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**NORWEGIAN COLLEGE OF FISHERIES SCIENCE**

# The impacts of oil and gas activities on fisheries in the Western Region of Ghana


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To God be the glory.

# Table of content

# List of figures, tables and box

## List of figures



## List of tables



## List of box

# Acronyms and abbreviations

| | |
|---|---|
| CBFMC | Community-Based Fisheries Management Committee |
| CCRF | Code of conduct for Responsible Fisheries |
| CDs | Compact Disks |
| DoF | Department of Fisheries |
| EEZ | Exclusive Economic Zone |
| E&P forum | Exploration and Production forum |
| EPA | Environmental Protection Authority |
| EIA | Environmental Impact Assessment |
| EU | European Union |
| FAO | Food and Agriculture Organisation of United Nations |
| FADs | Fish Aggregation Devices |
| FIA | Fisheries Impact Assessment |
| FSCBP | Fisheries Subsector Capacity Building Project |
| GDP | Gross Domestic Product |
| GIS | Geographic Information System |
| GNPC | Ghana National Petroleum Corporation |
| IEZ | Inshore Exclusion Zone |
| IFC | International Finance Corporation |
| IMF | International Monetary Fund |
| IRS | Internal Revenue Service |
| ISODEC | Integrated Social Development Centre |
| ITOPF | International Tanker Owners Pollution Federation Limited |
| MCS | Monitoring, Control and Surveillance |
| MLGRD | Ministry of local Government and Rural Development |
| NGO | Non Governmental Organisation |
| NICFC | National Inland Canoe Fishermen's Council |
| NRCD | National Redemption Council Decree |
| PNDC | Provisional National Defence Council |

## Acronyms and abbreviations

| | |
|---|---|
| UK | United Kingdom |
| UNDP | United Nation Development Programme |
| UNEP | United Nation Environment Programme |
| US | United States |

**ABSTRACT**

Ghana's find of oil and gas in commercial quantities marks the beginning of a billion-dollar industry. The exploration and production of it is a major industrial development but its negative impacts on fisheries can never be underestimated. The research questions to be answered are: how is it likely that the fisheries in Ghana will be affected by the expanding oil and gas activities? What kinds of measures have been introduced to safeguard the fisheries? What can be done to mitigate harms and to secure a peaceful co-existence between the petroleum and the fisheries sectors? Purposive and random samplings were used to select one hundred and eighty respondents in the Cape Three Points community during field survey in the month of June and July 2011. Key informants were interviewed and field observations were also made. The result shows that standard of living of respondents is generally low and they lack social amenities in the community. The general perception of the respondents (75.6 %) is positive because they are expecting the oil and gas activities to boost their livelihood activities and increase income. The majority of the respondents with positive perception are women engaged in fish related activities, petty trading and farming. 36.2% of respondents asserted that the oil and gas activities would bring great loss in the quantity of fish catch. These were mostly fishermen and fishmongers. Even though the 36.2% is quite marginal, it still confirms the assertion that fish catch may reduce. Restriction imposed by naval officials in charge of the rigs, the incident of oil spillage and pollution are other major concern by the respondents. The government is enacting some laws and policies which can safeguard the fisheries if well implemented, however local communities and stakeholder involvement is not adequate. Also the institutions lack the human resources and the capacity to implement these policies. Recommendations are therefore made to ensure peaceful co-existence between fisheries and the oil and gas sector.

Keywords:

Oil and gas activities, fisheries, mitigation, livelihoods, Western Region, Ghana

# CHAPTER ONE

This chapter gives a brief overview of the background, research questions, significance and organisation of the study.

## 1.1 BACKGROUND

Ghana is a Sub-Saharan African country with a population of about 22.5 million and a land size of 238,539 km² (FAO 2011). The most preferred and cheapest source of animal protein in Ghana is fish with about 75% of total annual production of it consumed locally (FAO 2005). Fish plays a major role as a source of livelihood, employment and income for many households, fishermen, fishmongers and fishing communities. It also links with other sectors in providing raw materials, especially for food processing companies, whilst employing the services and products of other sectors to operate (Boateng 2010; Amarfio 2010). According to the Director of Fisheries, "the fisheries sector employs about 10% of the labour force" (Corporate Social Responsibility Movement 2009).

On the 15 December 2010, Ghana celebrated its first oil and gas find (in commercial quantities), marking the beginning of a billion-dollar industry (Vines 2010; Nuwagira 2010). The current discovery contains light sweet crude kind of oil that is much sought after in the international market. The Jubilee Field in the Atlantic Ocean is estimated to contain some 1.8 billion barrels, one of the largest finds in West Africa in recent years (Sapa-AFP 2010). According to Anglo-Irish firm Tullow, the lead operator for the field, "about 55 000 barrels a day will be produced within the first few months before more than doubling output to 120 000" and 120 million cubic feet of gas per day (Tullow 2010; Nuwagira 2010; www.pennenergy.com). The first exports started in January 2011.

Fishing and oil industries are intertwined in a complex relationship around the world. Oil can be a blessing for national treasures: the oil industry offers job to fishermen, oil revenues and royalties bolster the economies of fishing communities. But it can also be a curse when offshore drilling and spills damage fisheries and fishing communities (Badgley 2011). Lincoln (2002) emphasises that no country or province which has been exposed to a prolonged history of

offshore hydrocarbon exploration has been left untouched by the inevitable accidents and unforeseen consequences of the oil industry. The fishing industry is usually the first sector to be impacted by these oil activities. As experienced by most oil producing countries, such as Nigeria, the oil activities have caused destruction of delicate marine ecology, which is the main source of livelihood in the oil-bearing communities, leading to loss of fish catches, the exacerbation of poverty, social conflicts, population displacement, occupational disorientation, and the violation of human rights (Ibabi and Olumati 2009; World Bank 1995; UNDP 2006). Now, as similar activities are starting in Ghana, the crucial question is: Will Ghana experience the same? Will the oil and gas discovery be a blessing or a curse?

Although some projects and workshops have been carried out on the damaging effects of oil activities on the environment and the livelihoods of the fishing communities, environmentalists and other experts have focused attention and research on the environmental degradation resulting from oil activities and how best to manage the oil revenue (Amarfio 2010; Babatunde 2010). Little attention is given to the impact of these oil and gas activities on fisheries and general livelihood of the fishing communities. This research will therefore try to fill part of this knowledge gap by reviewing relevant literature together with empirical field work in an attempt to answer these research questions.

## 1.2 RESEARCH QUESTIONS

The dominant view blames oil activities and its attendant consequences for the declining productivity of local economies that are mainly based on fisheries (Ibeanu 2002; Aaron 2006; Opukri and Ibaba 2008). Although countries such as Norway has been able to effectively manage the impact their oil activities have on the fisheries such that both industries are mutually helping the socio-economic development of the country, several oil producing countries in the developing part of the world, especially in Sub-Saharan Africa, the oil activities have devastated the fisheries sector (Babatunde 2010). If Ghana can stand out in Africa and avoid the ‘resource curse’ that most oil-rich developing countries are facing, then these research questions need to be answered:

- How is it likely that the fisheries in Ghana will be affected by the expanding oil and gas activities?

- What kinds of measures have been introduced to safeguard the fisheries?
- What can be done to mitigate harms and to secure a peaceful co-existence between the petroleum and the fisheries sectors?

## 1.3 SIGNIFICANCE OF THE STUDY

This research is very important in contributing to the subject area. The findings of this research will provide some necessary steps and strategies towards mitigating negative impact of oil and gas activities on fisheries in Ghana. The research will particularly be of interest to policy makers, fishers, researchers, oil exploration companies, community and opinion leaders, NGOs in Ghana and all who are concerned with the true significance and importance of mitigating impact of oil and gas activities on fisheries in developing countries. The study will also stimulate and complement scientific research on the impacts of oil activities on fisheries in Ghana particularly and Africa as a whole, thus, giving a better understanding of the importance of the subject matter for an informed decision-making process. If the outcome of this research is taken into consideration by stakeholders in the management of oil and fisheries in Ghana, it will go a long way to reduce Ghana's vicious cycle of poverty and enhance peaceful co-existence between the fisheries sector and the oil and gas sector.

## 1.4 ORGANISATION OF THE STUDY

The study is structured in seven chapters. Chapter one. Chapter two is a literature review and gives the theoretical background into issues related to oil and gas activities. Chapter three provides the approach and methodology used for the study. Chapter four covers the Ghanaian fisheries sector, the Western Region, the economic importance of fisheries to the region, and the governance of fisheries. Chapter five covers the Ghanaian oil and gas sector and also discusses the oil and gas policies and institutional framework including the mitigation measures introduced by government to safeguard the fisheries sector from the negative impact of oil and gas activities. Chapter six presents, analyses, and discusses the key findings. Chapter seven winds up with recommendations and conclusions.

# CHAPTER TWO

This chapter gives an overview of the theoretical issues related to oil and gas activities. It also outlines the theoretical issues relating to the risks, problems and potential negative impacts which oil and gas activities can have on fish stocks, environment, socio-economic conditions and culture of a country if no mitigation measures are in place.

## 2.1 DILEMMA OF NATURAL RESOURCES AND ECONOMIC GROWTH

Several empirical studies show that there is a negative correlation between economic growth and natural resources (Sachs and Warner 2001; Gylfason 2004; Mehlum *et al*. 2006; Boschini *et al.* 2007; Cabrales and Hauk 2010). This negative relationship, the so-called 'resource curse' or 'paradox of plenty', has become 'widely accepted as one of the stylised facts of our time' (Wright 2001; Boschini *et al.* 2007). The general pattern is that countries rich in natural resources on average are growing slower than natural resource poor countries, especially in the post-world war II period. Although there seem to be an empirical consensus on the 'resource curse', there are many outliers (Sachs and Warner 2001; Stevens 2003; Cabrales and Hauk 2010). Stevens (2003) and Mehlum *et al*. (2006) indicate that some resource-rich countries have grown very fast (for example, Botswana, Canada, Australia and Norway) while others have grown very slowly (for example, Nigeria, Zambia, Sierra Leone, Angola, Saudi Arabia and Venezuela).

Arguments by Robinson *et al.* (2006) and Cabrales and Hauk (2010) is that there are some outliers, meaning that the cross-country evidence is inconsistence with a monotonic effect of resources on development and growth. There is the need to understand when natural resources are a blessing and when they are a curse. Stevens (2003) argues therefore for the dropping of the term 'resource curse' and instead use the term resource impact and then determine whether it is a curse or blessing. Boschini *et al.* (2007) also argue that the effects of resources are not determined by resource endowments alone, but rather by the interaction between the *type of resources* that a country possesses, and the *quality of its institutions*. The combination of *type of resources* and *quality of its institutions* factors is termed *appropriability* of a resource (Boschini *et al.* 2007). According to Boschini *et al.* (2007), the concept *appropriability* captures the

likelihood that natural resources lead to rent-seeking, corruption or conflicts which, in turn, harm economic development.

Although the relationship between natural resources and growth is non-monotonic in institutional quality and differently so depending on the type of resources, Boschini *et al.* (2007) predict that institutional quality is most crucial and decisive for countries rich in resources. This implies that countries that have poor institutions are expected to have largest negative effects of their resources, while countries endowed with these resources and which have good institutions are predicted to have large gains from them (Boschini *et al*, 2007). Loung and Weinthal (2001) suggest that rather than institutional structures or political and social structures, it is the structure of natural resources ownership that determines economic outcomes in the respective resource rich countries. Specifically, they suggest that countries that sell their resources to domestic investors are more likely to avoid the resource curse than countries that sell their resources to foreign investors or maintain state control over these sectors. They argue that private ownership is likely to lead to stronger governance institutions because domestic investors have greater bargaining power *vis-a-vis* the state than foreign investors (Loung and Weinthal 2001).

## 2.2 OIL, A CURSE OR BLESSING?

Most people in Ghana believe that finding oil is a fortunate event that promises their future happiness. However, a growing body of literature support the claim that oil like most natural resources have the characteristics of causing negative growth, and leading to poverty and income inequality in most oil-rich countries (Ross 2001; Ibabi and Olumati 2009). Oil has the tendency of causing greater conflict in society (Collier Hoeffler 2000; Ross 2001; Kaldor *et al.* 2007), which links to war and strife, retards political change and entrenches regimes (Auty 2001b; Stevens 2003). Auty (2001b) claim that abundance of oil 'significantly weaken nascent democratic institutions, repress political parties so that power is weakly contested, public finances become opaque and corruption both by the elite and bureaucracy become rampant'. Oil also has anti-democratic properties: it tends to make states less democratic (Jensen and Wantchekon 2004; Cabrales and Hauk 2010).

Boschini *et al.* (2007) explains that while oil appears to have been a curse to some countries, it has also been a blessing to other nations. For example, oil has been the cause of recurrent problems in countries like Venezuela, Nigeria and Ecuador but Norway has become one of the world's richest economies largely thanks to its oil endowment. In that case, Stevens (2003), states that there is no single explanation of what creates a 'blessing' rather than a 'curse', nor is there any agreement on any collection of explanations.

The majority of the recent *economic explanations* are versions of the so-called 'Dutch Disease'. The 'Dutch Disease' was first coined by the *Economist* in 1977 based on the 1959 discovery of large offshore natural gas reserves in the Dutch North Sea that were developed and mostly exported to surrounding markets (Kapela 2009). The 'Dutch Disease', originally, meant the appreciation of the real exchange rate due to inflation arising from spending revenues domestically, leading to an overheated economy plus an appreciation of the nominal exchange rates as the domestic currency attracted higher demand (Corden 1984; Stevens 2003). However, the meaning has developed. Stevens (2003) explains that in some cases the concept has taken a much wider meaning to encompass all the negative macro-economic effects associated with the 'resource curse'.

These changes in meaning are reflected in the differing theoretical approaches. Corden and Neary (1982) split the impact of an oil boom into a 'resource movement effect' and a 'spending effect'. In the case of resource movement effect', a higher marginal product in the booming sector "... draws (mobile) resources out of other sectors" (Farmanesh 1991). This means that factors move into the oil sector which is bidding up wages and causing other sectors to contract (Stevens 2003). The 'spending effect' occurs as a result of the windfall demand rises in both tradables and non-tradables (Stevens 2003; Larsen 2004; Boschini *et al.* 2007). Tradables have prices determined by international market; therefore greater demand is met by higher imports, whereas prices in non-tradables rise relative to tradables and so resources shift from tradables to non-tradables (Stevens 2003; Larsen 2004).

Boschini *et al.* (2007) warn that whereas these theories can match the empirical finding that resource-rich countries on average have had lower growth rates than resource-poor countries, the

empirical fact, however, seems to be that countries differ in their experience of how growth has been affected by natural resources. These theories have limitation in that they cannot explain why Botswana and Norway have been successful, while Sierra Leone and Ecuador have not (Boschini *et al.* 2007).

Aside, the economic explanations, there are *political and social explanations* of how oil can be a curse or blessing. Politically, mismanagement of oil is the core of the curse. If oil is well managed, it will not lead to a curse but instead create faster growth (Auty 2001a). Policy failure (bad decision-making, nature of investment decisions and industrial policy) is the prime cause of the underperformance of oil-rich countries (Sevens 2003). The reason why these policies fail is due to inadequate quality of institutions (Cabrales and Hauk 2010). The quality of institutions is decisive in determining whether oil is a curse or a blessing (Cabrales and Hauk 2010). Institutions are linked to behaviour of politicians, as they limit their discretion and define the policy space. The quality of institutions is also indicative of the level of democracy of a country, thus more democratic countries tend to have better institutions, less corruption and therefore less likely to be cursed by oil (Cabrales and Hauk 2010). For example, in countries with weak institutions oil is one of the main sources of civil war and revolution (Cabrales and Hauk 2010), and Nigeria is a typical example.

Human capital accumulation or education is another major social factor (Kronenberg 2004; Cabrales and Hauk 2010). Some of those oil-rich countries take the risk of neglecting education of its citizenry by not redistributing oil wealth to support education either by a direct transfer or a subsidy for the investment in human capital (Gylfason 2001; Cabrales and Hauk 2010). This reduced commitment of education by some oil-rich countries will cost those nations in the long run since it is proven that increased education is conducive to higher growth levels (Barro and Lee 2001; Cabrales and Hauk 2010). Bravo-Ortega and De Gregorio (2002) explain that increase in human capital through education by oil-rich Scandinavian countries (for example, Norway) is the cause of their growth contrary to their Latin American counterparts that are also resource-rich (for example, Argentina and Chile) but lag behind in both education and economic growth.

Rent seeking and corruption is another major social factor. Rent seeking is the process of acquisition or distribution of resource rent (Kronenberg 2004). Availability of natural resources tends to lead to massive rent seeking especially in the government, a ruling class, the hands of a small elite, or on an elite of powerful allies and unions (Larsen 2004; Kronenberg 2004). This is a problem because resource revenues constitute vast wealth, and when individuals or coalitions of individuals attempt to take control over it, they become less entrepreneurial (Larsen 2004). Rent seeking may take the form of tariff protection or outright corruption as Kronenberg (2004) bluntly puts it, and developing countries are much vulnerable because of weak institutions (Larsen 2005). Rent seeking may lead to massive distortion of the economy and slow down growth, cause revolutions and civil conflicts (Kronenberg 2004; Kaldor *et al.* 2007; Cabrales and Hauk 2010).

Larsen (2004) shows that rent seeking activity involves several detrimental aspects. First, the activity being time consuming, drawing valuable labour hours away from productive, innovative activities, and secondly, when the activities are successful, the wealth may be disposed of in ways that are not conducive to growth, such as using it for personal consumption abroad, not invested in domestic technological progress or in human capital for the common good.

States and governing parties or ruling elites become less dependent on taxation of the people. They have an independent source of wealth (oil revenue). Hence, they don't have to accommodate the taxpayers to the same degree. Corruption, according to Kronenberg (2004), always goes hand in hand with rents because pressure groups may block political reforms in order to protect their rents, thus if there are no rents to be protected or captured, there is no scope for corruption. Widespread corruption certainly will have a negative effect on economic activities. It will lower investment, discourage entrepreneurship and limit growth (Bardhan 1997; Auty 2001b). Clearly, the issue of what causes oil to be a 'curse' or 'blessing' and how to enjoy the latter and avoid the former, is an extremely complex issue (Stevens 2003).

## 2.3 ESCAPING RISKS OF OIL ACTIVITIES, NORWAY'S EXPERIENCE

In this section, an attempt is made to find out the risks and problems of oil activities that are peculiar to many oil-rich countries and, to find out how Norway, an oil-rich country and one of

the world's largest oil exporters (Larsen 2004), managed to escape from these risks and problems to a greater extent. Norway's experience is used in this case because it is well documented and often used as a model to show how a country can successfully manage its oil riches in order to avoid the risks and problems associated with oil activities (Kronenberg 2004; Larsen 2004; Boschini *et al.* 2007). Kronenberg (2004) supports the use of Norway as a model because almost 90 percent of Norway's oil revenues are collected by the state, these revenues are then invested in infrastructure, education, and to a large extent in the foreign pension fund. Furthermore, the benefits from oil extraction are spread fairly evenly among the whole population and fairly over time.

The experiences of how Norway managed to escape from the curse since the country started oil production in the 1970s is here based solely on studies carried out by Larsen (2004; 2005), where he analyses why Norway caught up with its neighbours Denmark and Sweden and even forged ahead of them. Larsen states that Norway's escape may be part luck, part policy, and acknowledges that reports from Parliament in the 1970s show that Norwegian policy makers contemplated the dangers of the disease before they knew what label to put on it. Consequently, they attempted pre-emptive action (explicit and deliberate policy schemes). Policies taken by Norway to solve the problem of the Dutch disease involve mostly macroeconomic policy instruments and a summary of these policies are:

*i)* *Factor Movement Policy.* Use the centralised wages formation system to limit general wage increases at the magnitude of productivity increases in the manufacturing sector. Use programmes such as the "Solidarity Alternative" to coordinate income in order to moderate oil's effects on non-oil traded goods sector.

*ii)* *Spending Effect Policy.* Exercise fiscal discipline. Pay back foreign debts when possible. Thereafter, establish a Petroleum Fund abroad. Shield the economy from excessive demand and real appreciation when at full capacity, thus reduce loss of competitiveness. When not at full capacity, allow some increase in aggregate demand, but beware of the stickiness of public spending.

*iii)* *Spillover-loss Policy.* Encourage domestic accumulation of expertise in offshore oil extraction instead of using foreign specialist. Build up knowledge in technological

centres. Educate oil experts. Invest in oil research. Attempt to maintain a diverse export base.

iv) *Education, Research, and Development Policy.* Channel resources into education, research and development. Stimulate scholarships for visits abroad. Increase labour hours in teaching and research. Establish centres of excellence.

v) *Active Counter-cyclical Policy.* Use enhanced political legitimacy of resource rents to counteract recessions. Exploit the feasibility of using returns to the Petroleum fund compared to other finance alternatives in active governmental capacity utilisation.

vi) *Labour Market Policy.* Maintain centralised wage negotiation system. Encourage the negotiating parties of employer and employees union to keep in mind the effects on the aggregate economy, not only special interests. Use a neutral agency to compute productivity increase in manufacturing sector, and institutionalise these findings as ceilings of general wage increases. Stimulate female participation in the labour market through the establishment of vacancy and competence agencies.

vii) *Industrial Policy.* Maintain and accumulate know-how in industrial activities. Keep variegated exports. Seek successful inter-temporal paths for comparative advantage. Put emphasis on knowledge, technology and human capital.

Larsen (2004) acknowledges that some of the elements presented above are part of what constitute a democracy and a developed country, and are therefore shared with other rich countries. Other elements are unique to Norway, and may not easily be generalised or replicated by other countries. Many critics therefore doubt the feasibility of the Norwegian model in the transition economies because they lack the social capital and institutions that made Norway's success possible. Kronenberg (2004) suggests therefore that a better example for developing economies may be Malaysia, which overcame the curse with a more limited level of institutional quality and social capital.

## 2.4 LIKELY NEGATIVE IMPACT OF OIL AND GAS ACTIVITIES ON FISHERIES

Fisheries generate none of the excitement or fantasies of oil and gas. Oil and gas as mentioned earlier is a blessing for national treasures and can offer jobs to fishermen. The oil and gas revenues and royalties can bolster the economies of fishing communities and cause other positive

spillover effects. However, if no proper policies are put in place by governments, it becomes a curse. This section discusses the potential negative impact that oil and gas activities will may on fisheries, the environment, human, socio-economic and culture of fishing communities. It must be emphasised that this is a worst case scenario (often not the case), should no measures be put in place to mitigate the negative impact of oil and gas activities on fisheries.

The fishing industry is the first to be impacted by oil exploration activities. Fishermen are told to remove their boats and gears from an area so that seismic vessels can begin generating noise (Lincoln 2002). The seismic and drilling activities disrupt fishing activities (Arbo 2006). Until "airgun" recently used, the seismic survey equipments used in offshore petroleum could produce very loud noise and these explosives could kill fishes at a range of some hundreds of meters (Lincoln 2002) and reduce fish catches drastically (Quijano 2008). The seismic activity could force many fish to migrate some tens of kilometres away from the airgun, and if the fishes are forced away from their spawning ground or even a prime feeding area this could lead to reduced catchability and a major loss to the resource. The degree of the disturbance could also be very significant to fishermen working near the survey area (Lincoln 2002). Routine discharge of wastes during oil activities could impact vulnerable fishery resources.

Most of the oil activities that cause damage to fishing resources include oil spills. Oil spills can cause damage to fishing resources by physical contamination, toxic effects and by disrupting business activity (ITOPF 2004). As a result of the oil pollution, commercially exploited animals and plants may be killed due to smothering and toxicity. Catches may become physically contaminated or may acquire an objectionable oil-derived taste referred to as "tainting" (ITOPF 2004). Oil spills and blow-outs may also cause damage to eggs, larvae, seabirds and marine mammals (Smith undated). Also, fishing gears may be oiled or damaged (Smith undated), leading to the risk of catching stocks which are contaminated or even the fishing may be stopped until gears are cleaned or replaced. If fishes are contaminated, consumers may refuse to purchase this seafood from an affected region and this can lead to loss of income and market confidence (ITOPF 2004). In addition to mortality, oil may cause more subtle longer-term damage to behaviour, feeding, growth or reproductive functions of fishes.

Physical interference with navigation and with fishing fleets is an immutable and obvious consequence of oil activities on the shelf (Patin 1999). There is also a displacement of traditional fishing areas which normally occur because of construction of the offshore platforms, pipelines and other structures of the field development as well as from dumping debris and leaving various objects and materials on the bottom (Patin 1999).

## 2.5 LIKELY NEGATIVE IMPACT OF OIL AND GAS ACTIVITIES ON THE ENVIRONMENT

Some of the environmental impacts of oil activities, according to the UNEP technical publication (1997) are emission of greenhouse gases and other gases into the air. The primary sources of atmospheric emission (carbon dioxide, carbon monoxide, methane, volatile organic carbons, nitrogen oxides, sulphur dioxide and hydrogen oxide) from oil and gas operations arise, according to UNEP technical publication (1997), from flaring, venting and purging gases, combustion process such as fugitive gases from loading operations and tankage and losses from process equipments, airborne particles from soil disturbance, during construction and from vehicle traffic and particulates from other burning sources, such as well testing.

Discharges of waste water from oil activities may pollute the environment. The volume of waste produced depends on the stages of oil activities. Seismic operations often produce minimal waste volumes mainly from camp and vessel activities (UNEP technical publication 1997). Exploratory drilling causes effluents, mainly drilling fluids and cuttings (UNEP technical publication 1997). Other aqueous wastes include treatment chemicals, process, wash and drainage water, sewerage, sanitary and domestic waste, spills and leakages, and cooling water (UNEP technical publication 1997). Other potential negative impact are noise and light, solid waste disposal onshore and it impact on local infrastructure, others vegetation clearing; possible erosion and changes in surface hydrology and changes in drainage pattern.

## 2.6 LIKELY IMPACT OF OIL AND GAS ACTIVITIES ON HUMANS, SOCIO-ECONOMIC CONDITIONS AND CULTURE

Oil spills or pollution may have health impact on the human lives from consuming these contaminated fishing resources. Most petroleum products contain carcinogenic compounds which can lead to public health issues (ITOPF 2004). Empirical research also link oil activities to fever due to heat generated by gas flare activities, various gastrointestinal disorders contracted by drinking rain water, water from polluted rivers and streams or the consumption of fish from polluted water bodies in oil mining communities (Okoli 2006). There is also the link of oil activities to various respiratory ailments such as bronchitis, asthma, cough asphyxiation as well as ocular diseases (Okoli 2006).

Oil activities lead to occupational and income losses that set in both voluntary and involuntary migration (Opukri and Ibaba 2008). Those who stay in oil communities may end up living as aliens in their own communities, where they are unable to actualise their interest or aspirations (Opukri and Ibaba 2008). Research by Okoli (2006) in the government area of River State, Nigeria, show that oil activities have led to cases of sexual promiscuity, prostitution, sexually transmitted diseases, high rate of school drop outs, broken homes and unwanted pregnancies among others. Oil activities have also lead to conflicts, wars, corruption, kidnapping and fear among local residents of oil producing communities (Greenwood 2010; Walker 2011).

UNEP technical publication (1997) sums up the key human, socio-economic and cultural impact which may include:

- Land-use pattern, such as agriculture, fishing, logging and hunting as a direct consequence (for example land-take and exclusion) or as a secondary consequence by providing new access routes, leading to unplanned settlement and exploitation of natural resources.
- Local population levels, as a result of immigration (labour force) and in-migration of remote population due to increased access and opportunities.

- Socio-economic systems due to new opportunities, income differentials, inflation, difference in per capita income, when different members of local groups benefit unevenly from induced changes.
- Socio-economic systems such as social structure, organisation and cultural heritage, practices and beliefs and secondary impacts such as effects on natural resources, rights of access, and changes in value system influenced by foreigners.
- Availability of and new access to goods and services such as housing, education, healthcare, water, fuel, electricity, sewage and waste disposal and consumer goods brought into the region.
- Planning strategies where conflicts arise between development and protection, natural resource use, recreational use, tourism, and historical and cultural resources.
- Aesthetics, because of unsightly or noisy facilities.

Oil is not only a blessing or curse in general terms. It can also have quite specific effects. Some of the risks associated with oil development when it comes to fisheries is summarised above. If oil is not going to be a curse, such harmful effects must be avoided

# CHAPTER THREE

This chapter is about the approach and methodologies of the study. Several methods and sources are consulted to collect both qualitative and quantitative information for the purpose of this study. The research is carried out using the multidisciplinary approach. The sub-sections explain into details.

## 3.1 MULTIDISCIPLINARY APPROACH

As human civilisation develops, human societies need to understand more about their environment, economics, policy and culture (Lawrence 2003). The problem of natural resources use and their effects on other sectors is becoming more significant and complex, both in science and in society, and therefore needs the integration of the results of different disciplines and "emergent" results that can only be reached through integration. Hence, ***'The impacts of oil and gas activities on fisheries in the Western Region of Ghana'*** can not be achieved within a single discipline; it needs to be approached in a more holistic way. The study makes use of multidisciplinary methods and techniques of research to achieve the objectives. Information will therefore be gathered from various sources and disciplines that have knowledge needed for addressing the subject matter.

## 3.2 RESEARCH STUDY AREA

The study is carried out in the Ahanta West District of the Western Region of Ghana where Ghana has discovered oil and gas. Cape Three Points is the village used as the case study. The reason for the choice of Cape Three Points is because it is the fishing community closest to the oil discovery sites and one of the communities directly affected by the oil and gas activities (Boohene and Peprah 2011; ISODEC 2009). Also some studies have been carried out covering this area by Boohene and Peprah (2011), King (2010) among others, making some secondary data relatively available. See figures 3.1 and 3.2 showing map of Ghana, Western Region and the study area (Ghana Statistical Services 2002).

The Ahanta West District is located in the southernmost point of Ghana and the entire West African Sub-region. The capital is Agona Nkwanta, also known as Agona Ahanta (King 2010). The Ahanta West District has a total land area of 591 square kilometers and is occupied by 95,140 people according to the 2000 Population and Housing Census Report. Table 3.1 shows the population figures provided by the Ahanta West District Assembly. This gives the detailed age and sex distribution of the people in the district. The table 3.1 shows that there are more women in the district than men, which has implication for women who are mostly involved in farming and fishing related activities with the advent of the oil discovery. This according to King (2010), and Boohene and Peprah (2011) is a normal trend in Ghana. The table also shows that youths are more than adults, which again has implication for employment in the oil communities.

The main economic activity in the district is farming, followed by fishing. According to the Chief fisherman of Dixcove, fishing in the district nowadays, is very expensive and therefore a capital intensive venture because the fishermen no longer fish in the shallow sea waters around their communities since the fish stock in such waters have been depleted. Instead, they now fish in deep sea fishing far away offshore from their communities in order to catch a good fish (King 2010). Other activities include petty trading, agro-based industries, hairdressing, dressmaking, furniture making, block-making and auto-mechanic (King 2010). The main production centres (mainly for fish and foodstuffs) include Banso, Apemnim number 1, Akwidae, Dixcove, among others with Dixcove popularly known for its tuna fishing industry (King 2010).

Table 3.1. Ahanta West District population distribution by age and sex (Source: King 2010)

| **Age group (years)** | **Male** | **Female** | **Total** | **Percentage of population** |
|---|---|---|---|---|
| 0-14 | 19,751 | 20,771 | 40,522 | 42.60 |
| 15-64 | 23,663 | 26,075 | 49738 | 52.28 |
| 65 and above | 1,986 | 2,892 | 4,878 | 5.12 |
| **Total** | **45,400 (47.7%)** | **49,738 (52.3%)** | **95,168** | **100** |

Cape Three Points, locally referred to as *Akyinkyin,* is a small peninsula and fishing community in the Ahanta West District of the Western region. It forms the southernmost tip of Ghana,

located between the coastal towns of Dixcove and Princes Town (Boohene and Peprah 2011). Cape Three Points is known as 'land nearest nowhere' because it is the land nearest a location in the sea which is at 0 latitude, 0 longitude and 0 altitude (the distance is about 570 km). According to Boohene and Peprah (2011), it is best known for its lighthouses, the first of which was built in 1875 by the British as navigational aid for trading vessels sailing through the Gulf of Guinea. The main occupation in this community is fishing followed by farming. A number of the women in this community engage in fish mongering, by buying fish from the shore, smoke them and sell them to middle-women. As indicated by Boohene and Peprah (2011), although it is not a taboo for a woman to go to sea to fish, it is not common. Women also engage in the production of staple crops such as yam, cassava, maize and other vegetables for subsistence. Figure 3.1 shows the study area; with the red box indicating the location of Cape Three Points (http://en.wikipedia.org/wiki/File:Western_Ghana_districts.png). Figure 3.1 also shows the map of Ghana including the Western Region (CERGIS 2005).

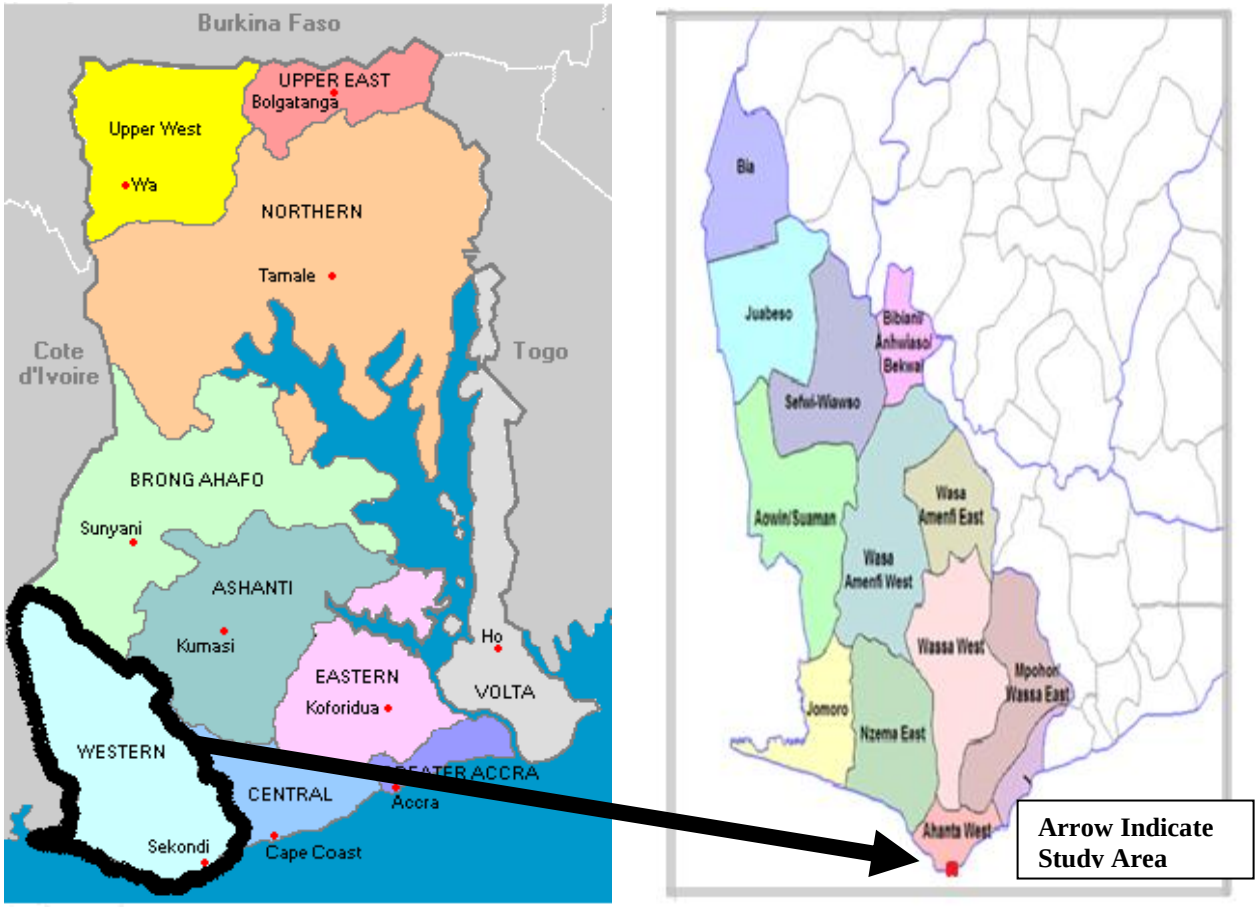



*Figure 3.1. Map of Ghana (left) and of Western Region (right), showing the study area.*

## 3.3 METHODOLOGY AND MATERIALS

The study went through a number of research methodological steps to arrive at the data presented in this study. The various methods and techniques used in order to realise the objectives are described below.

### 3.3.1 Population and sampling methods

The target population for the study included representatives of groups and sections of the community members (youth, women, men and the elderly) including chiefs and Assembly members. The purposive sampling method was used in the selection of the communities for the survey and based on information obtained from literature and provided by the Ahanta West District Assembly about oil and gas activities in the district. Respondents were selected randomly from the community, but ensuring that they are all engaged in fishing activities. It was also ensured that respondents are relatively well represented (youth, women who are mostly

traders, farmers, married to fishermen and fishmongers involved in fish related activities, men who are mostly fishermen and/or farmers, and the elderly). In all, 180 respondents were used for the filed survey to find out their perception about the oil discovery and the impact the oil and gas activities would have on their individual livelihoods.

### 3.3.2 Data set

This research is based on primary and secondary data. The primary data was obtained from structured interviews with key informants and administered questionnaires to local residents of Cape Three Points. Secondary data was obtained from documents from the oil companies, the related ministries, departments and agencies and the District Assembly. Other secondary sources of data used include published journals and documents from the internet.

### 3.3.3 Data collection methods and analytical techniques

In order to carry out the above mentioned task, structured questionnaires designed were used to solicit information from the respondents in the study area. Two second year students from the University of Education, Winneba were trained by the researcher and engaged to assist with the administration of the questionnaires in the local dialects since most respondents could not read and understand the questions themselves. For purposes of data validation, twenty questionnaires were pilot-tested in the study area to assess the relevance, validity and the understanding of respondents as well as the general availability of the different categories of information needed. The outcome of the pilot-test enabled the researcher to review and re-structure the final questionnaires (see appendix 1 for the final questionnaire). The questionnaires were administered face-to-face to respondents in June and July 2011, which was five to six months after the first export of oil from that region.

Key informants and stakeholders were also interviewed (see appendix 2 and 3) either face-to-face, by electronic mail and on phone to obtain information regarding their perception about the impact of oil and gas activities on fisheries, the mitigation measures put in place by government to safeguard the fisheries and the livelihood of the communities, the ability and capacity of the institutions to implement these mitigation measures, the level of participation and input from the public, local communities and stakeholder groups on these mitigation measures, and what could be done in order to ensure harmonious co-existence between oil and fisheries sector in Ghana.

The researcher also used observation technique to assess the kind of social amenities and infrastructure such as roads, schools, hospital, and drinking water in the community.

Descriptive analysis was used to analyse the sources of livelihood, income of respondents, likely and actual negative impact of oil and gas activities on fisheries in the communities. Information obtained from key informants and stakeholders were analysed qualitatively. The results were discussed and compared with other similar or relevant studies done on the region.

## 3.4 PROBLEMS AND LIMITATIONS OF THE STUDY

This study is not without flaws. The study is limited in scope in terms of target respondents and selected communities. Due to time and financial constraints, the study focused on just small percentage of the population in the-would-be-affected communities of oil and gas activities and interviewed key informants and stakeholders who were available to interview within the limited time for the study. These circumstances might affect the results. Since the field study is conducted few months after the production and first sale of the oil, the actual impact of oil activities on fisheries might not be very significant. Due to secrecy and lack of full disclosure of agreement of contracts between Ghana government and oil companies, primary data on that issue was not easily assessable and therefore relied on secondary data which might be biased. Also, due to the controversial nature of the topic, most key informants, especially those at key positions of government, were not ready to talk.

# CHAPTER FOUR

This chapter gives an overview of the fishing sector and its importance to livelihood to the people of Ghana in general and the Western Region in particular. It also explains the fisheries governance and management systems in Ghana.

## 4.1 OVERVIEW OF FISHERIES SECTOR IN GHANA

The Ghanaian fishing industry has a long history. It has been an important source of living for the people settled along the coast (Mensah 2010). The fishery started with very crude and inefficient harvest technology, mainly traditional use of hand dugout canoes. The fishery has evolved into a multi fleet industry with a blend of both traditional and modern technology.

Ghana has a coastline of 539 km and a continental shelf area of 20,900 km² (Finegold *et. al.* 2010). Ghana's Exclusive Economic Zone (EEZ) covers an area of 218,100 km² (Finegold *et. al.* 2010). There are 310 beach landing sites and 198 coastal fishing villages, as well as major ports where fish is also landed (DoF 2003). Ghana, like most other developing countries, operates the open access nature of fishery (Gordon and Pulis 2010). The fisher needs just to inform the chief fisherman in charge of that community or area for access. Ghana obtains fish through marine fishing, inland fishing (freshwater), lagoons and aquaculture (Gordon and Pulis 2010). Fishing activity accounts for an estimated 3% - 4.5% of GDP of the country. Fish capture, processing, marketing and associated services constitute a significant source of livelihood – certainly in coastal areas and around lakes and rivers, but in other areas too (Gordon and Pulis 2010). Table 4.1 shows the importance of the fishing sector to the economy of Ghana.

Table 4.1. Basic statistics of Ghana's fishing sector in the year 2005 (Source: Ghana Fisheries Department 2008)

| | |
|---|---|
| Total fish production | 393,428 MT (2005) |
| Total seafood export value | US$ 82,473,000 (2005) |
| Percentage of GDP | 3% - 4.5% |
| Total number of jobs | 1.5-2 million; 210,000 directly employed |
| Percentage of jobs | 10% |
| Nutrition from fish | Fish provides 65% of the country's protein |

Figures 4.1 and 4.2 show the total production from wild fishery and aquaculture respectively. The domestic market is the most important market for Ghanaian fish production (Gordon and Pulis 2010). Domestically, most of the catch according to Gordon and Pulis (2010) is processed: 60% is smoked, 20% is salted, and the remaining 20% is sold fresh. The majority of fish catch is predominantly consumed by the people along the coastal area, and inland areas are more frequently supplied with processed fish. Industrial fish processing includes tuna canning, and tuna fish-meal production. Canned tuna is the most important export, but other fish are also exported in frozen or smoked form (see table 4.2).

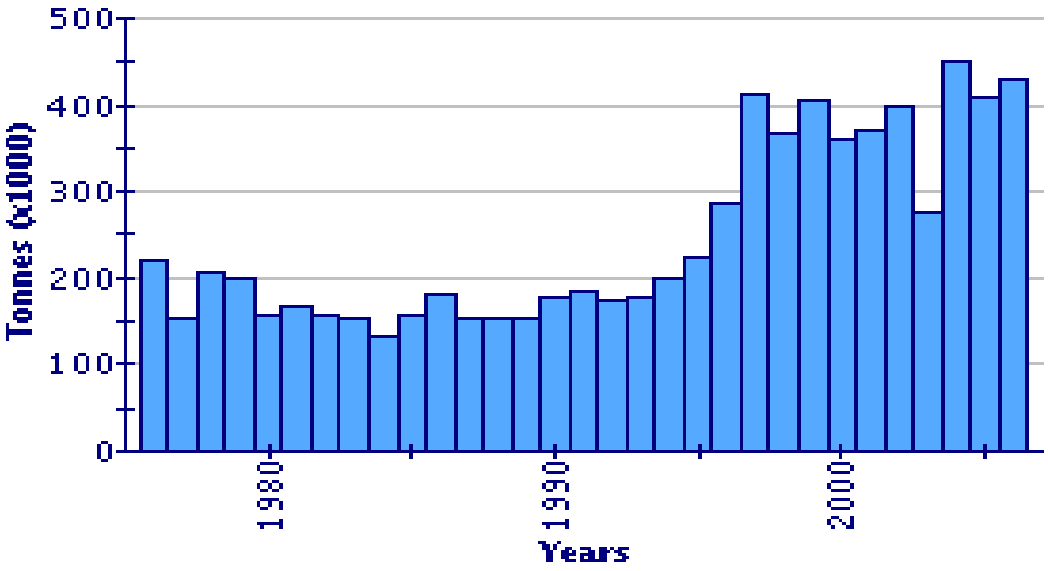



Figure 4.1. Wild capture production in Ghana from 1950 to 2007 (Source: FAO 2012)

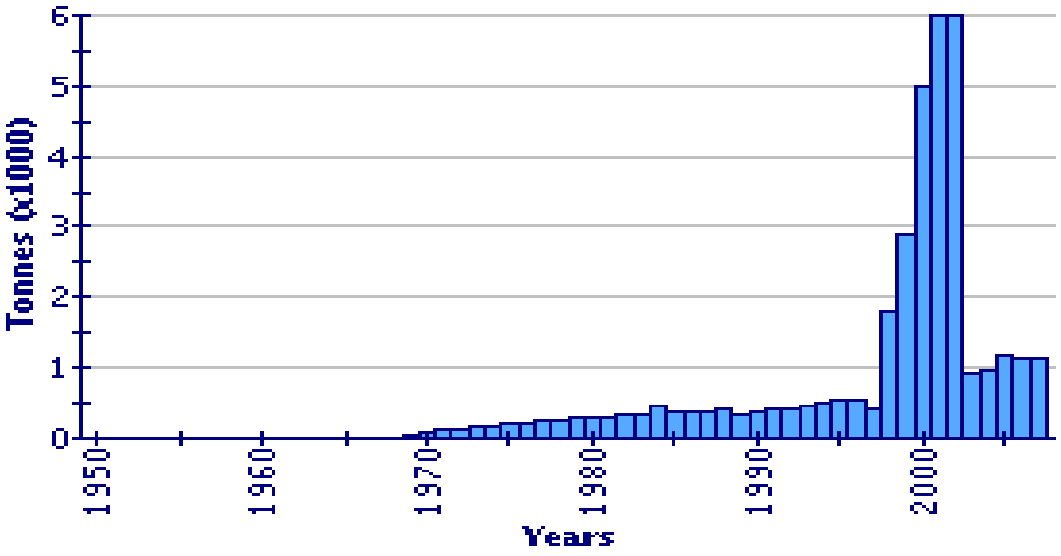



Figure 4.2. Aquaculture production in Ghana from 1950 to 2008 (Source: FAO 2012)

Table 4.2: Top 10 species exported by value in US Dollars (Source: Gordon and Pulis 2010)

| Number | Type of fish | Value ($) |
|---|---|---|
| 1 | Canned tuna | 72,000,000 |
| 2 | Fresh tuna | 7,200,000 |
| 3 | Tilapia | (No figure available) |
| 4 | Miscellaneous dried fish | 1,000,000 |
| 5 | Salmonids (frozen) | 900,000 |
| 6 | Marine fish, frozen | 600,000 |
| 7 | Cuttlefish and squids | 600,000 |
| 8 | Shrimps and prawns | 90,000 |
| 9 | Sardines | 80,000 |
| 10 | Crustaceans | 50,000 |

### 4.1.1 Tuna fishery in Ghana

The tuna fishery contributes significantly to the total landings and Ghana's fishing exports. Tuna fishery started in 1959, as a result of collaboration between the government of Ghana and Star Kist International of the USA. Actual exploitation of the resource started with the Japanese bait boats and since then, the fishery has developed with the growth of infrastructure such as cold stores and processing plants at the landing port of Tema (Mensah 2010).

The tuna fishery is a bait boat and purse-seine fishery. The purse-seiners are operated by commercial or industrial fishing companies whereas the bait fleet has some level of artisanal participation. There are about 45 tuna commercial fishing vessels operating in the tuna fishery of which 10 are purse-seiners (Mensah 2010). The vessels are operated by about 19 companies, mostly beneficially owned or controlled on joint venture basis with Ghanaians, having at least 50% of the shares required by the Fisheries Act 625 of 2002. The European Union (EU) is the largest importer of tuna from Ghana.

### 4.1.2 Fishing fleets used in fishing sector in Ghana

The marine is the largest subsector of fisheries in Ghana and is industrial, semi-industrial as well as artisanal (canoe) (Gordon and Pulis 2010). Figures 4.3, 4.4 and 4.5 show the trend of the artisanal (canoe), semi-industrial and industrial fleets in Ghana from 1968 to 2008.


Figure 4.3. Number of canoes and canoe fishermen from 1969 to 2008 (Source: Finegold *et. al.* 2010)

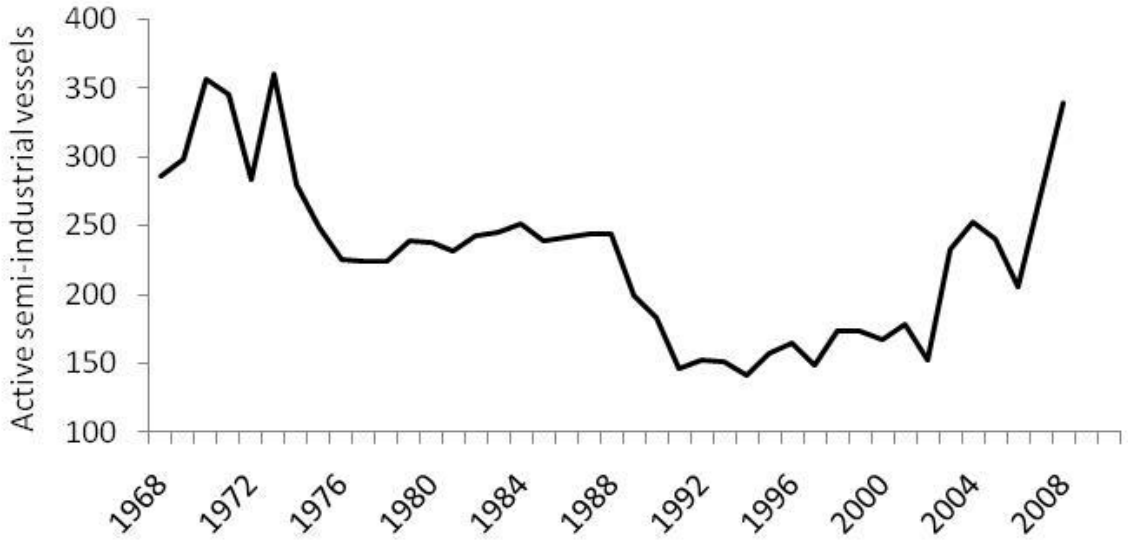



Figure 4.4. Number of active semi-industrial vessels since *1968* (Source: Finegold *et. al.* 2010)


Figure 4.5. Number of active industrial vessels (excluding tuna vessels) since 1968 (Source: Finegold *et. al.* 2010)

The dashed lines in figure 4.3 represent a projection until 2010. Figure 4.4 shows a rapid expansion from 2002 and figure 4.5 also shows a rapid expansion from 1987.

## 4.2 FISHERIES GOVERNANCE AND MANAGEMENT SYSTEMS IN GHANA

Ghana has in place a general legal fisheries governance framework, fishery sector institutions and management systems used in managing the fisheries sector. The fisheries governance and management systems in Ghana enumerated below is from Food and Agriculture Organisation (2004).

### 4.2.1 Legal framework

Fisheries management has been regulated over the years by a number of laws and regulations (FAO 2004):

- Fisheries Regulations LI364 of 1964.
- National Redemption Council Decree (NRCD) 87 of 1972.
- Fisheries (Amendment) Regulation 1977.
- AFRCD 30 of 1979 (Fisheries Regulations) and the accompanying regulation, Fisheries Regulation 1979 LI 1235.
- Fisheries Regulation 1984 (LI 1294).
- PNDC Law 256 of 1991.
- The Fisheries Act 625 of 2002.

Major sections in the laws relate to the building and importation of motor fishing vessels; licensing of fishing craft; manning of motor fishing vessels; and monitoring, control and surveillance (MCS). The laws also tackle the prohibition of the use of explosives such as carbide and dynamite; gear restrictions; and prohibition of the landing of juvenile fish.

The current legislation governing the fisheries sector, Fisheries Act 625 of 2003, amends and consolidates existing laws on fisheries. It provides for regulation and management of the fisheries, the development of the fishing sector and the sustainable exploitation of the resources. It tries to streamline legislation to respond directly to emerging issues and to conform to the national and international fishery resource development and management strategies.

Specifically, the act consolidates and strengthens the legislation establishing the Fisheries Commission to oversee the Fisheries Directorate, which becomes a secretariat with structures responsible for policy-making, administration and enforcement.

Consistent with the current fisheries management and development strategies, the act provides:

- rules and regulations to control industrial, semi-industrial and artisanal fishing through registration and licensing;
- protection and promotion of artisanal and semi-industrial fisheries through extension services, technology transfer, exemptions, reserved areas for semi-industrial and artisanal fisheries, development of landing facilities, and cooperation among small-scale fish processors and marketers;
- establishment of fishing zones, closed seasons and fishing reserves;
- protection of gravid and juvenile lobsters and other crustacea, juvenile fish and marine mammals;
- protection of fisheries water from pollution;
- proactive MCS and enforcement through a special unit to work in collaboration with the Ghana Navy, Air Force, Ministry of Defence and Ministry of Justice for efficient policing and prosecution of offenders;
- arrest, seizure, detention, fining, forfeitures and temporary bans for offending fishing vessels;
- promotion and licensing of aquaculture projects, making sure that they conform to environmental laws and specified operational standards; and
- establishment of a fisheries development fund to help partially finance the execution of the fishery development and management strategy and enforce its rules and regulations.

### 4.2.2 Fishery sector institutions

The Fishery Sector involves a variety of government and Non Governmental Organisations (NGOs).

## (a) Fisheries Commission

Established under the Fisheries Commission Act 457 of 1993, and operating under the Fisheries Law PNDC Law 256 of 1991, the Fisheries Commission has the authority of regulating and managing fishery resources and coordinating fishery policy. Specifically, the Commission shall ensure that fisheries resources are exploited on a sustainable basis, settle disputes and conflicts among operators, advise government on all matters related to fisheries, and advocate on issues to protect, promote and develop the fishing industry.

## (b) Department of Fisheries

The Department of Fisheries (DoF) now works as the implementation secretariat of the Fisheries Commission, as stipulated by the Fisheries Act 625 of 2002. It fulfils this role by:

- preparing fishery resource management plans;
- developing regulations for the fishing industry;
- organising MCS for the national fishery resources and ensuring compliance with national fisheries law; and
- institutionalising co-management concepts.

DoF performs these functions through several mechanisms, including sea patrols; observer programmes; port and landing inspection; licensing; vessel registration; formation and enhancement of Community-Based Fisheries Management Committees (CBFMCs); statistics gathering and analysis; and consensus building.

The DoF MCS Division was established under the Fisheries Subsector Capacity Building Project (FSCBP). The mandate of the Division is to enforce the Fisheries Laws.

The MCS Division, with the collaboration of the Ghana Navy, undertakes sea patrols to exclude industrial fishing vessels from the 30 metres Inshore Exclusion Zone (IEZ), reserved for artisanal fisheries. The Division also handles out quayside inspection of industrial vessels at the fishing ports of Tema and Takoradi, checking for valid fishing licences, legality of fishing gear, skipper's certificate, log book and crew composition, and effects similar supervision of the Lake Volta fisheries.

## (c) District Assemblies

Operating under PNDC Law 327 of 1993, the Ministry of local Government and Rural Development (MLGRD) is the key institution with responsibility for facilitating the establishment and development of a vibrant and well-resourced decentralized system of local government. MLGRD is responsible for managing fishers, fish processors and fishery resources at district and subdistrict levels.

Recently, the District Assemblies in collaboration with DOF, have been mandated to facilitate fishery resource management by: helping in forming and sustaining CBFMCs; cooperating with the DoF MCS units; providing legal and financial support to the CBFMCs; and approving levies proposed by the CBFMCs.

## (d) Community-Based Fisheries Management Committees

A Community-Based Fisheries Management Committee (CBFMC) is defined as a local committee, formed in a fishing community, based on existing traditional leadership authority and local government structures, legally empowered by Common Law, and comprising all stakeholders, to oversee the management and development of the fishing industry. The genesis of the CBFMCs was obtained from DoF's interest in ensuring a sustainable national fishery resource through co-management.

The principal responsibility of the CBFMCs is to enforce national fisheries laws at community level, and also to enact and enforce their own by-laws to the same end. Most communities have their own CBFMCs.

## (e) Other institutions

Other institutions that contribute to the management of fisheries resources in Ghana include:

- The Volta River Authority.
- NGOs, such as Friends of the Earth and the Adventist Development and Relief Agency.
- Private commercial entities, such as the Agricultural Development Bank, Rural Banks, and Continental Christian Trader (a dealer in fishing nets).

- Fisher associations, such as the National Inland Canoe Fishermen's Council (NICFC), Ghana National Canoe Fishermen's Council (GNCFC), Ghana National Association of Farmers and Fishermen, and Ghana Co-operative Fisheries Association.

### 4.2.3 Management objectives

The Department of Fisheries operates within the Ministry of Food and Agriculture, with the following sector objectives (FAO 2004):

- Increasing domestic food supply, especially protein sources, through more effective use of available fisheries resource at the regional and local levels as a means of satisfying national protein needs.
- Creating employment opportunities, particularly for the rural population, to tackle the problem of urban drift.
- Improving the living and working conditions of fisher folk.
- Contributing towards Gross Domestic Product.
- Contributing towards foreign exchange earnings under the Non-Traditional Export Programme.
- Assisting in the alleviation of rural poverty.

### 4.2.4 Fishery sector management systems

In Ghana, there are separate management systems for marine fisheries and for Lake Volta fisheries. Together, the two management plans attempt to respond to ecological, socio-economic and institutional issues related to the development of the national fishery. To conform to the global policy environment, according to FAO (2004), the national fisheries management plans draw heavily on the:

- Code of Conduct for Responsible Fisheries (CCRF) policy matrix;
- integrated development strategy models; and
- coastal area management models.

A number of cross-cutting concepts run through the two management plans.

- Process, concerned mainly with adaptive management in response to fluctuations in the fishery (bio-physical stocks), making way for adjustment in fishing pressure in the short term while ensuring fishery system sustainability in the long term.
- A precautionary approach entailing a combination of multi-disciplinary strategies and effective monitoring systems to respond to the multifaceted concerns related to abundance fluctuation in fish stocks; different interest groups; and trends and variation in gear and technology use.
- Partnerships in pursuit of co-management to increase local involvement in resource use decision-making so as to engender ownership among stakeholders and commitment in implementing regulatory mechanisms.
- Proprietorship, which recommends the appropriation of territorial fishing property rights to communities or zones (groups of communities), in contrast to the current open access system, which has presented difficulties in terms of control, and has resulted in overexploitation.
- A policy of efficient monitoring control and surveillance (MCS) that relies heavily on the collection and analysis of accurate and relevant data and information.
- Integration and resolution of conflicts arising directly from competing demands for use of the aquatic resource base, or indirectly from externalities generated by non-fishing activities.
- Promotion of public awareness of resource conservation and management needs, taking advantage of economic, social and cultural values associated with different resources.
- Legislation related to gear type, mesh size, licensing, levies, gear type and close seasons to regulate effort and sustain stocks.
- Economic policy related to energy, credit and promotion of measures that ensure efficient exploitation of the fishery resource to meet the nutritional needs of the people and for export.
- Institutional capacity strengthening.

### 4.2.5 Marine fisheries management systems

In the marine fisheries sector, there are separate management subsystems for small pelagics, large pelagics, demersals, shrimp and lobsters. The main components of the management regime according to FAO (2004) are:

- limiting industrial vessel fishing effort (especially trawlers and shrimpers) by limiting entry into the fishery through a licensing regime and
- prescribing the mesh sizes to be used in any particular fishery in order to limit the exploitation of juvenile or immature fishes (including shellfish and molluscs).

For example, for the small pelagic fishery, management rules and regulations have been formulated with the aim of protecting juveniles of sardinella. These regulations are primarily intended to work through input limitation, such as mesh size limits. There is also an attempt, to the extent feasible, to identify and take actions with the support of interested parties to forecast and minimise the often high variability in the recruitment, abundance and availability of small pelagic fish resources.

There are also a few traditional management systems, which tend to regulate access to marine fisheries in Ghana and thereby conserve the fish stocks. These include:

- In every fishing village a non-fishing day is observed each week (mainly on Tuesday, but sometimes on Wednesday or Sunday). A "fishing holiday" or "fetish day" has been an historical event (Walker 2002). These days are used to repair equipments, to give tribute and offerings to the gods of the sea, and to allow the fish to rest (Walker 2002). Observance of this day off is thought to ensure continued successful harvest.
- In some communities, there is a total ban on fishing activities for various periods (up to two weeks) prior to and during annual festivals.

## 4.3 WESTERN REGION OF GHANA

Western Region, where oil and gas production has started, covers an area of approximately 2,391 square kilometres, which is about 10 per cent of Ghana's total land area. The region has about 75 per cent of its vegetation within the high forest zone of Ghana, and lies in the equatorial climatic

zone that is characterized by moderate temperatures. It is also the wettest part of Ghana with an average rainfall of 1,600 mm per annum. It is bordered on the east by the Central Region, to the west by the Ivory Coast (Côte d'Ivoire), to the north by Ashanti and Brong-Ahafo Regions, and to the south by the Gulf of Guinea. The southernmost part of Ghana lies in the region, at Cape Three Points near Busua, in the Ahanta West District (Modern Ghana 2011).

The population of the region is 1,924,577, constituting about 10 per cent of the total population of the country (Boohene and Peprah 2011). It has a mean household size of 4.7 people, slightly lower than the national average of 5.1 (Gordon and Pulis 2010). With a population growth rate of 3.2, the region's population is expected to double by 2020. The population is relatively young, with over 40 per cent within the age group 0-14 (Modern Ghana 2011). The population density is 80.5% per square kilometre. Females constitute 49.2% of the population. The proportion of urban to total population is 36.3% (Boohene and Peprah 2011). From the west to east, its coastal districts are Jomoro, Nzema East District, Ahanta West District, Sekondi-Takoradi Metropolitan, Shama District and Ellembele District (Gordon and Pulis 2010).

The existing foundation of the economy of the region particularly the goods and services it trades can be summarised as fish, port services (Takoradi), gold (inland), tourism (coastal), timber (inland) and oil and gas (new) (Gordon and Pulis 2010). The region is the largest producer of cocoa, timber and wood based products, rubber and coconut, and one of the major producers of palm oil, with a strong agriculture base accounting for 58.1% of employment in the region (Boohene and Peprah 2011). The region has the highest concentration of individual gold mines in the country, with the nations active bauxite and manganese mines found within the region. However, most analysis show that while the region has abundance of resources it appears the region has not benefited much from its share of the natural resources (Boohene and Peprah 2011). Some of the reasons why the region has not benefited from its share of the natural resources include the generally low level of education of the people and out migration (brain drain). Others are property and ownership structure and unjust planning and policy issues of the government, and ignorance and poor attention given to the plight of the people of the region by the government.

### 4.3.1 The economic importance of fisheries in the Western Region

Western Region has about 30% of Ghana's coastline and 20-30% of the countries landing sites (Finegold *et al.* 2010). Fishing is the second largest occupation in the region, next to farming. The region produces marine fish which are sold throughout Ghana and beyond. Fishing in the region is both subsistence and commercial. Subsistence fishing is less capital intensive kind of fishing along the shallow waters of fishing communities. The fishermen usually use canoes in this type of fishing.

The fish marketing system involves a chain of activities including: purchase of inputs (canoes, mechanised wooden boats, nets, corks, weights, hook and lines); casting and dragging of nets; and on-board preservation using ice blocks (Gordon *et al.* 2011). Boat owners employ a number of fishers or fishing activities. The size of the crew ranges between 2 and 30 depending on the size of the canoes (Gordon *et al.* 2011). Crew members are paid after every trip once the operational costs are deducted from the proceeds, with larger shares going to the owner of the boat and nets and 50% of the profit shared among other crew members (Gordon *et al.* 2011).

This fishing sector is very vital to food security and job creation to alleviate rural poverty in the coastal communities in the region (USAID 2008). Fishing supports livelihoods, not just in fishing activity itself, but also linked to all the goods and services on which fishing and fish marketing depend, as well as providing disposable income to spend on many other consumption items in the local economy (Gordon and Pulis 2010). Fisheries have helped retain and attract populations to the coastal communities of the region who are engaged in fishing related activities. The economic multipliers according to Finegold *et al.* (2010) and Gordon *et al.* (2011) are generally categorised as: backward (i.e., the supply of goods and services that are inputs to the production process – such as boat building or fuel); forward (those linked to marketing, such as processing and transport service); and consumption (the economic effects of people simply spending their income on goods and services (see table 4.3).

Table 4.3. Economic linkages with fishing in Western Region of Ghana (Source: Gordon *et al.* 2011)

| **Economic Linkage** | **Activity** |
|---|---|
| Backward | • an "outboard motor lock-up/guardian" service<br>• boat-building activity<br>• lots of people mending nets (presumably boat-hands)<br>• numerous fishers and deck-hands all paid on a catch share basis<br>• shops selling spare parts, engine oil, nets water trading (fishing boats will carry and fill water containers, for a fee, collecting water from nearby villages where water is less scarce)<br>• workshops offering outboard repair services<br>• traders, walking from boat to boat, selling a wide variety of fishing related goods (e.g.,raincoats) and other items |
| Forward | • fish processing sites usually a hundred meters or so away, which in turn are purchasing fuel wood or paying porters to carry wood<br>• fish traders buying from those boats (large amounts and small amounts)<br>• hired transport (trucks, minibuses, taxis)<br>• people renting freezer space or selling ice<br>• porters – ferrying fish from the boats to the fish traders (taking a share as payment)<br>• porters – ferrying the accumulated purchases of the fish traders to waiting transport or to near-by fish processors<br>• small informal guest-houses (or people renting out space in their homes)<br>• use of telephone services (mobile and landline) - (also "consumption" linkage) |

| Economic Linkage | Activity |
|---|---|
| Consumption | • a wide variety of other consumer goods sold from stalls or by ambulant traders (clothes, telephone cards, linen, kitchenware, toiletries, maps, books, stationery, jewellery, handbags, medicines, matches, cigarettes, newspapers, ironmonger goods, cassettes/ CDs, radio/"hi-fi"s, mobile phones, batteries, plastic bags, etc)<br>• buildings or tented areas where videos are viewed<br>• cafes offering food and drink<br>• drinks being sold by ambulant traders<br>• other snacks and processed food being sold from stalls<br>• people selling "ready to eat" fruit (e.g., pealed oranges)<br>• women cooking and selling food (at the road-side) |

### 4.3.2 Nature and governance of fishing in the Western Region

The kind of fishing that the people of Western Region operate is the marine artisanal fishing using mostly nets, very small canoes with no engines, and vessels with outboard engines (Bennett 2002). The most common and popular practise of fishing in the region is light fishing. The use of lights (increasingly used by canoes fishers since 2003), has to some extent taken the seasonality out of fishing – with lights attracting fish (juveniles) and fishers able to maintain a reasonable catch year round (Gordon *et al.* 2011). Although light fishing is declared illegal in 2010, the enforcement of it is weak. A study by Synder (2010) shows that there seem to be fairly universal agreement and recognition by the fishermen and fish mongers operating in the region that light fishing is not a good practice. Some fishermen still practice this illegal light fishing, although they know it is bad but because there is no incentive to stop, and they think they will lose if they stop while others are still fishing using light, an example of the *tragedy of the commons* (Hardin 1968).

Fishing in the Western Region of Ghana is governed by the national laws governing fishing. There are also traditional management and authority that govern the fishing operations in the

region (Bennett 2002). There are three main "stakeholders" or power "blocks" in the traditional fishing governance in the region. They are the *omanhene* (chief), the *apofohene* (chief fisherman) and the *konkohene* (leader of the women fisher traders) (Overå 2001; Bennett 2002). All the three may have board of elders.

The *omanhene* (chief) and his board of elders play an important role in all aspects of life in the various fishing villages in the region. They in many ways function as a legal system (Overå 2001). Cases of all kinds (from marriage conflicts, higher cases of fishing disputes to large debt claims) are brought before the board of leaders, and depending on the seriousness of the issue, the case is brought upwards in the system until it reaches the court of the chief (Overå 2001).

The *apofohene* (chief fisherman) position is hereditary; however, the person is elected by the fishermen and must be an exceptionally experienced, wise and respected fisherman (Overå 2001). The duties of the chief fisherman range from presiding over the working of fishing in the villages; settling disputes and negotiations between fishermen (for example if they destroy each other's gears); he gives the fishermen advice; issues penalties and deals with actions required when there is accident at sea and, supervise the distribution of any communal inputs (Overå 2001; Bennett 2002; Kraan 2009). He is also the religious leader of the fishermen. Together with the priests of the sea god (*Bosompo*) and of other gods that are relevant in the field of fisheries, he performs rituals to ensure good fishing (Overå 2001).

The *konkohene* (leader of the women fisher traders) carries similar set of roles as the chief fisherman, but in her case exclusively for women who are involved in fish processing and trading (Bennett 2002). She settles disputes between traders, processors and the fishers and help set fish prices. The strength and involvement of the chief fishermen and *konkohene* appear to vary by community within the region. The leadership of the *konkohene* extends beyond the market walls to other activities of fish traders such as purchasing, processing, and trading relationships between fish traders and fishermen (Walker 2002). Each morning, the *konkohene* is expected to meet the first canoe at the beach to set the daily price for fish.

However, there are indications according to Synder (2010) that, in some areas the authority of the *konkohene* is undermined by the particularly successful and powerful fish mongers. Some of the roles of the chiefs and *konkohenes* are limited to the beach and landing sites, and in some cases a wider community in which they are located. Fishers fish on daily basis and most observe a "day of rest" once a week (Tuesdays in most communities), especially in small fishing communities. It is a myth within the fishing communities that 'the sea god' feeds on Tuesdays, and in order to avoid disturbing the sea god, hence avoiding the wrath of him, fishing is banned on Tuesdays. Offenders are punished by the chief fishermen.

The state and government recognise the legitimacy and power of the *omanhene* (chief), the *apofohene* (chief fisherman) and the *konkohene* (leader of the women fisher traders). They are the main voice and focal point of contact by the state in dealing with the fishing sector of the region. The *omanhenes* (chiefs) of the various fishing villages of the region are the most powerful voices when it comes to dealing with issues that affect the fishing sector of the region.

# CHAPTER FIVE

This chapter gives an overview of the oil and gas sector and its importance to livelihood to the people of Ghana in general and the Western Region in particular. It also explains the key legal policy and institutional frameworks in Ghana to manage the oil and gas sector and its impact on fisheries.

## 5.1 OVERVIEW OF THE OIL AND GAS SECTOR IN GHANA

Since Ghana gained independence from the British in 6 March 1957, part of every government policy has been to explore the hydrocarbon deposits of Ghana (Ghanaweb 2009). However, oil and gas exploration has been limited due to the high risk nature of its terrain and low oil price environment (as at that time). Between 1898 to the late 1990s an estimated hundred exploration wells had been drilled in Ghana with no significant discovery except for the Saltpond oil in 1970 (Ghanaweb 2009).

In 2004, Kosmos Energy/E. O. Group made initial contact with Ghana National Petroleum Corporation (GNPC) to start a potential oil and gas exploration in Ghana. In 2007 Ghana made discoveries of oil and gas in two deepwater blocks: Cape Three Points and Tano by Kosmos Energy and Tullow respectively (Ministry of Energy 2010). The two discoveries referred to as the "Jubilee Field" is an offshore production operated by Tullow as a unitised field. On February 19, 2009 International Finance Corporation (IFC) Board of Directors authorised Ghana to enter into investment agreements to support the development of Ghana's Jubilee Field. The offshore oil and gas project is expected to help diversify Ghana's economy and satisfy her energy needs (Boahene and Peprah 2011). In addition to the proposed $100 million loan to Kosmos energy and $115 million loan to Tullow Oil, IFC will assist the companies in enhancing the projects benefit for local communities (Boahene and Peprah 2011).

The government of Ghana and by extension the people of Ghana have a 23.5% stake (GNPC 10% carried in West Cape Three Point, GNPC 10% carried in Deep Water Tano and E. O groups, a Ghanaian Company 3.5%) in the Jubilee Fields. The majority (76.5%) is owned by Kosmos Energy (a privately held American company), Tullow (UK-listed operator) and the US

producer Anadarko Petroleum (see table 5.1). It must be emphasised that the people of Ghana so far has limited transparency in terms of the disclosure of the content of all agreements our governments have signed with the oil companies (Ellimah 2009), therefore little is known by the general public with respect to these issues. There is a worrying concern in Ghana over the ownership of Ghana's oil, because current reports in the national newspapers show that some oil companies operating in the Jubilee Field have taken unprecedented steps to control Ghana's oil and foreign policy through a proposal contained in the "Jubilee Field Unit Crude Oil Lifting Agreement" which was discussed in London. In the proposal to the Government of Ghana, the companies are insisting that "all export tankers owned, technically managed or commercially operated by a company headquartered in or flying flags of US sanctioned countries shall be automatically rejected" and at present these countries are Cuba, Iran and Sudan (Xcroc 2010). However, Ghana has good relations with Iran which spans the fields of health, agriculture, education and culture, and with Cuba in the area of education and health (Xcroc 2010).

Table 5.1. Jubilee Field partners stake in Jubilee Field oil production (Source: ISODEC and OXFAM America 2009)

| **West Cape Three Points** | **Deep Water Tano** |
|---|---|
| Kosmos 30.875% (operator) | Tullow 49.95% (operator) |
| Anadarko 30.875% | Kosmos 18% |
| Tullow 22.896% | Anadarko 18% |
| GNPC 10% (carried) | GNPC 10% (carried) |
| E. O. Group 3.5% | Sabre 4.05% |
| Sabre Oil and Gas Ltd. 1.854% | |

The Jubilee Field is estimated to contain between 600 million and 1.8 billion barrels, one of the largest finds in West Africa in recent years (Ministry of Energy 2010; Sapa-AFP 2010). There is also additional 800 billion cubic feet of gas in the field (ISODEC 2009). The Jubilee Field is 63 kilometres (39 miles) from the coast of Ghana and 132 kilometres (83 miles) southwest of Takoradi, the capital of the Western Region of Ghana (see figure 5.1). According to Anglo-Irish firm Tullow, the lead operator of the field "about 55 000 barrels a day will be produced within the first few months before more than doubling output to 120 000". The first exports started in

January 2011 (Tullow 2010; Nuwagira 2010; BBC news Africa 2011). The International Monetary Fund (IMF) predicts the government revenue from oil and gas could reach US$ 20 billion over the production period of 2012-30 for the Jubilee Field alone (ISODEC 2009). There is also a recent positive result of Hyedua 2 well (possible 1 billion barrels) (ISODEC 2009). See box 5.1 for location of Ghana's oil wells.

Box 5.1. Location of Ghana's oil wells (Ghanaonline.com).

1. **ODUM -1 WELL** is situated in the Tano Basin located 51 kilometres from the Ghanaian coastline, and 117kilometres southwest of the port city of Takoradi.

2. **MAHOGANY - 1 WELLS** is located 63 kilometres from the Ghanaian coast line. The oil discovery made by Mahogany-1 exploration well, and confirmed by the Hyedua-1 well drilled by Tullow oil on the Deepwater Tano Block, was renamed Jubilee Field in December 2007.

3. **THE WEST CAPE THREE POINTS BLOCK** is located between the Tano Fields operated by Tullow oil to the west and the Heliconia Block to the east. The area is an eastern extension of the larger Cote D'Ivoire - Tano Basin. The discovery is about 140 kilometres south west of Takoradi and about 65Kilometres from the nearest coastal town of Half Assini.

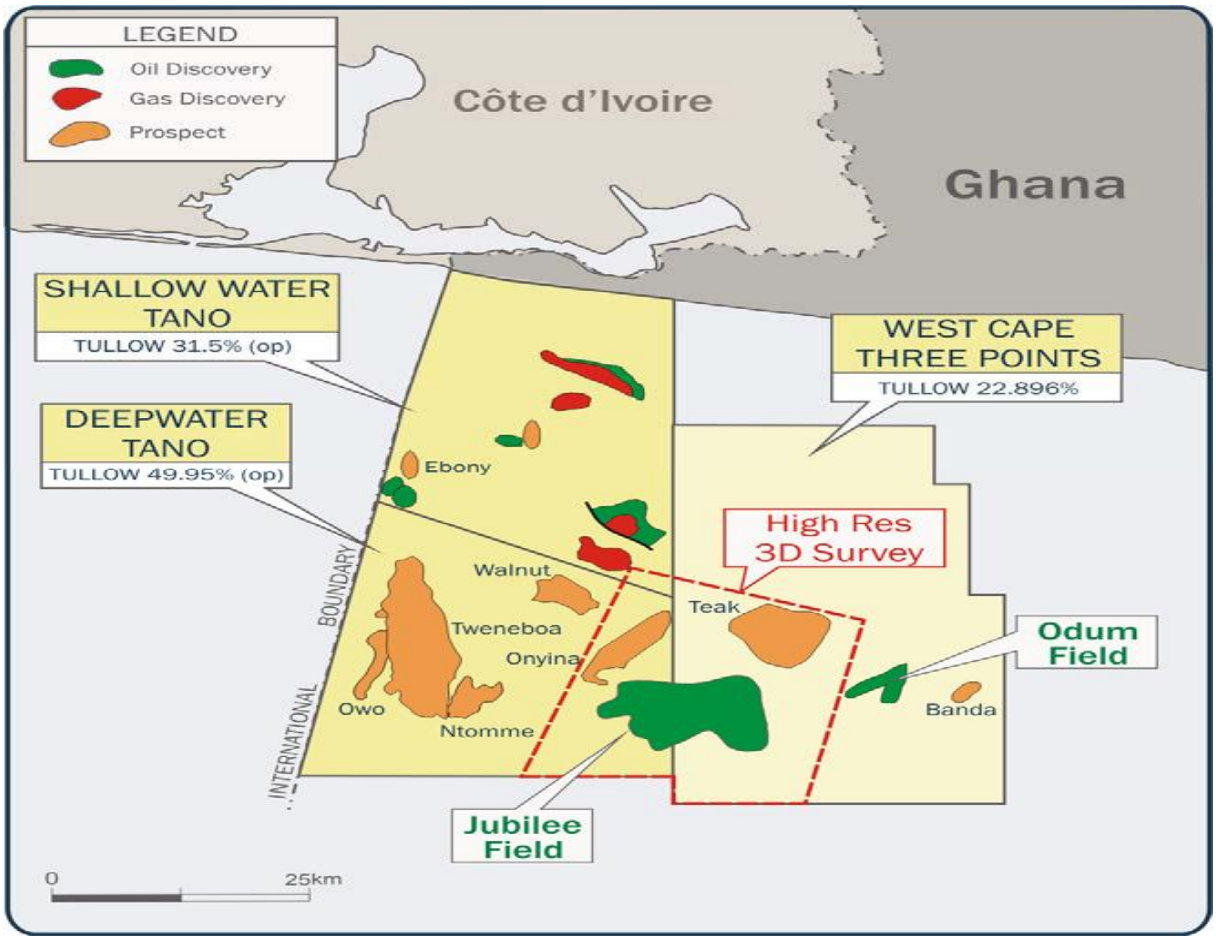
4. **THE MAHOGANY-1 OIL DISCOVERY** was made on June 07, 2007. It is located about 63 kilometres from Half Assini, the nearest coastal town and 132 kilometres southwest of the port city of Takoradi.

5. **THE HYEDUA-1 OIL DISCOVERY** was made on August 07, 2007 about 5.3 kilometres to the southwest of MAHOGANY-1 Well in the Tullow Tano deepwater Block.

6. The latest to add to the string of Ghana's discoveries is the Odum-1 well, discovered in February 2008. The Odum-1 well is located approximately 13 kilometres east of the Jubilee Field. It is 51 kilometres from the coastline and 117 kilometres southwest of the port city of Takoradi.

7. The Mahogany and Hyedun discoveries are now being unitised to be developed as a single entity, named Jubilee Field to mark the coincidence of the discoveries with Ghana's Golden Jubilee year (50 years of independence).

Figure 5.1. Detail of Jubilee Fields off the coast of Western Region (Source: ISODEC 2009; Tullow 2010)




## 5.2 OIL AND GAS POLICY AND INSTITUTIONAL FRAMEWORK IN GHANA

This section explains the key legal, policy and institutional frameworks in Ghana to manage the oil and gas sector. It also includes the mitigation measures introduced to safeguard the fisheries from the potential negative impact of oil and gas activities.

### 5.2.1 Petroleum Exploration and Production Law, PNDC Law 84

The Petroleum Exploration and Production Law (PNDC Law (84) has been the main legal document used to managed Ghana's petroleum for the past two decades. The law provides the framework for the management of oil and gas exploration, development and production. The law

defines the basic terms and conditions of any petroleum agreement, spelling out the rights and obligations of each party with appropriate sanctions.

There is currently a Petroleum Exploration and Production Bill in Parliament that when passed into a law will replace the PNDC Law 84. The Deputy Minister of Energy indicated that the new bill is limited in scope and therefore better able to provide the legislative framework for exploration and production of petroleum in Ghana (Ghana News Agency 2011). The National Petroleum Commission Act, 2011, a bi-product of parliamentary consideration of the Petroleum Revenue Management Law and the Petroleum Exploration Production Bill, is to ensure that GNPC ceases its regulatory and advisory function and is supposed to wrap up this function within six months. However, the Act has not received presidential assent yet.

### 5.2.2 Petroleum Management Law, Act 815

The Ghana Petroleum Revenue Management Law Act, 815 was enacted in 2011. According to Bhandari (2011), there were months of debate with heavy input from the public and civil society to develop this law. The Act offers one of the transparent means by which revenue accruing from the commercialisation of petroleum resources can be safeguarded and utilised in the most equitable way (Ghana News Agency 2011). Section 21 subsection 5 of the law states that "in other to maximise the impact of the use of the petroleum revenue, the Minister (reference to the Minister of Finance) shall prioritise any four sectors when planning how to utilise the petroleum revenue" (Asiamah 2011).

Section 21, subsection 21 provides in no order of priority, 12 areas where oil revenues should be invested in the absence of a long term national development plan. They include agriculture and industry; physical infrastructure and service delivery in education; science and technology; potable water delivery and sanitation; infrastructure development in telecommunication; road; rail and port; physical infrastructure and service delivery in health; housing; environmental protection; sustainable utilisation and protection of natural resources; rural development; developing alternative energy sources; strengthening of institutions of government concerned with governance and the maintenance of law and order; public safety and security; provision of social welfare and the protection of the physically handicapped and disadvantaged citizens

(Asiamah 2011). Seven out of the ten parts of the oil revenues is to be put into the nation's annual budget of which seventy percent (70%) of the annual budget is to be utilised for public investment expenditure consistent with the long-term national development plan.

### 5.2.3 Framework for managing upstream petroleum industry

The framework for managing the upstream industry in Ghana is established and given legal backing by PNDC Law 64 and the Petroleum Exploration and Production Law, PNDC Law 84. The supplementary laws are the Petroleum Income Tax Law, PNDC Law 188 of 1987, Internal Revenue Act 2000, the Ghana National Petroleum Corporation Model agreement, Ghana Shipping Act, 2003 and Maritime Security Act, 2004 (Act 675) (Akabzaa 2012). The law establishes the contractual relationship between the State, Ghana National Petroleum Commission (GNPC) and the prospective investors in the upstream operations (www.cesca-world).

### 5.2.4 Environmental Protection Agency (EPA) Act, 490 of 1994

The law regulating the impact of other activities on fisheries was promulgated in 2002 and section 93 of the Act 625 states clearly there is a need to present to the Fisheries Commission, a Fisheries Impact Assessment (FIA) before any activity other fishing can take place in the Ghana water bodies (Amarfio 2010). The law makes reference to the Environmental Protection Authority (EPA) Act which was already in place and appropriately makes reference to the EPA Act in the sub-section. The Environmental Impact Assessment (EIA) and the FIA are mutually exclusive. As such it should be incumbent on the actors in the oil industry to prepare a comprehensive FIA.

The EPA is the main institutions responsible for environmental management in Ghana. It has the mandate of ensuring that petroleum activities minimise adverse environmental impact. The Petroleum Law and the Petroleum Agreement demand strict adherence to the environmental laws and regulations in Ghana, specifically, the EPA Act 490 and the Environmental Assessment Regulation, LI 1652 (www.cesca-world). In addition to the above mentioned environmental requirements, the Petroleum Agreement requires strict adherence to best international oil environmental practices. The Environmental Protection Agency is primarily responsible for

regulating the environment and ensuring the implementation of Government policies on the environment.

### 5.2.5 National oil spill response system and contingency plan

The Environmental Protection Agency (EPA), realizing the susceptibility of the country to the risk of oil spill due to the transport of oil from surrounding countries to Europe, initiated measures in 1986 to develop a National Oil Spill Contingency Plan (Allotey undated). The Plan provides the framework for coordination of an integrated response, definition responsibilities, reporting and alerting procedures and means of communication, training and exercises, equipment etc. According to the Executive Director of EPA in 2011, Mr. Allotey, the Agency has developed environmental sensitivity indices along the coast of Ghana which is Geographic Information System (GIS) based, covers the whole coastline, 96 maps in the Atlas, including main features and ranking (coast type, economic and ecological features). This will help in determination of action required in the event of oil spillage.

### 5.2.6 Local content and participation policy

Local content and participation refers to the level of use of Ghanaian local expertise, goals and services, people, business and financing in oil and gas activities (Ministry of Energy 2010). This is a piece of legislation that is under consideration in Parliament of Ghana. According to Mr. Inusah Fuseini, the Deputy Minister for Energy, this legislation when passed into law "will ensure that Ghanaians benefit as much possible from the oil and gas find in terms of employment, ownership and control and the provision of goods and services" (Ghana News Agency 2011).

According to Ministry of Energy (2010), the key policy objectives to be attained under the Local Content Platform are to:

- Maximise the benefits of oil and gas wealth generation on a comprehensive local content platform by maximizing the use of local expertise, goods and services, job creation for people, businesses and financing in all aspects of the oil and gas industry value chain and retention of the benefit within Ghana.

- Develop local capability in all aspects of the oil and gas value chain through education, skills and expertise development, transfer of technology and know-how and an active research and development portfolio.
- Achieve a degree of influence or control over development initiatives for local/domestic stakeholders.
- Achieve at least 90 percent local content and local participation in all aspects of oil and gas industry value chain within a decade.
- Increase capabilities and international competitiveness of domestic businesses and industrial sectors.
- Create oil and gas and related supportive industries that will sustain economic development.

### 5.2.7 International Conventions and Agreement

Ghana is signatory to a number of United Nations and Regional Cooperation Conventions and multi-lateral agreements which will help in managing environmental impacts. Some of these conventions according to Mr. Jonathan Allotey, the Executive Director of the EPA of Ghana, include:

- International Convention for Prevention of Pollution of the Sea by Oil London, 1954 (as amended in 1962 and 1969).
- Convention on Fishing and Conservation of the Living Resources of the Seas, Geneva, 1958.
- Convention on the Continental Shelf, Geneva 1958.
- International Convention for the Conservation of Atlantic Tunas, Rio de Janeiro, 1966.
- International Convention Relating to Intervention on the High Seas in Cases of Oil Pollution Casualties, Brussels, 1969.
- Convention on Wetlands of International Imperative Especially as Water fowl Habitat, Ramsar, 1971.
- International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage, Brussels 1971 and the 1976 Protocol.
- International Convention for the Prevention of Pollution from ships and Protocol (MARPOL 73/78).

- Protocol concerning cooperation in combating Pollution in cases of Emergency, Abidjan, 1981.
- United Nations Convention on the Law of the Sea, Montego Bay, 1982.
- Convention for cooperation in the Protection and Development of the Marine and Coastal Environment of the West and Central African Region, Abidjan 1981.

## 5.3 OIL AND GAS ACTIVITIES IN THE WESTERN REGION

The discovery of oil and gas off the coast of Western Region of Ghana is a business opportunity with cascade effect on the rest of the economy in Ghana in general and Western Region in particular. Since the oil and gas activities in the Region are relatively new, there is the need for proper infrastructure to be put in place. Some of the infrastructure needed includes pipelines, storage tanks, refineries, gantry cranes, roads and seaport transport terminal, public utilities, hospitality industry among others.

There are some infrastructure being put in place by the government, oil and gas companies and private companies. By the time the oil and gas production ramps up, Ghana will have a large-scale downstream infrastructure in place. In the mean time, smaller projects are meeting the market demands. The GNPC is currently developing a gas infrastructure project to lay pipelines from the offshore wells to Takoradi (the capital of Western Region) where the Volta River Authority (VRA) operates a power plant that runs on Nigerian gas imported via the West African Gas Pipeline (WAGP). Work on an oil services terminal has also began at Takoradi Port since September 2009. The project valued at $50 million apart from a warehousing space and transit sheds, includes the pipeline that will bring oil crude from offshore fields (www.pennenergy.com). The seaport of Takoradi which has historically served as the country's main dry bulk cargo terminal is to be expanded according the Ghana Ports and Harbours Authority (GPHA). GPHA will expand the main breakwater, build a new pier for dry and liquid bulk, develop a terminal exclusively for oil and gas, and relocate the existing cargo terminals to make space for energy-related facilities.

Before 2005, all downstream activities were carried out by the state owned Tema Oil Refinery (TOR) and the Bulk Oil Storage and Transportation company (BOST), but now the private companies such as Cirrus Oil Services; a subsidiary of Cirrus Energy is allowed to complement the public service. Cirrus Oil Services currently operates tank farms in Takoradi and Tema (www.pennenergy.com). According to the Managing Director of BOST, Dr. Yaw Akoto, the US$200 million terminal project in Takoradi will create 500 new permanent jobs and the company was ready to identify people from the community and train them to acquire employable skills (www.modernghana.com).

According to the District Chief Exceutive for Ahanta West, Mr. Joseph Dofoyena, they are working with Harvard Marine Institute to offer oil-related training to the people from the region so that they can also get work in the oil and gas sector. Other individuals from the region such as Solomon Cudjoe have also started learning how to operate earth-moving machines and also learning how to drive heavy-duty truck (www.modernghana.com).

# CHAPTER SIX

This chapter presents the key findings from the field study and interviews in the Cape Three Points village. It also analyses and discusses the key findings. The chapter is based on the primary data and complemented by secondary sources of data.

## 6.1 PRESENTATION OF KEY FINDINGS

The researcher administered questionnaires to 180 respondents and also observed the way the people live. The 180 respondents is about one-third of the population of about 400 to 500 in the Cape Three Points village (http://www.ghanawestcoast.com/gwc/cape_three_points.php). All the 180 respondents are engaged in fishing related activities. The number of respondents is not representative; therefore views expressed reflect those of the respondents and not the entire community.

### 6.1.1 Socio-economic characteristics of the surveyed community

Out of the 180 respondents, 52% were males and 48% females. The study covered respondents from different age groups between 18 – 60 years and over 60 years. A greater portion (89%) of them was within the age bracket of 18-60 years which are actively involved in fishing activities. With regards to education, 58% have no education, 36% have education up to the primary level and 6% have education up to the secondary level. Ninety percent (90%) of the respondents have children. They also live in households with other extended families.

Field observations also show that the community lack social amenities. The roads are in bad state, they lack healthcare facilities, there is no portable source of drinking water in the community, and toilet facilities are mostly pit latrines. The majority of the respondents, aside from living of fishing related activities, also live on subsistence farming (48%) and other sources of economic activities such as petty trading, artisanal works, small-scale illegal mining among others. The monthly income earned by the respondents is generally low. The majority of them (79%) said they earn about GH¢ 0-200 (equivalent of US$ 0-112) monthly, 14% earn about GH¢ 200-400 (equivalent of US$ 112-224) monthly, with only 4% earning more than GH¢ 800 (equivalent of more than US$ 448) monthly.

### 6.1.2 Perception about the oil and gas discovery

The respondents were asked how they perceive the oil and gas discovery will influence their livelihoods and their community. The general perception of the respondents (75.6 %) is positive because they are expecting the oil and gas activities to boost their livelihood activities and increase income. The majority of the respondents who have the positive perception are women who are engaged in fish related activities (fish processing such as smoking, salting and mongering), petty trading and farming. Others (19.3%) have a negative perception. A few of the respondents (5.1%) fail to link the oil and gas discovery to the impact on their lives.

### 6.1.3 Negative impacts of oil and gas activities on fisheries

When respondents were asked what the likely/actual negative impacts oil and gas discovery will be on their livelihoods and communities, 36.2% of respondents asserted that the oil and gas discovery would bring great loss in the quantity of fish catch. These were mostly fishermen and fishmongers. Even though the percentage is quite marginal, it still confirms the assertion that fish catch may reduce. The fishermen respondents indicated that due to the previous use of light fishing, fishes are no more close to the shores and now they have to go deep inshore in order to catch good quantity of fish. The women fish mongers indicated that should the quantity of fish caught by fishermen reduce, they (fish mongers) will also get less fish to buy from them than previously and this will affect not only the incomes of the fishermen but also them. Since some of the fishermen are married to them (fish mongers), it means their combined income will reduce and this will affect their livelihoods.

The respondents think that drilling of oil, restriction imposed by naval officials in charge of the rigs and the incident of oil spillage are some of the factors that will impact greatly on the fish stocks. The respondents (11.2%) think legal issues against offenders and 10.1% of respondents think low levels of income are some of the other negative impacts that oil and gas activities will have on fisheries. Others, 9.2% respondents think that loss of jobs and 9% think high cost of living are some of the other negative impacts that oil and gas activities will also have on fisheries. Pollution from the oil and gas activities is another concern by 3.6% of the respondents.

### 6.1.4 Stakeholder involvement and institutional capacity

The majority of the people interviewed ranked the local communities and stakeholder participations from fairly involved to involve. The Constitution of Ghana makes public hearings a mandatory part of the process towards securing a permit to start oil drilling in Ghana according to the Constitution of Ghana. According to Ellimah (2009), at least the oil affected districts of Western Region had the opportunity to interrogate the Environmental Impact Assessment (EIA) of Tullow Oil and her partners. However, critics indicate that EIA documents are technical and the people within the affected communities barely have enough information about the oil that has been discovered close to them and therefore they are incapable of participating in processes that would help them deal with any possible impacts that will occur (Ellimah 2009).

Most of the key informants interviewed responded "no" to the question; do you think the institutions in place by government to safeguard the fisheries sector have adequate human resources and capacity to implement the policies? Others responded that they think the institutions have to a small extent some capacity. The majority recommended that 8–14% of Ghana's oil revenue should be allocated to developmental projects in oil bearing fishing communities.

## 6.2 ANALYSIS AND DISCUSSIONS OF KEY FINDINGS

This section analyses and discusses the key findings of the study. How come that people in the small fisheries dependent communities closest to the oil and gas activities in Ghana generally have positive perception of oil and gas?

### 6.2.1 Socio-economic characteristics of the surveyed community

About twenty five percent (25.2%) of the respondents were in the age bracket of 18-25, 30.1% were in the age bracket of 26-35 and 34.2% were in the age bracket of 36-60. Thus, a greater portion (89.5%) of the 180 respondents was within the age bracket of 18-60 years which are actively involved in fishing activities. This implies that adverse impact of oil and gas activities is likely to affect the livelihoods of the majority of these people. Fifty eight percent (58%) had never been to school. This means that the likelihood of these people getting formal jobs such as

in the oil and gas industry is limited and calls for measures to improve the level of education in these communities. Fifty five percent of them have from 3 to 6 children.

They also live in households with other extended families. This implies that breadwinners of these families whose livelihoods depend on fishing need to be protected against the adverse impact of oil and gas activities on their livelihoods and that of their dependents. The community lives in deplorable state and any adverse impact of oil and gas activities will further worsen their situation. The majority of the respondents earn below the minimum wage in the country. Although income alone does not justify the standard and quality of life of these respondents, it gives an indication of the standard of living of these respondents, which is generally low.

### 6.2.2 Perception about the oil and gas discovery

According to the women respondents, during the run up to the 2008 presidential and parliamentary election, many politicians in their political campaign messages made several promises to them and urged them to vote for them to come to power and in return they will ensure that they and their communities will benefit greatly from the oil wealth through job creation and infrastructure provision. These promises according to them are still heard on the radios and from the District Assembly.

The government and oil company officials who come to sensitise them about the impact of the oil on their livelihoods portray mostly the positive side. For example, in June 2007, the president of Ghana at that time, Mr. John A. Kufuor said "this oil discovery will turn Ghana into an African tiger" (BBC news Africa 2011). The current president of Ghana, Professor John Evans Atta Mills, on his commissioning speech for the oil production in December 15, 2010 in Takoradi, said "after a long wait, the day has come" (Xcross 2010). These impressions have fuelled the high expectations held by many of the women respondents, hoping that there will be high clientele base to patronise the goods sold in these communities. The women also cited an improvement in their social lives and the provision of infrastructure such as roads, schools, health facilities, electricity and potable water as some of the reasons for their high expectations. It must be emphasised that this field survey was conducted just 5-6 months after the first exportation of oil from the area and therefore hopes were generally very high. The high positive

perception of the respondents is justifiable given that they have low income, lack the basic social amenities and infrastructure in the community. Therefore, any activity, in this case oil and gas which is "preached" to improve their lots will be highly appreciated.

However, Non-Governmental Organisations (NGOs) who have visited the communities have also tried to not only make the communities see the positive aspect of the oil and gas discovery but also the negative implications for their lives and communities, considering their level of education and skills and the competence required to work in these oil and gas industry or to take advantage of the prospects the industry brings to the communities. The respondents are aware of the negative impact oil and gas has had on other fishing communities in other countries such as Nigeria, and some of them - especially the fishermen - are sceptical. This unbalanced information about the oil and gas discovery on the livelihoods of these communities could send wrong signals if not corrected, and the people might revolt should their expectations not be met. This can lead to a 'resource curse' rather than a 'blessing' to the communities in particular and the nation in general. A typical example as stated by the chief of the Cape Three Points community, Nana Oberituo "..... we, the chiefs of the Western Region have matched to the Parliament of Ghana demanding 10% share of the oil revenue to develop our communities and that of our people".

### 6.2.3 Negative impacts of oil and gas activities on fisheries

The pollution from the oil and gas activities could lead to chemical pollution of water bodies, air and noise, as well as plant pollution. Crops grown along the sea are likely to be affected from absorption of poisonous substances that will affect the process of photosynthesis. Coconut, which is consumed on a large scale will also be affected by similar biological effects (Boohene and Peprah 2011), and can affect the health status of the populace who consume the coconuts. The issue of ballast water dumped into the sea (Amartefio 2009), increased tanker and shipping traffics and the potential risk of collision, more noise that scare the fish are some of the worries fishermen in the region talk about. Research conducted by Boohene and Peprah (2011), shows that some women in the study area indicated that it will not be in the interest of the gods of the sea if oil is drilled every day. They believe that this will affect the fishing since they will find it

difficult to offer the sacrifices, which they usually offer on Tuesday to the gods of the sea (Boohene and Peprah 2011).

Mr. Edlove Quarshie, a fisherman and representative of the Line Hook Canoe Fishermen Association, claim the negative impacts have exacerbated to the extent that "lives are even being lost" (Badgley 2012). Mr. Quarshie recounts a deadly incident in June 2007 when an oil industry supply ship ran over a fishing canoe one night at sea killing four fishermen on spot with two dying later from injuries (Badgley 2012). Fisher folks, in the oil bearing communities have already been instructed to steer clear of a particular radius of the oil rigs, specifically 500-meter no-fishing zone around the Jubilee Field (Ellimah 2009; Badgley 2012). "Incidentally, all the fish appear to have taken cover in areas close to the rigs due to 24-7 lighting on the Kwame Nkrumah, the refitted tanker that serves as the oil storage and off-loading vessel, making it difficult for the fishermen to get them without incurring the displeasure of the navy that patrols our territorial waters", Mr. Richard Ellimah, a Development Practitioner claims (Ellimah 2009). The fishing community workers and residents even claim boats and motors have already been seized (Badgley 2012).

The fishermen said although they know that fishing generates none of the excitement or fantasies of oil, yet the industry accounts for nearly 5 percent of Ghana's Gross Domestic Product (GDP) (Badgley 2012), and their hope is that the oil find will create more jobs and give them other alternative sources of income when its discovery in the region was first announced. But these expectations have gradually been dashed. According to information gathered from Civil Society Platform on Oil and Gas (an NGO serving as one of the mouth piece of fishermen), the offshore oil industry is unlikely to offer more than 400 jobs in the whole of the country (latest government estimates of job offers from the off-shore oil and gas activities) with the figure only increasing to 800 jobs by 2020 (Badgley 2012). Meanwhile, fishing indirectly or directly supports up to 10% of the country's population, approximately two million people are involved in localised catching, marketing and processing nationwide (Badgley 2012).

Meanwhile, new oil finds off Ghana's coast have been announced, meaning new drilling sites will continue to be opened, leading to more no-fishing zones, which will affect the livelihoods of

fisher folks, more tanker traffic and increased environmental risk and with oil monitoring activities currently difficult, inadequate and no compensation fund for fishermen in the event of spill currently in place, the negative impact on fisheries may increase if mitigations measures are not put in place. However, the president has promised accountability on the part of public officials and asked Ghana's development partners and non government agencies to support government's effort to build transparent and anti-corruption initiatives (Ghanaian Times 2009) and this has prompted Integrated Social Development Centre (ISODEC) and Oxfam America to pledge their support to government in the protection of livelihoods of fisher folk and other communities around the Jubilee Oilfield as well as the larger marine ecological zone of the Gulf of Guinea (Ghanaian Times 2009).

### 6.2.4 Legal policy and mitigation measures to safeguard the fisheries

There are general legal, policy and institutional frameworks in place to manage the activities of fisheries (see section 4) on one hand, and oil and gas (see section 5) on the other hand. These general frameworks are also being worked on by the government of Ghana. When they are well implemented, they can mitigate the potential negative impacts that oil and gas activities might have on fisheries. However, as of May 2012, there were no definite and concrete mitigation measures already in place by the government to safeguard the fisheries from the adverse impact of the oil and gas activities, even though first export of oil was in January 2011.

The worrying issue is that the development and enforcement of rules and regulations is taking time, and some of them are unfounded and/or unachievable within the timeframe. For example, the local content and participation bill which when passed into law should ensure that Ghanaians benefit as much as possible from the oil and gas find in terms of employment, ownership and control, states that the provision of goods and services should be 90% by 2020. This 90% local content participation is not realistic and in fact unattainable. Even Norway with global industrial experience in oil and gas development and operation, and efficient and high quality developed technology has about a 60% share in the development and operation of her oil and gas resources. Ghana currently lacks the pre-requisite conditions to attain the 90% local content and participation by 2020. For me, this is rhetoric and shows the clear "cheap politics" which could

cause Ghana to experience the resource curse as is in the case of other oil rich countries, should the expectation of the people not be met.

Taking the above into consideration, the important questions to ask are: Can we believe in the legal and policy frameworks? Should we have confidence that mitigation measures can safeguard the fisheries? How can we believe in other policies and strategies by the government? These questions are important to ask because the transparency level in Ghana is not adequate. People are not open to talk about issues of potential oil and gas activities impacting negatively on fisheries for fear of victimisation or losing their jobs. Ghana is relatively stable democratically, but with the December 2012 presidential and parliamentary election underway, if the concerns and opinions are not properly tackled by the stakeholders and the people revolt, then this can turn into a resource curse. Also, there are no strict environmental regulations, monitoring and oil spill response in place. There are quite a number of incidents of environmental problems that have occurred from oil and gas activities and the government has turned a blind eye to it.

With no critical opinion or voice that can be raised against the government and the oil and gas companies, they may not stick to the environmental strategies and regulations to protect the fisheries and the communities. And with no such open criticisms from the people, proper mitigation measures are not likely to be implemented.

### 6.2.5 Stakeholder involvement and institutional capacity

The local communities and stakeholder participations is not adequate and the institutions in place by government to safeguard the fisheries sector do not have adequate human resources and capacity to implement the policies. The various management institutions are constrained by lack of funding, thereby unable to retain the best qualified staff. They do not have the requisite equipments and other resources to effectively deliver their mandates. Corruption, bureaucracy and red tapes are some of the other key issues that make the institutions not to effectively perform as stated in the documents. Key informants stresses Ghana should learn from the pioneers the good practice. Training, learning by doing, fiscal commitment, equipment, infrastructure, technological know-how are some of the measures that can help improve the capacity of the institutions to mitigate the impact of oil and gas activities on fisheries.

# CHAPTER SEVEN

Based on the previous chapters, several recommendations can be outline. This chapter provides the main recommendations and conclusion.

## 7.1 RECOMMENDATIONS

In order for Ghana to ensure a peaceful co-operation between the fisheries sector and the oil and gas sector, the following are recommended:

### 7.1.1 Good environmental management and oil spill response

The government should further develop its natural resource management. There should also be a natural resource fund to cater for future compensation and management of environmental damages that might occur in the operations of oil and gas. Fishermen need to be assured that fishing communities will be compensated should there be oil spills and their livelihoods affected or should they loss their fishing rights due to oil and gas activities. There should be an intensification of the oil monitoring activities in order to reduce oil spills and other adverse impact from the oil and gas activities that might affect the fish stocks and marine ecology.

### 7.1.2 Minimising conflict with local industries

There is the need to reduce the conflict that will arise between the oil and gas sector and the fisheries sector. The issue of Dutch Disease whereby the oil and gas sector tend to cripple other vital sector such as in this case agriculture and manufacturing sectors should be reduced. The restrictions of the use of the ocean resources due to oil and gas activities should be tackled properly by government. As a result of the oil and gas activities, migrant labour from outside the communities will be attracted to work in the oil and gas sector and this will put pressure on the scarce amenities such as housing, schools, and health facilities. If not properly managed, this will inflate social pressures and further exacerbate into conflicts. The issue of high prices, inequalities in social class, where the rich continues to be rich and the poor get poorer, should be addressed. Local fishermen with abundance indigenous knowledge about the coast could be integrated into the monitoring, control and surveillance team to patrol the coast. This can bring about a sense of involvement and reduce the tension between the oil and gas sector and the fisheries sector.

### 7.1.3 Increase the positive spill effects

The government should ensure sound spending of oil revenues to prevent the Dutch disease. There is the need to develop local expertise to take advantage of the benefits from the oil and gas sector and also to reduce the expatriate quotas and focus on development projects for the local people. There should be a conscious effort by government and oil companies to develop the oil communities. A portion of the oil revenue should be set aside for the purpose of developing these communities through the provision of basic infrastructure and amenities such as better roads, public toilets, boreholes, schools and health facilities. Scholarships schemes should also be put in place to assist the youth to have education. The provision of these amenities will provide positive feelings among the people of the communities as they are benefiting from the resources of their land. Also, the oil companies should be encouraged to reserve some of the jobs for the local people as long as they have the requisite skills and qualifications. This will ensure that the people benefit from the oil wealth. The local people should be trained in other alternative forms of livelihoods and also given assistance in the form of credit facilities and skills.

### 7.1.4 Improve stakeholder involvement and institutional capacity

There is the need for public-private partnership, frequent consultation and dialogue with the people, traditional leaders, civil society organisations and countrywide education using the religious bodies, the media and various traditional management and authority that govern fishing operations in the regions. Institutions such as the Environmental Protection Agency (EPA), the Internal Revenue Service (IRS), the Navy, the Ghana Maritime Authority, the Fisheries Commission, the Banking and Insurance industries need to be well resourced with human and equipments needed to enable them function properly. There should be improvement in accountability. The management of Ghana's petroleum and revenue spending should not lie only with GNPC who is only responsible to the president and not Parliament. There should be another institution different from the GNPC to manage the petroleum and the revenue that accrues from it. All transactions between the foreign oil companies and GNPC in the form of bids should not be secret. The government should increase the transparency of these deals by revealing details of all transactions between the foreign oil companies and GNPC. This will increase transparency and accountability in the nation.

## 7.2 CONCLUSION

The citizenry of Ghana in general and that of Cape Three Points in particular may be right about their high hopes of the oil and gas discovery changing their lives for the better. Amidst these high hope and expectation from the people, if the negative impact of oil and gas activities on fisheries is not mitigated, the people might revolt should their expectations not be met. This can lead to a 'resource curse' rather than a 'blessing' to the communities in particular and the nation in general. If these recommendations are considered by stakeholders in the management of oil and gas, and fisheries in Ghana, it will go a long way to reduce the conflict between the oil and gas, and the fisheries sector, and improve the living standards of the people of Cape Three Points and the Western Region. Ultimately, the positive spill over effect will go a long way to reduce Ghana's vicious cycle of poverty and prevent the endemic social conflicts, which has pervaded most oil producing fishing communities of oil-rich countries.

There is a need for further research that will cover wider areas and longer periods of time in order to trail the actual impacts of oil and gas activities on fisheries in the region. Other research could be to monitor the policies and legal frameworks in place to safeguard the fisheries in order to enhance their efficacy.

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## APPENDIX

### Background Information

Ghana's find of oil in commercial quantities marks the beginning of a billion-dollar industry. The exploration and production of it is a major industrial development but its negative impacts on fisheries can never be underestimated. As experienced by most oil producing countries, the oil exploration activities have caused destruction of delicate marine ecology, which is the main source of livelihood in the oil-bearing communities causing loss of fish catches, the exacerbation of poverty, social conflicts, population displacement, occupational disorientation, and the violation of human rights.

If Ghana can mitigate what is called the "***resource curse"*** that has caused the vicious cycle of poverty and endemic social conflict, which has pervaded most oil producing fishing communities of oil rich countries such as Nigeria, Congo, Tanzania, just to mention a few, then research must be carried out to find ***the impacts of oil and gas activities on fisheries in the Western Region of Ghana.*** The research is being undertaken in partial fulfilment of the requirements of the Master of Science Degree in International Fisheries Management at the University of Tromso, Norway. All information provided will be treated with the utmost discretion and used only for academic purposes. Your names will not be used against you, but to crosscheck in case of missing data.

You are kindly requested to answer the questions below by checking the boxes where applicable. Your responses are very important and please honestly respond to them. The completion of the questionnaire will take you only a few minutes of your time.

The attached questionnaire can be easily filled. The only thing you need to do is to check/tick the box close to the right answer. Please do so with all level of honesty.

- Please answer all questions
- Please cross clearly with a blue or black ink. [×]
- Preferably use pencil please
- Write in CAPITAL LETTERS where appropriate.

**Appendix 1. Sample of questionnaire administered to locals within the study area**

**Section A: General characteristics of respondent**

1. Name (Optional)…….
2. Organisation. …….
3. Questionnaire No: ……..……

4. Sex
   a) Male [ ]
   b) Female [ ]

5. Age
   a) 18 – 25 [ ]
   b) 26 – 35 [ ]
   c) 36- 60 [ ]
   d) 60 and above [ ]

6. Marital Status
   a) Married [ ]
   b) Single [ ]
   c) Divorced [ ]
   d) Widowed [ ]

7. Educational level
   a) No education [ ]
   b) Primary education [ ]
   c) Secondary education [ ]
   d) University [ ]

8. What is your occupation?
   a) Fisher [ ]
   b) Farmer [ ]
   c) Petty trader [ ]
   d) Artisanal worker [ ]
   e) Fish monger [ ]
   f) Galamsay (mining) [ ]
   g) Not working [ ]
   h) Others [ ] Please specify……

9. How long have you lived in this community?
   a) Less than one year [ ]
   b) 1 year – 5 years [ ]
   c) 5 years – 10 years [ ]
   d) More than 10 years [ ]

10. How many members are in your household?
    a) More than 10 [ ]
    b) Between 10 – 6 [ ]
    c) Between 6 – 3 [ ]
    d) Less than 3 [ ]

11. How many sources of income do you have?
    a) None [ ]
    b) 1 source [ ]
    c) 1- 2 sources [ ] Please specify……
    d) More than 2 sources [ ] Please specify ……...

12. What is the monthly income you get from fishing related activities? (In Ghana cedis)
    a) 0 – 200 [ ]
    b) 200 – 400 [ ]
    c) 600 – 800 [ ]
    d) More than 800 [ ]

**Section B: Effects of oil and gas activities on the fisheries and the communities**

13. What do you perceive the oil and gas discovery to be on your livelihoods and your communities?
    a) Positive impacts [ ]
    b) Negative impacts [ ]
    c) Does not know [ ]

14. What are the likely or actual positive impacts of oil and gas activities on your livelihoods and your communities?
    a) Increase in job prospects within the community [ ]
    b) Improvement in social life with influx of people [ ]
    c) Development of social amenities (schools, roads, lights, etc) [ ]
    d) Others [ ] Specify.....

15. What are the likely or actual negative impacts of oil and gas activities on your livelihoods and your communities?
    a) Low fish catch [ ]
    b) Loss of job [ ]
    c) Low level of income [ ]
    d) Legal issues against offenders [ ]
    e) Increase in accommodation cost [ ]
    f) Unable to fish at all [ ]
    g) Bad state of road and heavy vehicles [ ]
    h) Environmental degradation /pollution [ ]
    i) Harassment by naval officials [ ]
    j) Cultural change [ ]

**Appendix 2. Interview guidelines for key Informants**

**Section A: Organisation background**

1. Name of informant (optional).....

2. What is your position in the institution?.....

3. What is the name of your institution?.....

**Section B: Likely impact of oil activities on fisheries and the mitigation measures**

4. What are the likely impacts the expanding oil and gas activities will have on fisheries?

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5. What kind of measure do you think have been introduced to safeguard the fisheries (including livelihoods of the local fishers and fishing communities)?

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6. Are the policies and legal framework put in place by government to safeguard the fisheries adequate?

a) YES [ ]
b) NO [ ]
c) Do not know [ ]
d) Others [ ] Please explain.....

7. Do you think the institutions in place by government to safeguard the fisheries sector have adequate human resources and capacity to implement the policies?

a) YES [ ]
b) NO [ ]
c) Do not know [ ]

8. If your answer to question 7 is NO, what should be done to enhance the human resource and capacity of these institutions?

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9. To what extent do you think the local communities and stakeholders are involved in formulation of these policies and legal frameworks?

a) Very involved [ ]
b) Involved [ ]
c) Fairly involved [ ]
b) Not involved [ ]

10. What can be done to mitigate and secure a peaceful co-existence between the petroleum and the fisheries sectors?

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11. What percentage of Ghana's oil revenue do you think should be allocated to developmental projects in oil bearing fishing communities?

a) 1 – 2 % [ ]
b) 3 – 5 % [ ]
c) 6 – 7 % [ ]
d) 8 – 10 % [ ]
e) 11 – 14 % [ ]
f) Above 15% [ ]

**Appendix 3. List of key informants interviewed**

| **Name** | **Position and organisation** |
|---|---|
| Nana Oberituo | Chief of the Cape Three Points |
| Mr. Deroy Ekow Taylor | Assembly member of the Cape Three Points |
| Mr. Paapa Kwason | Head of the Fishermen Association of Cape Three Points |
| Madam Adwoa Berimah | Head of the Fish Mongers Association of Cape Three Points |
| Mr. Peter Ransom Smith | Head of the Cape Three Points community school |