that oil and gas production's revenue goes to the host communities.

The elasticity on dummy variable is 46%. The interest is not here, it is just used to identify defects type or treatment effect and do not have any intrinsic meaning. Let farmer (Dummy=0) and fisherman (Dummy=1), then the elasticity on interactive variable (EXDFA) is -2.17. Specifically, for every 1% increase in oil and gas operations, there will be a corresponding decline income below any effect realize by farmers' income in the host communities. In this instance, every 1% increase in operations of oil and gas will lead to $(0.24+0.07-2.17) = -1.86\%$ in fishermen income in host communities in both current and future terms. Thus Dummy=1 for fishermen, the total effect including interactive variable. Total effect analysis shows a negative relationship between operations of oil and gas and fishermen income. Thus, future operations of oil and gas activities will lead to decline in future incomes of fishermen.

Table 4.22: Monthly Rent in 2010

RENT LEVEL FREQUENCY PERCENTAGE

GHC-2010

| RENT LEVEL | FREQUENCY | PERCENTAGE |
|--------------|------------|------------|
| FREE-10 | 94 | 49.47 |
| 11- 20 | 84 | 44.21 |
| 21- 30 | 12 | 6.32 |
| 31- 40 | 0 | 0 |
| 41- 50 | 0 | 0 |
| 51+ | 0 | 0 |
| TOTAL | 190 | 100 |

Source: Field Survey, 2016

In 2010, about 49% of respondents in their communities were paying about Ghc10 or not even paying rent at all and 44% were paying rent in the range of Ghc11-Ghc20 on monthly basis. On average in 2010 across all host communities were paying Ghc15 on monthly basis.

Table 4.23: Monthly Rent in 2015

RENT LEVEL FREQUENCY PERCENTAGE

GHC-2015

| | | |
|----------------|------------|--------------|
| FREE-10 | 0 | 0 |
| 11- 20 | 0 | 0 |
| 21- 30 | 38 | 20 |
| 31- 40 | 17 | 8.95 |
| 41- 50 | 22 | 11.58 |
| 51+ | 113 | 59.47 |
| TOTAL | 190 | 100 |

Source: Field Survey, 2016

However in 2015, about 59% of respondents in their communities were paying over Ghc50 per month and 12% were paying rent in the range of Ghc41-Ghc50 on monthly basis. If you did trend analysis for rent in 2010 to 2015, statistically one will come to terms that, there has been over 400 percent of inflation on rent in host communities over a period of five years. Using inferential statistic, this astronomic increase in rent will not only affect the 36% of respondents whose accommodation type in table 8 was rented but the communities as a whole.

Table 4.24: Oil and Gas Impact on Properties

RESPONSES FREQUENCY PERCENTAGE

| | | |
|-------|-----|-------|
| YES | 112 | 58.95 |
| NO | 78 | 41.05 |
| TOTAL | 190 | 100 |

Source: Field Survey, 2016

Out of a total sampled population (190), 112 (59%) of them had their properties directly affected in various degree in host communities ,but 41% as the remaining respondents were not affected in terms of properties. The entire 59% category was fishermen and farmers, since these form the dominant economic units in the study area.

Table 4. 25: Type of Properties Affected by Oil and Gas Operations

| DISTRICT | PROPERTY TYPE | SIZE | FREQUENCY | PERCENTAGE |
|--|--------------------|-----------|-----------|------------|
| ALL | SEA | 500M | 28 | 25 |
| ALL | FARM LAND | 1-5 ACRES | 4 | 3.6 |
| ELLEMBELLE AND FISH POUND AHANTA WEST | | 1-5 PONDS | 4 | 3.6 |
| ALL | COCONUT PLANTATION | 1-5 ACRES | 12 | 10.71 |

| | | | | |
|--------------------------|-----------------------|--------------|------------|-------------|
| ALL | CASSAVA | 1-5 ACRES | 36 | 32.14 |
| ALL | PALMNUT PLANTATION | 1-5 ACRES | 8 | 7.14 |
| ELLEMBELLE NZEMA EAST | AND COCOA | 1-5 ACRES | 5 | 4.09 |
| NZEMA EAST | RUBBER | 1-5 ACRES | 5 | 4.09 |
| ALL | OTHERS ACRES | 1-5 CROPS | 9 | 8.03 |
| ELLEMBELLE | POULTRY | 1 FARM | 1 | 0.9 |
| TOTAL | | | 112 | 99.3 |

Source: Field Survey, 2016

In table 25 above, 112 respondents indicated that their properties were directly affected by oil and gas operations in their communities. Out of these 112 victims, 32% were cassava farmers, 25% fishermen and the least affected in table 26, above was poultry farmers. It is interesting to note that, the fishermen were able to demonstrate to the researcher that the sea was their economic property: as they have the right to earn income from it, they have the right to use it, right to transfer to future children, and finally have the right to enforcement of it according to other laws like United Nations Law of the Sea.

Table 4.26: Impact of oil and Gas Operations on Production Level

PRODUCTION

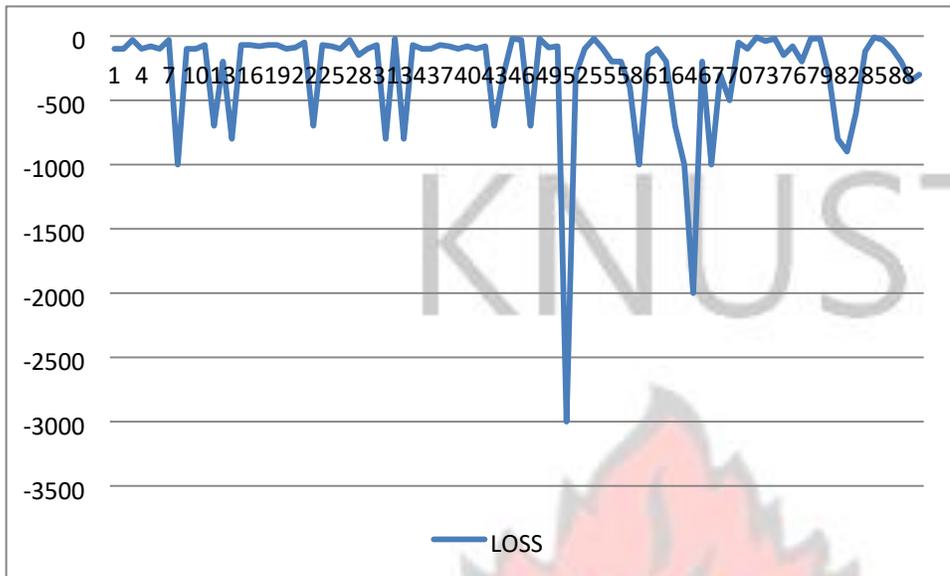
DECLINE /LOSS

| RESPONSES | FREQUENCY | PERCENTAGE |
|-----------|-----------|------------|
| YES | 112 | 100 |
| NO | 0 | 0 |

Source: Field Survey, 2016

All those properties affected by oil and gas operations had led to a decline in their production output levels and subsequently reduced their revenues. The fishermen especially, fish catch had reduced drastically over the period under consideration since oil and gas operations started in host communities. Fishermen now travel far distance in search for fish which increases their operational cost and yet record low catch. These have cumulatively impacted negatively on their profitability and hence affecting their wellbeing or increased poverty among fishermen in host communities. These usual cause fishermen to fight with Ghana Maritime Authority Police or Securities when they cease their fishes for fishing around areas regarded as „no go area“. To quote one fisherman in his own words „we wish the oil and gas dry up in the sea for us to rest“.

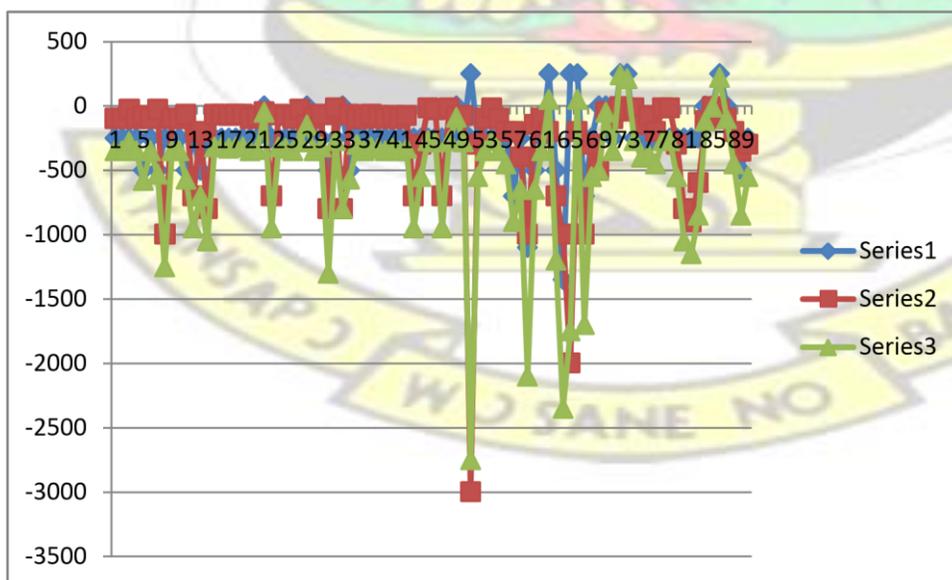
Figure 4.1: Losses Recorded by farmers and fishermen on monthly basis as a Result of Oil and Gas operations in their communities.



Source: Field Survey, 2016

The figure 1 illustrates losses recorded by fishermen and farmers as result of oil and gas operations in their communities on monthly basis. The least average recorded loss is Ghc10 and the highest average recorded loss is Ghc3000.

Figure 4.2; fishermen and farmers income and revenue variations and net effect over the period, 2010-2015



Source: Field Survey, 2016.

Form figure 2 above, it was only five respondents (farmers) whose income level had positive values of Ghc250 on average. All fishermen's income had reduced drastically in host communities to a higher value of Ghc 1200 on average per month. On net basis the largest loser among farmers and fishermen is Ghc2750. However, it was only two farmers who had a positive net gain of Ghc240 and Ghc220 on average per month in host communities. This suggests the extent to which especially fishermen are negatively impacted on income basis.

Table 4.27: Compensation Payment

| RESPONSES | FREQUENCY | PERCENTAGE |
|------------------|------------------|-------------------|
| YES | 35 | 41.18 |
| NO | 50 | 58.82 |
| TOTAL | 85 | 100 |

Source: Field Survey, 2016

41% out of 85 respondents who are farmers and fishermen/farmers has received compensations from oil and gas companies in host communities at the time of this work. Those who received compensations however, bemoaned the approach or procedure for evaluating their properties by the oil and gas companies and their Consultants (valuators); compensations paid were inadequate, considering the cost incurred on those properties and

monthly revenues derive from them as against what oil and gas companies actual paid. Among all the affected victims, it was only rubber farmers who were relatively satisfied with the compensations received. This was possible because, Ghana Rubber Estate limited (GREL) negotiated for compensations on behalf of the rubber farmers. Rubber farmers revealed, the process was „executed in accordance with International Standards“ to use the very words of a respondent. Furthermore, at the time of this research across all the four District Assemblies, the remaining 59% has not received any form of compensation from oil and gas companies for impacting negatively on their source of livelihoods. It is also enlightening to add that, respondents (27 fishermen) who are being banned in host communities from fishing close or near the operational areas of oil and gas fields (typical called exclusive zones) were also asking for compensations. The „effect of zero-sum game“ has affected the fishing industry in favor of the oil and gas industry under the study area of Ghana.

Table 4.28: How Compensations Were Expended

| COMPENSATION EXPENDED ON | FREQUENCY | PERCENTAGE |
|---------------------------------|------------------|-------------------|
| REINVESTMENT ON FARMS | 5 | 14.29 |
| TRANSPORTATION | 3 | 8.57 |
| PAYING SCHOOL FEES | 4 | 11.42 |

23

65.71

CONSUMPTION&OTHER**EXPENSES****TOTAL****35****99.99***Source: Field Survey, 2016*

Out of the 35 victims who received compensations expended their money in the following ways:

66% was for consumption and other household expenses, 14% was for reinvestment in farming business, 11% was for paying of school fees, and 9% wade into transport business.

Table 4.29: Developmental Infrastructure, Social Amenities and Other Services by Oil and Gas Companies in Host Communities; positive externalities of oil and gas on host communities

**DEVELOPMENTAL,
SOCIAL
AMENITIES AND
OTHER SERVICES**

| PROJECT | PROVIDER | DISTRICT | COMMUNITY |
|------------------------|---------------------------------|-----------------|------------------|
| 1. SCHOLARSHIPS | GNPC, AND TULLOW | HESS ALL | ALL |

2. HEALTH KOSMOS AND ALL AXIM, SANZULE,
INFRASTRUCTURE ENERGY ENI

KNUST
EIKWE,
NYAMEBEKYRE

3. ROAD GHANA GAS ELLEMBELLE ALABOKAZO-
INFRASTRUCTURE COMPANY EIKWE,
NZEMA EAST
SANZULE, AIYINASE
NORTH-GWIRE

4. WATER KOSMOS ALL BEYIN-SANZULE,
PROVISSION ENERGY
AYISKRO, APATAIM
AGONA, AGORFU

5. EDUCATIONAL TULLOW, GNPC, ELLEM.NZE AXIM, NKROFUL,
INFRASTRUCTURE GHANAGAS &JOMO BEYIN

6. TRANSPORT GHANA GAS WESTERN ADELKASUZO
PROVISSION COMPANY REGION BEYIN
TRADITIONAL
COUNCIL

7. TOILET ENI FACILITY

ELLEMELLE SANSULE

0 0

8. ECONOMIC VENTURES AND EMPOWERMENT

Source: Field Survey, 2016

4.5.1 SCHOLARSHIP SUPPORT SCHEMES

Indeed, there are good number of scholarships available for the communities; this scholarships ranges from Senior High school to tertiary level. The scholarship schemes available for the host communities include HESS scholarship scheme, GNPC scholarship scheme and Tullow scholarship. However, it should interest social policy planners to not that, the scholarship scheme that are available to support the poor but brilliant students in the host communities have been diverted to say the least to political party members, high echelon and influential in society to the disadvantage of target groups. To say the very words of a fisherman-respondent; „we reasoned the scholarship was meant to serve the most affected victims like fishermen and farmers for example“ but that has not been the case.

4.5.2 HEALTH SUPPORT PROJECTS BY KOSMOS ENERGY AND ENI

Some oil and gas companies in host communities have selected some area of interest according to the companies“ Corporates social responsibility principle and also by the recommendations of the District Assemblies to aid the health sector to ensure prompt and

quality health care services to the people. Two of such companies include Kosmos Energy and Ente Nazionale Idrocarburi (known as ENI). ENI Foundation health focus is on the fourth and fifth Millennium Development Goals: reducing child mortality and maternal death - ENI has this project covering mainly three District Assemblies (Jomoro, Ahanta West and Ellembelle). Eikwe Mission Hospital is under serious renovation and rehabilitation project by ENI Foundation and a newly built Community Health Planning services (CHPs) compound at Sanzule also by ENI. Axim Government Hospital also benefited from Kosmos Energy project; thus rehabilitated Emergency Accident Unit, fully equipped with patients' beds, wheelchair etc.

4.5.3 ROAD INFRASTRUCTURE PROJECTS BY GHANA GAS COMPANY;

The road linking Alla-bokazo to Eikwe and Sanzule is under massive construction and also, the road linking Gwire-Aiyinase to Eshiem and other communities. Hitherto the operations of oil and gas the road from Gwire-Aiyinase to Eshiem was not motor able especially during raining seasons, which is now under feeder road construction by Ghana Gas Company. The construction of this road is to facilitate operations of Ghana Gas Company, however cannot preclude the usage by the communities in the catchment area. This is one of the positive externalities host communities in the area will enjoy, since road is in the realm of public goods category. The road when completed will facilitate cocoa transportation to the centers; this used to be an impediment to cocoa farmers in particular.

4.5.4 WATER PROVISION PROJECTS BY KOSMOS ENERGY;

Kosmos Energy is the only oil and Gas Company in host communities that provide safe water to the people. Safe Water Project covers over 19 host communities serving an estimated 30,000 people according to *Daily Graphic Newspaper dated September, 2015*.

This positive externality has been extended to a Community Senior High School at Bamiankor under Nzema East Municipal Assembly. This Project was confirmed by Member of Parliament and Minister of Petroleum, Mr. Emmanuel Armah Kofi Buah in 2015 when interviewed by Daily Graphic Newspaper. However, the researcher also found that the safe water project was not „free“ but community members are paying commercial rates to the operator.

4.5.5 EDUCATIONAL INFRASTRUCTURE BY TULLOW GHANA, AND GNPC;

Oil and gas companies have identified a gap in terms of educational infrastructure among host communities and are contributing positively in that regard. It is in that light Kosmos Energy, GNPC and Tullow Ghana had selected some communities within the four Districts to benefit from their educational infrastructure packages. Axim under Nzema East Municipal is one of the beneficial communities: Project Client is Axim Girls Senior High School. GNPC funded Projects at the school includes, a newly constructed 12 unit, two storey building, which has one common Staff room, Headmistress office, Library, 8 toilet facility and other facilities. Another project is the second floor building comprising 6 unit classrooms, which was started by Nzema East Municipal Assembly. These projects were confirmed by Municipal Planning Officer and the Assistant Headmaster of the school, when contacted by the researcher. The last project for Axim community was by Tullow Ghana Limited; the project is comprises of first and second floors, which when completed will accommodate an estimated 800 students.

Some other educational infrastructure projects provided by Ghana Gas Company Limited include, four newly built Primary schools under the catchment. These projects can be located at the following communities, Nkroful –Nyaneba Model Primary, Beyin Primary school, Adelkasuazo Primary and Nyamebikyere Pirmary School. The project components are as follows; 6 unit classrooms, 2 storerooms, ICT room, Headmaster office, 4 toilet facility, tap-water, and electricity to the buildings.

4.5.6 CREATION OF ALTERNATIVE ECONOMIC VENTURES AND EMPOWERMENT;

It is revealing to note that none of oil and gas companies under host communities is creating or aiding alternative sources of income generating units to support these local communities. This is devastating, considering the negative impacts of oil and gas companies, especially on fishing-value-chain. The impact of oil and gas has led to what is known as *zero-sum-game* to the fishing industry within host communities: oil and gas companies had expanded while fishing industry in the host communities was being threatened. In fact this revelation is in shape paradox with Growth and Poverty Reduction Strategy (GPRS), 2002 recommendations.

Table 4.30: Oil and Gas Fields, Blocks /Concession and Companies that operate them in Host Communities

| OIL FIELDS | &GAS BLOCK/CONCOIL AND GAS DISTRICT ESSIONS | UPSTREAM AND MIDSTREAM COMPANIES | SERVIECES TYPE | LOCAT ION |
|--|--|---|-------------------------|--------------------------|
| DEEPWATER TANO, 'TEN'MAHO GANY TEAK | JUBILEE | TULLOW | ALL | UPSTREAM OFFSHORE |
| WEST CAPE THREE POINTS | JUBILEE | KOSMOS | ALL | UPSTREAM OFFSHORE |
| DEEPWATER TANO/CTPS | JUBILEE | HESS GHANA | ALL | UPSTREAM OFFSHORE |
| OWO,ALMOND ,PECEAN | JUBILEE | GNPC AND ALL OTHERS PARTNERS | ALL | UPSTREAM OFFSHORE |
| | | QUANTUM TERMINAL | ELLEMBEMIDSTREAM | ANOCHE |
| | | GHANA GAS COMPANY LTD | ELLEMBE LLM | MIDSTREAM ATUABO |
| | | ATUABO FREE PORT | ELLEMBELLEM | MIDSTREAM ATUABO |
| SOUTH CAPE THREE | SANKOFA & ENI GYE NYAME | ELLEMBELLEM | UPSTREAM & M | OFFSHORE / SANZU |

POINTS:

JOMORO

LE

**OIL AND GAS
SERVICE
COMPANY**

**AFRICAN OIL AHANTA
SERVICES WEST
LTD.**

**SERVICES APOW
PROVIDE A
R**

**ALTUS AHANTA
INTERVENTI WEST
ON LTD.**

**SERVICES APOW
PROVIDE A
R**

**ENI E&P AHANTA
GHANA WEST**

**SERVICES APOW
PROVIDE A
R**

**EXPRO GULF AHANTA
LTD WEST**

**SERVICES NEW
PROVIDE AMAN
R FUL**

**HARLEQUIN AHANTA
INTER.GH.LT WEST
D**

**SERVICES EWUSI
PROVIDE EJOE
R**

**JONMORE AHANTA
INTERNATIO WEST
NAL**

**SERVICES ANKYE
PROVIDE RYIN
R JUNCT
ION**

**SCHLUMBER AHANTA
GERS SEACO WEST
INC**

**SERVICES KEJAB
PROVIDE IL
R**

**GENESIS OIL AHANTA
GAS WEST**

**SERVICES ABOAD
PROVIDE I**

SERVICES

R

**RIGWOLRD
INTER.SERVI
CES**

**AHANTA
WEST**

**SERVICES
PROVIDE
R**

**PRETSI
A**

**HARLIBURTO
N**

**AHANTA
WEST**

**SERVICES
PROVIDE
R**

**ABOAD
I**

Source: Field Survey, 2016

From table 30 above, researcher found that all the service companies or providers are located under Ahanta West District. These service companies provide essential services to the offshore and onshore operating companies in the industry. Table 30 and Map1 (oil and gas activity Map at Appendix) further illustrate some important oil and gas Fields, Blocks or Concessions and their operators in the industry. This illustration can aid identify right or wrong doings that might be exacerbated by the companies on host communities. For instance, Gas Company at Sanzule is operated by ENI and its positive or negative impact on that community can wholly or partly be attributable to that company. ENI gas field consist of Sankofa, which has fours fields and Gye Nyame having one field; this fields are located off, South of Cape Three Points- 60kilometers away from Sanzule into the sea.

Table 4.31: Cumulative Imputed Impact Analysis on Host Communities

**CUMULATIVE
IMPUTED
IMPACT
ANALYSIS
VARIABLES**

NEGATIVE IMPACT

**POSITIVE
IMPACT**

**NET
IMPACT**

ECONOMICS

INCREASED COST OF LIVING

DECREASED INCOME LEVEL

NEGATIVE

INCREASED RENT LEVEL

NEGATIVE

INCREASED LAND VALUE

NEGATIVE

DECREASED AGRIC./FISHERING

NEGATIVE

OUTPUTS

POSITIVE

POSTIVE

HEALTH INFRASTRUCTURE

POSITIVE

POSTIVE

EDUCATIONAL INFRASTRUCTURE

EMPLOMENT

THREATEN OVER 112

50 JOBS

NEGATIVE

AGRIC. & FISHERING VENTURE

SECTOR THREATENED;

EXCLUSIVE ZONING

LOW OUTPUT

NEGATIVE

**TOURIST
ATTRACTION**

SECTOR THREATENED

NEGATIVE

KNUST

ENVIRONMENT

ENDANGERED SPICES, WATER,

**CUTTING AND
EXCAVATION OF TREES
AND LAND, POLLUTION**

NAGATIVE

**SOCIAL
CULTURE**

**AND TRADITIONAL
I.POLITICAL
INST.'BADBLOOD'RELATI
ONS,**

**AFFECTING FAMILY
TIES, SACRED LAND
AFFECTED, CULTURE OF
FREE -GIVING IS
AFFECTED**

NEGATIVE

AND CEMENTRY

NEGATIVE

**COMPENSATION UNPAID COMPENSATION FEW PAID NEGATIVE
S**

Source: Field Survey, 2016

Every social or welfare planner is always concerned with the greatest good for the greatest people in both primitive and modern economic circles. For the purpose of this study; overall cost and benefits for host communities is defined as the sum of imputed value of benefit and cost to host communities involved.

The logo of Kenya National University of Science and Technology (KNUST) is centered in the background. It features a yellow eagle with its wings spread, perched on a green shield. Above the eagle is a black mortar and pestle with a red flame above it. The entire emblem is set within a white circular border. Below the emblem is a yellow banner with the Swahili motto 'NYAJAPU WJ SANE NO BADWENHA' written in black capital letters.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSIONS AND POLICY

RECOMMENDATIONS

5.1 INTRODUCTION

This chapter comprises of summary of findings, conclusions, and policy recommendations.

5.2 SUMMARY OF FINDINGS

The fishermen and farmers have not only been subjected to their farm lands and portion of sea taken over by oil and gas companies, but have not also been compensated and inadequately compensated for damages to their various properties. For instance out of a total 112 affected or victims, (59%) were not compensated for damaging their properties at the time of this piece of work.

Oil and gas operations over the last five or more impacted negatively on the vegetation and farm lands of some host communities. Gas pipeline alone has cleared vegetation covering an area of 20m wide right from Atuabo through to Prestea and Aboadze Thermal Plant.

There is destruction of vegetation as claimed by host communities. However, available results or evidence from the questionnaire technique does not support the ostensible claim by some host communities under the study environment with regards pollution in the form of oil spills, gas flare and other effluents. In sum, some companies have defaulted on their mitigation measures especially on the compensation part as against what is stated in their EIA and SEIA statements.

5.3 CONCLUSION

Fishing economic unit is negatively impacted on net basis or total effect; the estimated economic model revealed a 1% increase in oil and gas operations will lead to 1.86% decline in fishermen income all else equal. This finding confirms the perceived decline in fishermen income level. Fishermen are therefore, exasperated or their wellbeing is threatened following the prohibition of fishermen across all host communities from fishing around exclusive zones, together with the Jubilee FPSO lighting effect on the sea.

Host communities as a whole are experiencing increased cost of living (increased price of goods and services): increased level of rent, decreased income level of fishermen (decreased output level of fish catch), and increased land value.

Oil and gas companies in host communities do not balance the developmental level of these communities. It seems Government and Multinational oil and gas companies exist to harness solely their turnover at the expenses host communities. This assumption abides Bamet and Muller (1974) in their insistence that the primary interest of global corporations is of worldwide profit maximization at the expense of host communities. In other words, both Government and oil and gas companies do not provide any possible alternative economic units for host communities to ensure sustainable economic livelihoods in communities.

A total review and findings of the oil and gas law and frameworks revealed, there are no specific oil and gas law in the country currently protecting host communities and environment especially the upstream sector compared to Norwegian oil and gas industry.

These findings can also be verified in Darko-Mensah, (2009). Oil and gas companies operating in Ghana do not have any financial assurance mechanism or performance bond for host communities against any disasters.

However, oil and gas companies have contributed positively to the developmental drive of some host communities under the Western and Central Coastline in Ghana. ENI Foundation, ENI Ghana Limited main focus is on health infrastructure and training of health personnel; its aim is to support governments quest to achieving the Millennium Development Goals four (reducing child mortality) and goal five (reducing maternal death). In this regards, ENI

has built fully furnished CHPs Compound for Sanzule, and also, renovated and rehabilitated some buildings of Eikwe Mission Hospital to including training of some Staffs.

Ghana National Petroleum Corporation as Jubilee partner has scholarship scheme and equal built some educational infrastructures for some host communities. Furthermore Kosmos Energy has provided Safe Water and health infrastructures to some host communities. In a similar fashion, Tullow Ghana Limited also has scholarship support and educational infrastructure for some communities under the study area. Finally, Ghana Gas Company has since its inception supported in both road and educational infrastructures in some host communities.

5.4 POLICY RECOMMENDATIONS

Government of Ghana should include financial assurance or performance bond in all upstream oil and gas contracts, as such will not only be appropriate incentive compatibility strategy to bring best practices in the local host communities but will among other things ensure that the host communities are not unduly disadvantaged especially in their environment which is their source of wellbeing today and future. Alternatively the government together with the oil and gas companies should establish what is known as „Host Community Fund“ for these communities. This will go a long way to enhance the capacity of these fishermen to join alternative economic livelihoods to ensure sustainable wellbeing in the communities as recommended by Growth and Poverty Reduction Strategy (GPRS), 2000. This will in the short and long run reduce the conflicts between fishermen on one side and oil and gas companies on the other hand.

Houses very close to Atuabo Gas processing Plant and Anochie, Quantum Terminal should be relocated, considering the increased in temperature around their neighborhood. On this score government regulatory framework must be credible or integrated to ensure host communities are supported: one that involves reconciling the priorities of different users while reducing their negative impacts on biodiversity, food security and livelihoods.

EPA, District Assemblies and other government agencies or even Parliament ought to commission an investigation into the unpaid, inadequate compensations and related matters on host communities to ensure that these communities are not adversely shortchanged in their communities.

Government should as a matter of agency establish sub-EPA offices in all oil and gasbearing District Assemblies to complement the Environmental and Sanitation Officers.

When effectively and efficiently executed will strengthen and build their capacity to enhance constant or regular monitoring and evaluating of the operations of these oil and gas companies in host communities to avoid any oil spills, gas flares and other effluents.

Considering the level of destructions on vegetation, oil and gas companies ought to select some areas or communities for trees planting Programme and also support farmers in crop production to boost food security in the local communities.

Host communities via their Chiefs and leaders should come together as group to always put their exasperations in a more solidified way to demand for some appreciable level of development. In other words, host communities should not only be seen as estates for exploration, exploitations and „pollution heavens“ but must also benefit in terms of development to balance the impacts, since these resources are non-renewable.

KNUST

REFERENCE

- Christiana Kayinwaye Omorede (2012), Assessment of the Impact of Oil and Gas Resource Exploration on the Environment of Selected Communities in Delta State, **Nigeria**
- ENI (2014), Environmental Impact Assessment Report, <http://www.enireport.com>.
.Accessed on 15th December, 2015
- Environmental Protection Agency Act, 1994 (Act490) and Environmental Assessment Regulations 1991, (LI1652)
- Idoniboye O.B (1991), Damage Assessment following an Oil Spill in Nigeria NNPC. Seminar Paper, Port Harcourt, Nigeria.
- Keohane, Nathaniel, Revez, Richard and Stalins, Robert (1998), the Choice of Regulatory

Instruments in Environmental Policy, Harvard Environmental Law Vol.22, 299-358

Kiss A, Shelton D. (1991), international Environmental Law.

KITE (2010), Ghana's Emerging Petroleum Industry; *What Stakeholders Need to Know*

Koskenniemi M (1991), Peaceful Settlement of Environmental Disputes. Nordic Journal of International Law (60:72)

McCauley R. D. (1994), Environmental implications of offshore oil and gas development in Australia - seismic surveys. Australian Institute of Marine Science, Townsville, Queensland. 121 pp.

MFRD (2003), Report on the Fisheries Research and Utilization Branch of the Fisheries Department. (Marine Fisheries Research Division Directorate).pp1986-1995

Moltke Von.(1977), The legal Basis for Environmental Policy. Environmental Policy and Law(3:130-140)

Munashishe M (1993), Environmental Economics and Sustainable Development: World Bank Working Paper (No.3) New York World Bank.

National Academy (2003), Cumulative Environmental Effects of Oil and Gas Activities on Alaska's North Slope Report in Brief, Washington DC, National Academy

Nwankwo J.N, Ifeadi.C.N (1988), The Status of oil Spill Contingency Planning in Nigeria: Proceeding of an International Seminar, Port Harcourt, Nigeria

Nwankwo J.N. (1993), Oil and environmental Pollution: Paper Presented at the Conference on Strategies for the 5th National Development Plan (1986-1999) NISER

Nwaugo V.D (2005), Effects of Gas Flaring on Soil Microbial Spectrum in Parts of Niger, Delta Region of Southern Nigeria: African Journal of biotechnology.

Odiette W.O (1999), Environmental Impact Assessments for Sustainable Development. Developmental News(No.5 19-22)

Odu C.T.L (1996), Environmental Pollution gas flares Emission and their effects on the Acidity of Rain Water in the Niger Delta Region.

OECD (1975), The Polluter Pays Principle; Definition, Analysis and Implementation, Paris.

OECD (1990), Pollution Prevention and Control Integrated Pollution, Prevention and Control. The Status of Member Countries Implementation of Council Recommendations.

P.A.Sakyi et al (2012), Ghana Quest for Oil and Gas: Ecological Risk and Management Frameworks

ParthaDasgupta (1993), Natural Resource and Economic Development in Low -Middle Income Countries

Patey, Luke. A. (2007), State Rules: Oil Companies and Armed Conflicts in Sudan“ Third World Quarterly.18: 1-19.

Paul. (2003), Resource Impact: Curse or Blessing? A Literature Survey. Journal of Energy

Literature 9 (1): 3-42.

Pegg, Scott. (2009), Chronicle of a Death Foretold: The Collapse of the Chad-Cameroon Pipeline Project. Richard. African Affairs Quinney(1974) , Critique of Legal Order: Crime Control in a Capitalist Society: 108 (431): 311-320

Sarraf, Maria and Moortaza Jiwanji. (2001), Beating the Resource Curse: The Case of Botswana. Environment Department Working Paper #83, Report #24753. Stevens, Steiner R. (2008), Double standards? International best practice standards to prevent and control pipeline oil spills, compared with Shell practices in Nigeria. Friends of the Earth, Netherlands. 61 pp. November, 2008.

Subhes C. Bhattacharyya, Springer, (2011), Energy Economics: Concepts, Issues, markets and Governance

Sudan Tribune (2009), „South Sudan Villagers, Environment Suffer from Oil Boom“
<http://www.sudantribune.com/spip.php?article26231>

T. Colborn et al (2011), „Natural Gas Operations from a Public Health Perspective“, Human and Ecological Risk Assessment: An International Journal Volume 17.

Technical Meeting Document (1998), Environmental practices in offshore oil and gas activities

Tyler S.R (Ed). (2006), Communities, Livelihoods and Natural Resources: *Action Research and Policy Change in Asia*. International Development Research Centre

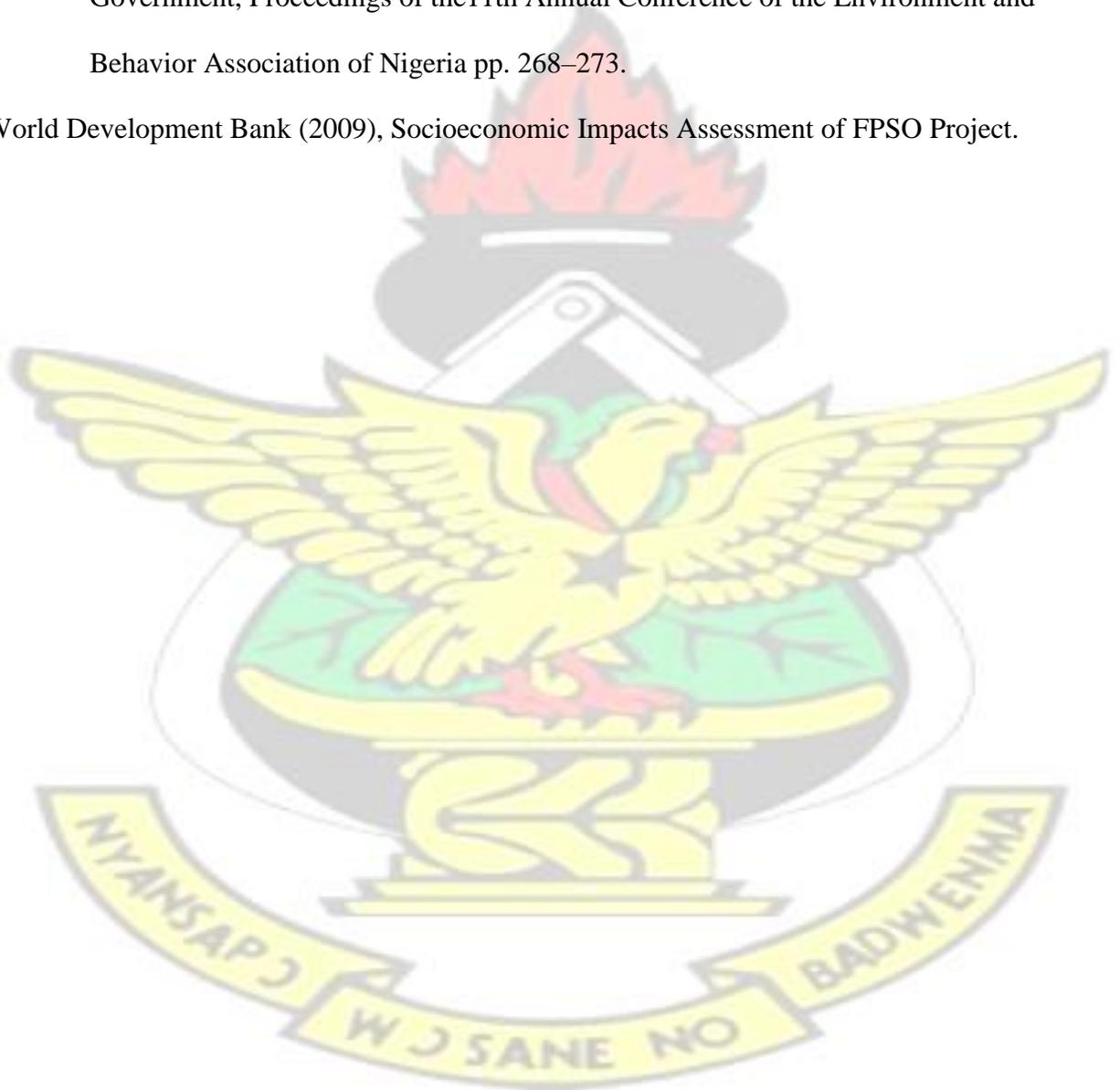
UNEP (2002), Africa environment outlook: past, present and future perspectives. United

Nations Environmental Programme Report. 400 pp.

UNEP (2011), Environmental Assessment of Ogonil and. United Nations Environmental Programme Technical Report. 262 pp

V. Adekunle *et al.* (Eds), Challenges of Environmental Sustainability in Democratic Government, Proceedings of the 11th Annual Conference of the Environment and Behavior Association of Nigeria pp. 268–273.

World Development Bank (2009), Socioeconomic Impacts Assessment of FPSO Project.



KNUST

APPENDIX A: positive and negative impacts of oil and gas operation

Image 1

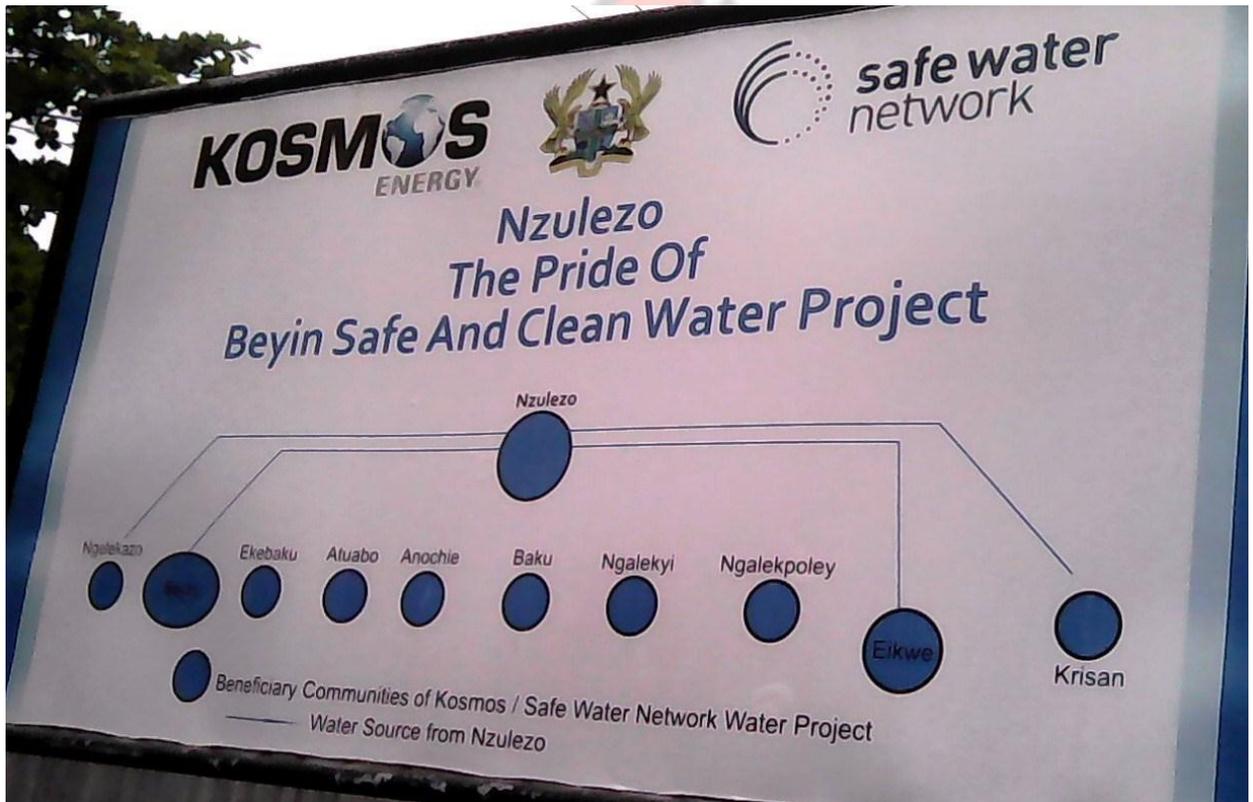


Source: Field Survey, Atuabo Gas Plant Site, 2016

The arrow is pointing at source of the flame which leads to increase in temperature within the vicinity of the communities mentioned above.

KNUST

Image 2: Kosmos Energy ‘Safe Water Project ,’ For Some Host Communities





Source: Field Survey, 2016.

Image 3; Ghana Gas Pipeline from Anochie (Quantum Terminal) to Aboadze Power Plant and Prestea Main Station



Source: Field Survey, 2016

KNUST

Image 4: TEN PROJECT, FPSO

FPSO Prof. John Evans Atta Mills

The FPSO is expected to arrive in Ghanaian waters in early March 2016 and will be stationed at the TEN fields, around 60 kilometers from the coast of Ghana's Western Region.

FPSO Mills will produce and store oil from Ghana's Tweneboa-Enyenra-Ntomme (TEN) offshore oil fields

Seafarers warned as TEN Project picks steam
The Ghana Maritime Authority (GMA) has issued a warning to all mariners and vessels operating in the country's territorial waters to maintain a safe distance of 5 nautical miles off the TEN Field Deep Water Port (DWP) As required by Section 235 of the Ghana Shipping Act of 2003 Act 645.

FPSO Facts and Figures

- Length = 350m
- Width = 56m
- Accommodation: 120 people
- Total man hours: 17,084,565
- Oil production capacity: 80,000 barrels per day
- Oil storage capacity: 1.7 million barrels
- Weight of topsides modules: 19,000 tonnes
- Weight of turret: 4,500 tonnes

Logos: Tullow, TEN project, MODEC, FMC

Source; TULLOW GHANA LIMITED (TEN PROJECT), 2015

The TEN PROJECT FPSO shows the total exclusive zones within which fishing activities are prohibited as required by Act of 2003Act 645.

KNUST

APPENDIX B: QUESTIONNAIRES AND MAPS

A. Household Questionnaire to thesis out social, economic and environmental externalities

Primary Information of respondent

Name of District.....

Name of community.....

1. Age...

2. Sex M F

3. Educational Level:

Basic education senior high Tertiary Postgraduate

4. Marital Status: Married Single Divorced
Widowed

5. Household size.....

6. Type of Accommodation: Rented Owned Other
.....

7. Occupation.....

8. What was your monthly Income level in 2010 (before oil and gas activities in community) in Ghc?

100 – 500 600 – 1000 1100 – 1500 1600 and above

9. What is your monthly Income level in 2015 (now) in Ghc ? 100 – 500 , 600 –

1000 1100 – 1500 1600 and above

10. Do you belong to any fishing association? Yes No

11. Do you have any other work apart from your occupation.....?

12. Have you ever experienced gas flaring in your community before and now?

Yes No

13. As a community, have you had any oil spills or gas perforation before and now?

Yes No

14. Could you please count the losses as a result of the oil spills, or perforations?

.....

15. Does the oil and gas companies discharged any effluent or waste into the sea or on land in your community? Yes. No

16. If yes, mention some problems that the effluents have on your health, and the environment

.....

.....

17. Has oil and gas operations affected plants growth (biodiversity) in any way in your community? Yes No. If Yes

explain.....

18. Have your property being affected by the oil and gas operation? Yes

No

19. What type of property? quantity.....

20. Have point 18 and 19, led to increase or decrease in your production
level?

Yes No

21. How much do you think, you lose or gain Ghc per
month as a result of oil and gas operation effect?

22. Has the operations of oil and gas affected your social values ?

Yes No

23. If yes, could you
explain.....

24. Can you mention any developmental projects in your community
brought by the oil
and gas
operations/company.....

25. Have your community experienced involuntary resettlement or land
takeover?

Yes No

26. Describe the compensation value and procedure if
there were any

.....

27. What did you use the compensation on?
.....

28. How many people do you know in your community that got employment in the oil and gas companies

29. How many upstream, midstream and downstream companies join your community to do business since the start of oil and gas operations?
.....

30. Have your community ever experienced any outbreak of skin or urinary and upper respiratory tract infections attributable to the operations of oil and gas operations?

Yes. No.

31. If yes explain

32. Does the operations of oil and gas affect your culture & spirituality values in any way?

Yes. No

33. If yes explain

34. Does the business of oil and gas operations affect land ownership acquisition in your

community?

Yes No if yes explain.....

36. Does the actives of oil & gas operations have indirect effects on your property

Yes No

37. If yes provide more information

38. Does oil and gas activities affect your community source of drinking water? Yes

No

39. If yes explain

40. Does your community have an alternative drinking source? Yes

No

41. If yes, please who provided

42. What was the nature of your access road network in 2010.....and 2015.....

43. Count the number of infrastructures and social amenities put up by the oil and gas companies in your community

44. Are the oil gas companies in your community planting any tree after their project operations?

Yes

No

45. what was Prices of rent in 2010 (before) Ghc..... and now Ghc.....

B.QUESTIONNARE FORGOVERNMENT INSTITUTIONS

Name _____ of _____
District.....

1. _____ Position
.....

2. _____
Responsibility.....
.....

3. What are main problems about or created by oil and gas operations in your District;
communities.....
..?

4. What mitigation measures does the Assembly put in
place.....

5. As a development partner, which projects do you proposed to the oil & gas companies
to put in place for your people...

6. Does the Assembly have Environmental Protection Unit? Yes. No

7. If yes how many times have you undertaking monitoring and evaluation assessment?
.....

Explain some of your findings

8. Does the office have the capacity to monitor and enforce the laws guiding the operations
of oil and gas in the Assembly? Yes. No

9. How many companies join your Assembly to undertake upstream, midstream and downstream business since oil and gas operations started?

.....

KNUST

10. What regulations does the Assembly have guiding operations of the oil and gas in the Assembly?

11. Is there any environmental law in the country regarding oil & gas activities at the moment? Yes No

12. Is the District aware of any financial assurance mechanisms or performance bond in oil and gas laws in Ghana? Yes. No

13. If yes, explain the components of it.....

14. Could you please outlined the formula or procedure for decommissioning exercise for the company in this District If any

.....

15. Is gas flaring criminal under oil and gas laws in Ghana? Yes. No

16. Is there any guideline for the oil and gas companies and EPA to follow during postclosure period? Yes. No

17. If yes, outlined them... ..

18. What advance special technology did your District recommend to oil and gas companies to put in place to avoid oil spill on water bodies in futuer?.....

19. Did your District Assembly involved in the involuntary compensation process? Yes
No

If yes explain the procedure.....

20. How are the local people being educated on activities connected to oil and gas operations

C. QUESTIONNAIRE FOR REGULATORY AGENCIES; ENVIRONMENTAL PROTECTION AGENCY.

1. Department (Please state clearly).....

2. Is there any environmental law in the country regarding oil and gas operations covering fishing and environment at the moment? Yes No

3. If yes, what is the present environmental law on oil and gas activities in Ghana?...

4. please could you please provide me with the EIA statements for Ghana Gas Company, ENI Project, Tullow ,Kosmos Energy and TEN project; **a print out**

5. Have your outfit/department been involved in drawing a regulatory framework for oil and gas companies? Yes No

6. Have your outfit got the necessary mandate or capacity to ensure that oil and gas companies observe environmental laws? Yes No

7. If yes, what measures does your department adopt to enforce the environmental laws?.....

8. How many times does your outfit perform monitoring and evaluating activities in a year?

State and Comments on.....

9. What does your outfit do to ensure appropriate compensation is given to local residents who are negatively affected by the activities of oil and gas activities in host communities?

.....

10. What avenues are there for the local people to get information on benefits packages.....?

11. Are there well established and easily reached avenues through which local residents whose rights are abused may channel their grievances? Yes No

If yes state some of them.....

12. In your opinion does the current laws on oil and gas operations in Ghana serves the concerns of the local communities? Yes No

13. If yes explain in brief

14. As a regulator what amends do you recommend to be made in the laws on oil and gas operations in Ghana that will serve the interest of the local communities

.....

15. Which policy option will you recommend to legislature; economic incentives or regulation and or both for oil and gas in Ghana?

16. Explain its effectiveness for the benefits of local host communities... ..

.....

17. Any comments or remarks on oil and gas operations on local communities

18. Is EPA aware of any financial assurance mechanisms or performance bond in oil and gas laws in Ghana? Yes. No

19. If yes, explain the components of it

20. Could you please outline the formula or procedure for decommissioning exercise for the company in this District If any

20. Is gas flaring criminal under oil and gas laws in Ghana? Yes. No

21. Is there any guideline for the oil and gas companies and EPA to follow during postclosure period? Yes. No

22. If yes, outlined them... ..

23. What advance special technology did your EPA recommend to oil and gas companies to put in place to avoid oil spill on water bodies in

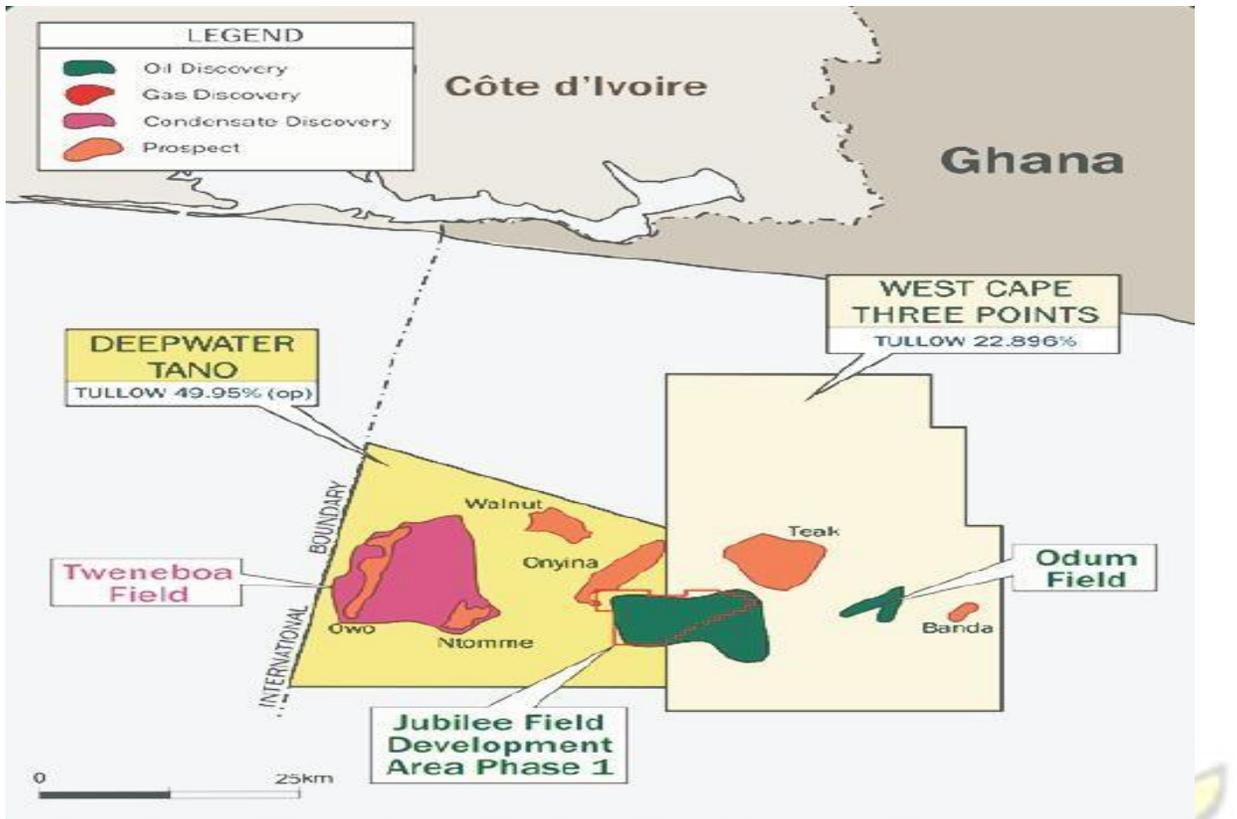
futuer?.....

24. Did your EPA involved in the involuntary compensation process to ensure that local people were not worse-off? Yes No

If yes explain the procedure.....

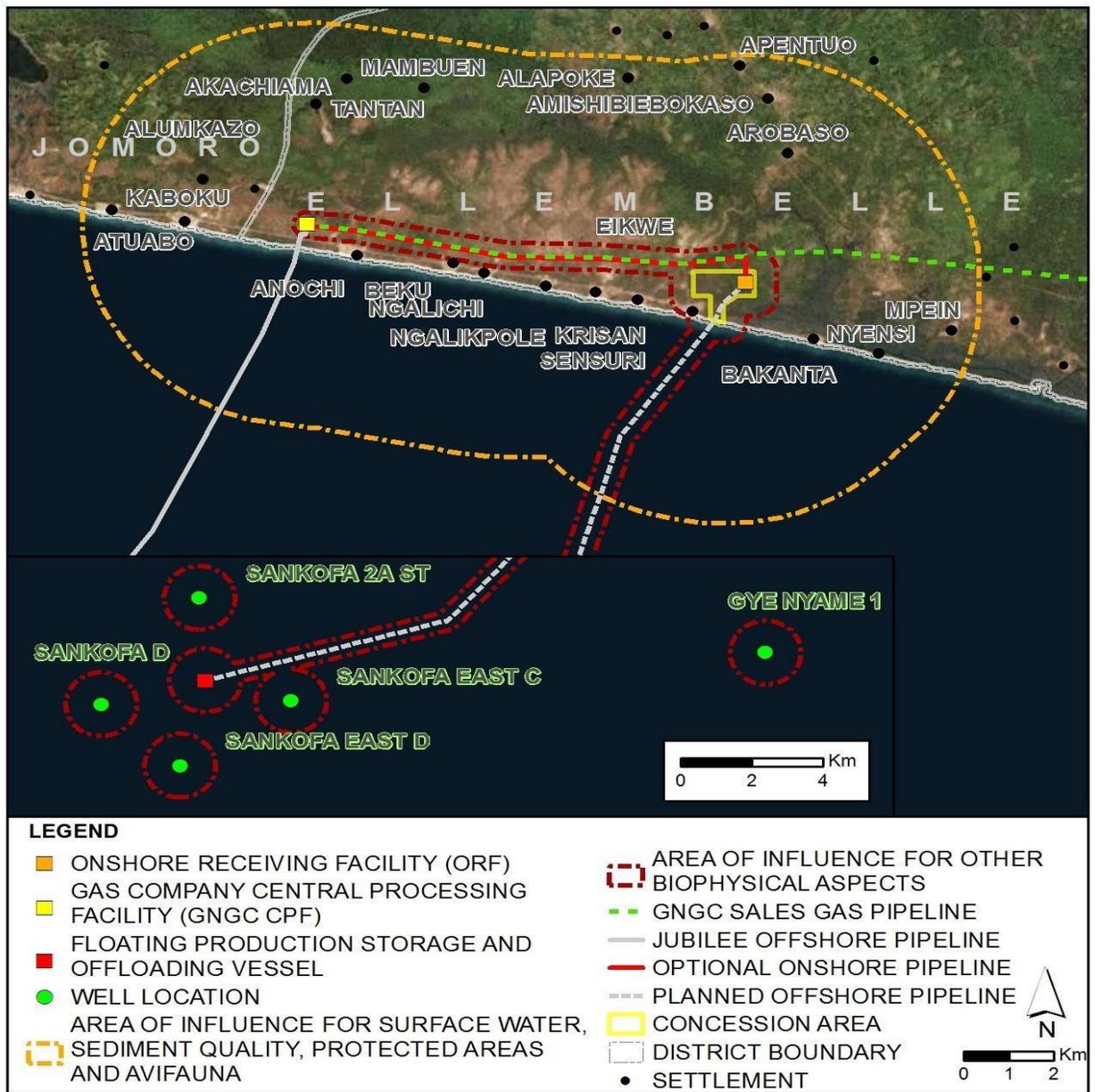


Map 1: Ghana Offshore Activity Map



Source; Offshore map of south-western Ghana, showing the location of the Jubilee Oil Field in the Deep-water Tano and West Cape Three Points blocks (Asafo-Adjaye, 2011). This map clearly shows the exact oil and gas operational areas of the Jubilee and „TEN“ Fields close to the local host communities.

Map 2: Socio-Economic, Cultural and Health Direct and Environmental Area of Influence



Source; ERM, 2014

This shows the exact locations for gas especially under the Sankafa and GyeNyame fields offshore gas production close to local communities.