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managing conflicts in the marine fisheries sectors in Ghana

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MANAGING CONFLICTS IN THE MARINE FISHERIES SECTORS IN GHANA

Godfred Asiedu Ameyaw

This thesis is presented as part of the requirements for the conferral of the degree:

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The University of Wollongong
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ABSTRACT

Marine fisheries are found to play an important role in the provision of food, employment and income generation in Ghana. Data from national fisheries data systems and information from fishers are analyzed, which indicate that fish catches have declined in the last two decades due to overfishing. Current fisheries management systems have not been effective in controlling fishing effort, and the scarcity of fish has resulted in competition in fishing which creates different types of conflicts in the fisheries. Research on conflicts in marine fisheries was conducted through conversations with fishers and other stakeholders, direct observation, review of secondary data, and analysis of fish catch and effort data. It found types of conflicts in marine fisheries at different levels, causes of the conflicts and existing management mechanisms were analyzed and more effective measures recommended for managing the conflicts. Some of the conflicts in the fisheries include gear, spatial, resource competition, signaling and navigation conflicts. Fishing also competes with offshore oil and gas production activities which also create conflicts. These conflicts threaten the long-term sustainability and short-term economic feasibility of the fisheries and food security which justifies the need for research and improved management. It is concluded that improving management systems for fisheries, effective enforcement of fisheries law and regulations, strengthening of fisheries arbitration systems, collaborative management of fisheries, communication among ocean governance agencies and the creation of a comprehensive ocean governance framework are critical in managing marine fisheries conflicts in Ghana. It is recommended as a matter of policy that open access canoe fisheries must be restricted, distribution and sale of pre-mix fuel must be depoliticized with the subsidy on the commodity incrementally removed, fisheries arbitration must be strengthened, legal and regulatory frameworks for ocean activities including fisheries and oil and gas operations harmonized and enhanced, and a comprehensive ocean policy framework developed for Ghana.
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CHAPTER ONE
1.0 INTRODUCTION

1.1 INTRODUCTION
Marine fisheries play a significant role in defeating hunger, enhancing human health and minimizing poverty. Fish is extremely important especially for the poorer members of the global community (FAO, 2014) of which Ghana is a part. Fisheries play a critical role in the supply of food, complementing food production by aquaculture and livestock industries (FAO, 2009) as it is in Ghana. According to Beddington et al. (2007), the public perception of fisheries is that they are in crisis and have been for some time. In Ghana, there is presently a major concern by fishers, fisheries managers, fisheries scientists, researchers and other fisheries stakeholders that Ghana’s marine fisheries are gradually heading towards a crisis point. The increase in size and number of both industrial and small-scale fishing has raised concerns of a global crisis in fisheries (Crean and Symes, 1996) as the case may be in Ghana. Pauly et al. (2002) stated that a significant number of fisheries world-wide are being overfished, which has led to declines in productivity and catch. This situation is peculiar to Ghana as proven by official marine fisheries statistics. Pontecorvo and Schrank (2014) reported that, global marine fish catch increased steadily between 1950 and 1989 followed by a small decline and moving upwards to a highest point in 1996. This peak was followed by a gradual decline to 2010. They concluded that the limit and the decline in catch afterwards indicate that production of fish in the world’s oceans has reduced because fishing technology has improved leading to an increase in fishing effort. This is confirmed by the circumstances currently prevailing in Ghana’s marine fisheries. Change and innovation in fishing methods have resulted in appreciable increases in fishing effort. According to Pomeroy et al. (2016), scientific evidence confirm that marine, coastal and freshwater ecosystems have been negatively impacted significantly over the past 50 years, reducing their
productivity, resilience and long-term economic and social importance. Galbraith et al. (2017) conducted historical hind casts with a bio-energetically constrained, spatially and temporally resolved model of global fisheries and showed that global wild marine fish harvest increased fourfold between 1950 and a peak value near the end of the 20th century but in contrast, projections into the future under open access fisheries suggest a long-term decrease in harvest of 5% per year due to overfishing. Recent decreases in production of the world’s fisheries are likely to have critical ecological and socio-economic implications (Mora et al., 2009) and in fact Andrew et al. (2007) attested to that by saying that, there is general perception that fisheries in the developing world are gradually losing their potential as building blocks of social and economic development. Overfishing and decreases in production of the world’s fisheries can lower the numbers of individuals of reproductive age, reducing population sustainability, remove or damage biota associated with the bottom and disrupt sedimentary structures, altering important habitat features. Removing an abundant species from the fish community can alter food chains and the species composition of the community. Socio-economic implications of fish production declines include loss of food, employment and income generation, livelihoods and business opportunity. These are potential threats to the country if fisheries stakeholders in Ghana continue to engage in business as usual.

Torre-Castro and Lindstrom (2010) state that the depletion of fisheries is one of the most challenging problems that humanity is facing and describe that as a worldwide crisis that is of acute importance in developing countries where coastal populations are ultimately dependent on marine resources. Marine fisheries in Ghana are no exception to this global challenge. Marine fisheries in Ghana are important for nutrition, food security, employment and income generation

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The importance of the fisheries sector in Ghana is highlighted by the enactment of the Republic of Ghana National Fisheries and Aquaculture Policy (Ministry of Fisheries, 2008) and the Ghana Fisheries and Aquaculture Development Plan (Ministry of Food and Agriculture, 2011) for the management of the fisheries sector. The Policy provides the government’s framework for the fisheries contribution to the Ghana Poverty Reduction Strategy II and the Plan describes the steps that will be taken to implement the Policy. The Plan clearly states the strategic objectives of the fisheries sector as follows:

1. Maintaining current capture fisheries production;
2. Increasing revenue and profitability in capture fisheries by at least US$50 million per year;
3. Increasing aquaculture production from 9000 to 100,000 tonnes per annum;
4. Retaining Ghana as a landing and processing hub for the West Africa tuna industry;
5. Developing fisheries management to allow effective control of all commercial fishing effort in Ghanaian waters; and
6. Ensuring fisheries management costs are sustainable and that the fisheries sector overall makes a fiscal contribution to Government revenues.

In spite of the importance of fisheries, available data from national marine fisheries data systems and information from fishers indicate that, over the years, there have been continuous expansions of all sectors of the fisheries with regard to the number of fishing vessels and the number of fishers leading to significant increases in fishing effort. FAO (2016) estimates that production from Ghana’s marine fisheries has decreased since 1999, from almost 420,000 metric tons to 202,000 metric tons in 2014. Chapter five of the Ghana’s Marine Fisheries Management Plan (2015-2019) describes the status of exploitation of marine fish stocks which states that with the
exception of the tuna fleet, the catch per unit effort of all fleet has been decreasing with much smaller sizes of fish landed, which is a manifestation of growth overfishing. The Scientific and Technical Working Group of the USAID/Ghana Sustainable Fisheries Management Project in collaboration with the Marine Fisheries Research Division of the Ghana Fisheries Commission carried out a model assessment of the status of the small pelagic stocks in Ghana (Lazar et al., 2017) and showed that commercial landings of small pelagic species, the most important in terms of landings, peaked in 1996 to 250,000 metric tons. Landings declined continuously to reach the lowest level in 2013. The study concluded that the rapid declining trends of small pelagic landings in Ghana, varying from about 250,000 metric tons in mid-1990s to 44,180 metric tons in 2014, suggest that there is a serious overfishing situation in Ghana’s small pelagic fisheries. The finding was described as similar to the deteriorating health conditions of a dying patient.

Analysis of national marine fisheries catch data (as presented in chapter three) shows that annual fish production for marine fish species of commercial value have continued to decrease over the last two decades. National marine fisheries statistics and information from fishers show that the small pelagic fishery which is the most important for food security, especially in coastal communities, has seen the largest decline. For example, in 1992 the total fish production by all the fleet and species was 370,407 metric tons while the total production of *Sardinella* (small pelagic) was 140,871 metric tons representing 38% of the total catch. In 2012, the total fish production by all the fleet and species was 333,697 metric tons while the total production of *Sardinella* was 35,415 metric tons representing 10% of the total fish catch. In 1992, total catch of seabreams (demersal) was 11,652 metric tons representing 3% of the total catch. In 2012, total catch of seabreams was 7,174 metric tons representing 2% of the total catch. In 1992, tuna catch
The decreases in Ghana’s marine fish production and the increases in number of fishers over the past years have resulted in fish scarcity leading to competition in fishing among user groups and consequently, resulting in different types of conflicts among fishers within the fisheries. Increasing human population in general, and number of fishers in particular as well as the rise in demand for fish are also responsible for fish scarcity, competition and conflicts in Ghana’s fisheries. Ghana’s small-scale fisheries operates on an open access basis, which is an enabling condition for fishing vessel overcapacity and overcapitalization, leading to conflicts within the fisheries. Ghana’s Inshore Exclusive Zone is reserved for use by only the small-scale fisheries sector and small semi-industrial vessels but other vessel types sometimes fish illegally within the Inshore Exclusive Zone, creating conflicts between small-scale and small semi-industrial fishers and illegal poachers. Industrial trawlers engage in high amounts of by-catch for species targeted by the small-scale and semi-industrial fisheries sectors causing conflicts between the different groups. Inequitable and unfair distribution and sale of the highly subsidized pre-mix fuel for the small-scale fisheries sector and the associated political interests give rise to some of the conflicts prevailing in the fisheries sector. In addition to conflicts within the fisheries, the marine fisheries sector presently competes with Ghana’s offshore oil and gas industry for space at sea and on land which creates multiple sea-use conflicts between marine fisheries and oil and gas production activities at the community level. Inadequacies in governance and management systems in Ghana such as the overlaps in roles and responsibilities of ocean governance institutions create more conflicts at the national level (Tsamenyi, 2013). Fishers describe the continuous occurrence of these conflicts at the primary level, which is confirmed by direct observations in the field and
from proceedings of stakeholder meetings but governance frameworks in Ghana have not responded adequately to manage and resolve the conflicts.

Fish stocks can be replenished to ensure a continuous availability through time. Renewable natural resources such as fish are often common property, in which several entities have property rights to the resource (Sumaila, 1999). Open access nature of common pool resources may lead to their overexploitation and subsequent scarcity. Fish scarcity and multiple sea-use are underlying causes of fisheries conflicts in Ghana but Adams et al. (2003) found out that conflicts over the management of common pool resources are not simply material. Conflicts arise at a deeper cognitive level. Differences in knowledge, understanding, preconceptions, and priorities may provide a deeper explanation of conflict. Knowledge of the empirical context, knowledge of laws and institutions, and beliefs, myths, and ideas allows stakeholders to define the problems of resource use. Wilson (2002) argued that only by revealing the uncertainties and ignorance inherent in understanding of fisheries will it be possible to establish the collective learning experience necessary to manage resource use conflicts in such complex ecosystems.

The issue of conflicts within Ghana’s marine fisheries, conflicts between Ghana’s marine fisheries and oil and gas production activities, conflicts within governance and management systems, and the consequences of the conflicts is one which must be of critical management concern. Fishers compete among themselves to fish for declining fish stocks using illegal fishing methods, there is lack of lack of compliance and enforcement of fishing rules and regulations, competition over fishing inputs which create conflicts within fisheries, there is spatial conflicts between the fisheries and the oil and gas sectors due to multiple sea-use and conflicts among ocean governance and management agencies in exercising their roles and responsibilities as enshrined in law. There is the need for marine fisheries, oil and gas and other ocean policy
makers in Ghana to work together to address this important challenge. Evidence-based policy
decision-making process is key to efficiently addressing this challenge which must be based on
quality data, information and knowledge generated through scientific research. Symes and
Hoefnagel (2010) support the argument that good policy making depends on appropriate
information generated by scientific research.

1.2 BACKGROUND, SIGNIFICANCE AND JUSTIFICATION FOR THE RESEARCH
People have increasingly relied on marine and coastal resources for their existence (Berkes et al.,
2001). The pressure on the use of these resources has increased over the years as a result. For
instance, Boude et al. (2001) note that there has been a sudden increase in the pressure on the use
of aquatic resources over time because of continuous high demand and technological innovation.
Never before have people consumed so much fish or depended so greatly on the fisheries sector
for their well-being (FAO, 2014). Ocean fishing is a vital industry for many countries and their
people (Blake and Campbell, 2007). In spite of the importance of fish, available records show
that global fish production has decreased mainly due to overfishing. The World Bank (2004)
reports that the evidence of overfishing is accumulating even as global fish-catching capacity in
many countries continue to increase, while the landings of important marine fish species have
been in decline since 1988. This supports the issue of global fish scarcity.

Boude et al. (2001) noted that the scarcity of fish is not new, only that it appears now to be a
common issue for different aquatic ecosystems. Pomeroy et al. (2016) say that fishery scarcity,
due to increasing fishing effort, overfishing, and user competition is an increasing global
concern, and that scarcity and resource depletion in marine ecosystems may accelerate conflict.
Consequently, coastal waters are now associated with increased levels of conflict and
disagreements among different groups of people (Williams, 1996). Overfishing results in the
reduction or collapse of important fish stocks, which leads to higher levels of poverty, economic instability, conflict and intensified violence among the different competing resource user groups (Pomeroy et al., 2016). Coupled with the problem of overfishing and the subsequent decline in fish landings, fisheries in developing countries like Ghana face intense external pressure from competing uses of resources and space such as oil and gas prospecting, infrastructure development and tourism (Nielsen et al., 2004). These pressures on limited resources set the context for many of the conflicts this research will examine.

1.2.1 Types of marine fisheries conflicts globally
The Oxford English Dictionary generally defines conflict as a serious disagreement or argument, typically a protracted one, or as a serious incompatibility between two or more opinions, principles, or interests. Globally, marine and coastal resource use conflicts are a common phenomenon in fisheries (DuBois and Zografos, 2012). Review of literature suggests that, worldwide, marine fisheries conflicts occur in different forms with different characteristics. According to Charles (1992), conflicts within fisheries happen due to the distribution of scarce fish resources, the sharing of fishery benefits, and management modalities between fishers and governments. Conflicts between fisheries and external competing users such as ocean extraction and tourism also occur. Internal conflicts in marine fisheries occur in the form of territorial conflicts over use rights, conflicts between federal and provincial governments as well as conflicts between commercial and recreational user groups.

Globally, climate change-driven changes in the distribution of sea life are expected in every marine ecosystem but the exact magnitude and extent of effects are largely unknown due to the immaturity of scientific analytical approaches (MacNeil et al., 2010). Warming ocean temperatures associated with climate change are likely to change migratory patterns of fish in the
open sea which may cause fish scarcity and potential for conflicts (Intergovernmental Panel on Climate Change, 2007). King (2015) opined that the Southeast Asian region’s open sea fisheries traverse several overlapping maritime territorial claims. Vietnamese fishing vessels following the northward fish migration or reacting to fisheries depletion within the Exclusive Economic Zone are likely to be intercepted by Chinese patrol vessels, compounding existing maritime territorial disputes. Disputes surrounding the Spratly Islands, for example, cause Vietnam to be in conflict with neighbouring states.

Conflicts can arise from tension between the allocation of fish between the current and future generations. According to Johnson and Bavinck (2004), allocation is the deliberate assignment of rights to a benefit or resource by authorities, which may involve a negotiated process. There may be competing claims for allocation of fish between the current and future generations. Social divisions within a fishery mean that participants generally disagree over the allocation of rights and responsibilities (Charles, 2001). This is a good example of fisheries conservation conflicts which are discussed in chapter four.

Conflicts also arise from competing fishing gear use and multiple methods, utilization of space and other resources at the fish landing site or fish marketing processes. Conflicts between sectors of commercial fisheries such as industrial fisheries conflicts with small-scale fishers are also common. For example, Flaherty and Karnjanakesorn (1993) reported that commercial fish trawlers in Thailand have gradually excluded small-scale fishers from the fisheries leading to conflict between commercial fish trawlers and small-scale fishers. Furthermore, increases in number of users of marine environment and resources exert additional pressure on traditional ocean users and creating possible conflicts (Alexander et al., 2013 and Yates et al., 2015).
Johnson et al. (2013) note that offshore oil and gas extraction started to occur alongside traditional uses of the ocean such as fisheries in the last half of the 20th century.

Literature review also reveals that apart from internal fisheries conflicts, conflicts also occur between fishery interests and other industries. According to Arbo and Thuy (2016), the intensification of different operations in the marine environment cause potential use conflicts. Different users often operate and utilize resources in the same space and different activities have the potential of causing substantial negative impacts on other operators. Offshore wind power development has been in existence in European countries since the 1990s (Chen et al., 2015) which conflicts with local communities and ocean users. Wind farm turbine construction and operation have the potential to change fish behavior and their habitats (Nienhuis and Dunlop, 2011). It was found out by Berkenhagen et al. (2010) that the potential impacts of offshore wind power development on fishing include impacts such as decreasing the fishing areas and affecting the navigation of fishing vessels. They explained that wind farms could coincide with areas of particularly high fish yields leading to loss of fishing opportunities and in fact the cumulative impact on fisheries is significant.

It has also been documented that, the establishment and operation of Marine Protected Areas (MPAs) could potentially lead to conflicts with fisheries (Lopes et al., 2015). Traditional fishing grounds may be set aside as protected areas where fishing activities are curtailed which could lead to different kinds of conflict at different levels. Conflicts also arise regarding interests in the conservation of protected species (Kovacs et al., 2016). There are often conflicts between fisheries and the conservation of endangered species. For example, the conservation and protection of marine mammals which are fish predators may end up in conflict with fisheries
when marine mammals are given priority over fishers in the allocation of fish quotas. These are examined in Ghana.

1.2.2 Brief description of Ghana’s marine fisheries sectors
The marine fishing industry in Ghana has three sectors (Amador et al., 2006) but is broadly categorized into four different fleet types which are the artisanal or small-scale (canoe) fleet, the semi-industrial (inshore) fleet, and the industrial (trawler and tuna) fleet. The small-scale sector is mainly operated by local fishermen from open beaches in coastal fishing communities. In the small-scale sector, locally-built wooden dug-out canoes with outboard motors and different fishing gear types like gillnets, purse seine, beach seine, and hook and line for catching different species of fish are used (Akyempong et al., 2013). The semi-industrial fleet operate from only a few landing sites along the coast that are suitable for bigger locally-built wooden vessels with in-built engines. Trawl nets and purse seine nets are the two main fishing gears used by semi-industrial vessels for catching both high quality demersal fish and pelagic species depending on the season. Industrial trawler fisheries are operated by big fishing companies using foreign-built steel-hulled vessels. Industrial trawlers fish for high quality demersal species by bottom trawling. Industrial tuna vessels (tuna purse seiners and tuna pole and line vessels) target tuna and other tuna-like fish species in far offshore marine waters of the country (Addi et al., 2016). The industrial vessels operate from two main fishing harbours, Tema and Takoradi, where there is appropriate infrastructure. There are fewer numbers of semi-industrial vessels and fishers compared to the small-scale sector while there are also fewer numbers of industrial trawler and tuna vessels compared to semi-industrial vessels. The nature of marine fisheries in Ghana, change and innovations in the fisheries expose the fisheries to different types of conflicts which occur at different levels. These conflicts are described and analyzed in detail in subsequent sections of this thesis.
1.2.3 Nature of marine fisheries conflicts in Ghana
Fishing is the major economic activity in many coastal communities in Ghana. Marine fisheries are predominantly small-scale and constitute a very dynamic and complex system. Several stakeholders including fishermen, fish processors, fish sellers, input providers and institutions are involved in the catching, processing, marketing, governance and management of the fisheries with many interactions at different entry points. According to Charles (1992), conflicts often happen in any bio-socio-economic system that changes continuously like a fishery which is complex and characterized by many interactions among people. Ghana’s marine fisheries comprise an open access small-scale fishery with tens of thousands of fishers and different types of vessels using a variety of fishing gear types which target different species of fish. There are exclusive fishing zones for small-scale fishermen whose fishing operations are enhanced by government subsidies on fuel for their outboard motors and other fishing inputs such as fishing nets. By their nature and domain of operations, marine fisheries are prone to different types of conflicts. The fisheries are also prone to conflicts because most of the fishers are not formally educated and adequately trained in basic maritime operations to have the requisite knowledge and skills to engage in fishing activities in the right manner to reduce the incidence of conflicts. Many of the fishers, particularly small-scale fishers don’t understand and appreciate the justification for the fisheries law and regulations that guide the operations of the industry. Moreover, more people aspire to improve on their living conditions and social status by wearing good clothes, driving good cars, owning houses, among others. There are only a few livelihood options and requisite skills to engage in other lucrative jobs which are lacking. These people count on fishing as the way forward to realizing those dreams and therefore engage in all sorts of fishing malpractices to enhance their catch. Engaging in illegal fishing is an issue that creates different kinds of conflicts in the fisheries.
Currently, there are no offshore wind farms in Ghana’s marine waters, Marine Protected Areas do not exist, there are no cases regarding the conservation and protection of endangered species. Conflicts between marine fisheries in Ghana and other ocean sectors are therefore minimal compared with conflicts within the fisheries. Conflicts within the fisheries can be described as gear, destruction of equipment, spatial, resource use, signaling and navigational, landing sites use, fishing inputs, illegal fishing, location of fertile fishing grounds, catch shares and marketing conflicts. For conflicts between fisheries and other competing industries, those that occur between the fisheries and the oil and gas sectors are found to be the most important in terms of the frequency of occurrence and impact on the fisheries, which therefore deserve special attention as a case study of issues of conflicts between the marine fisheries sector in Ghana and other sectors that operate in the marine environment. Marine fisheries and oil and gas conflicts in Ghana can be described as governance and inter-agency conflicts, spatial, destruction of fishing gear and equipment, siting of onshore oil and gas facilities, restriction on fishing activities and intrusion of exclusive zones conflicts. Laws and other regulatory frameworks exist in Ghana to regulate marine activities including fishing at sea and offshore oil and gas production activities and to reduce potential conflicts. However, challenges with effective enforcement and non-compliance by operators give rise to the occurrence of conflicts.

Analysis of official national marine fish production figures (as presented in chapter three) shows that fish landings have been on a continuous decline since the early 1990s. The decline in catches has been accompanied by significant increases in fishing effort, illegal, unregulated and unreported fishing, as well as lack of effective sector governance which has resulted in the scarcity of fish. Fish scarcity is leading to competition over use between industrial fisheries and small-scale local fisheries and conflicts particularly within the more complex small-scale marine
fisheries sub-sector. Pomeroy et al. (2007) stated that conflicts are a sign of competition for access to fish stocks. Due to high increases in the number of fishing vessels, there is competition for fishing in a limited space previously used by a fewer number of vessels. Fishing vessels fish illegally in zones where they are not permitted to fish. Fishing vessels also compete for space for berthing, loading and offloading at the landing site. High increases in the number of fishers lead to competition for fishing input supplies on land prior to fishing which create conflicts. The use of a variety of fishing gear types by different groups of fishermen and differences in fishing methods cause the destruction of fishing gears and other equipment and create conflicts.

Competition in fishing at sea among groups of fishers leads to the adoption of illegal fishing practices as fishers try to maximize their catch efficiencies by all means possible. This results in conflicts between fishers who obey the law and fish by the legal means and others who engage in illegal fishing. Just as fishers compete to catch fish at sea, fish traders, processors and marketers also compete in the buying and selling of fish at the landing site.

The preamble of the United Nations Convention on the Law of the Sea (UNCLOS) says that “states recognize the desirability of establishing a legal order for the seas and oceans which will promote the peaceful uses of the seas and oceans”. Ghana’s territorial marine waters have multiple uses just as many other coastal states in the world. Fishing activities occur alongside other activities, such as oil and gas production, shipping and transportation in Ghana’s coastal areas and the offshore marine environment. Different stakeholders with different interests interact in different ways, no wonder conflicts tend to occur in the prevailing circumstance. Conflicts between fisheries and other sectors in the marine domain are rare but with the intensification of exploration and production activities of oil and gas, conflict issues between marine fisheries and the oil and gas sectors have become issues of public interest. Fishing in
Ghana’s marine waters occurs alongside the exploration and production of oil and gas. Records indicate that Ghana discovered oil in commercial quantities in 2007 but oil and gas production started in 2010, after which conflicts between marine fisheries and oil and gas operations became a topical issue. Fishing activities are restricted in traditional fishing areas to allow oil and gas operations to function. Fishers are restricted from fishing within 1 km radius around oil and gas installations, and areas of the sea earmarked for oil and gas exploration. Ghana’s marine waters are dissected by oil and gas pipelines, notable among them being the West African Gas Pipeline and the Ghana Gas Pipeline. Fishers are also not allowed to operate close to areas of the sea where there are submarine oil and gas pipelines. Fishers get arrested by security personnel on duty for fishing close to such areas, which is a major conflict issue between fishing industry and oil and gas sector operators.

Besides conflicts within the fisheries and conflicts between the fisheries and the oil and gas sector at the production or community level, conflicts also occur at the national level that involve ocean governance institutions. Ocean governance in Ghana is multi-sectoral in nature where different regulatory bodies (Ministries, Departments and Agencies) are mandated by law to regulate and manage all marine and coastal activities. These institutions have different roles and responsibilities regarding governance of the ocean that are described by different legal documents. Inadequacies in the legal instruments lead to overlaps in roles and responsibilities which create governance and inter-agency conflicts. It is therefore important to have a unified and comprehensive framework for ocean governance in the country that can more effectively manage conflicts over coastal and marine resource use and avoid potential consequences.
1.2.4 Existing and potential consequences of the fisheries conflicts in Ghana

The consequences of conflicts in fisheries have been documented by different people in different ways some of which describe that, conflicts can be an important hindrance to economic and social development because they have the potential to destroy the institutions that are critical for development (Bennett, 2000; Bennett et al., 2001). Tropical fisheries conflicts can bring difficult conditions for pro-poor people because fisheries play a prominent socio-economic role in tropical countries. This is an undisputed fact which is rightly supported by the importance of marine fisheries in Ghana. As indicated above, conflicts occur within Ghana’s marine fisheries, and also, between marine fisheries and the oil and gas sector at the community, governance and inter-agency levels. Pomeroy et al. (2007) state that effective fishery resource conflicts management and resolution are needed for the long-term sustainability and short-term economic feasibility of the fisheries and that, minimizing conflicts in fisheries improves food security. Lack of adequate management of the conflicts will lead to increased levels of resource competition and resource degradation, destruction of property and loss of human life. Failing to manage the conflicts in the fisheries in Ghana exposes the fisheries to the consequences enumerated by Pomeroy et al. (2007). Conflicts involving individual fishers that may seem simple may become complex in fishing communities to involve families that can cause social unrest. High incidence of conflicts in Ghana’s fishing territory may drive fishers away to fish in other areas of less or no conflicts to conduct their fishing business which will lead to loss of fishing opportunities in areas of conflicts. Potential investors are not likely to invest in fisheries in areas of competition and conflicts among players in the industry. Local incomes and government revenues from fishing will be severely impacted in the process. The prevalence of these conflicts must therefore be a major fisheries management concern. Policy makers and other fisheries stakeholders must work together to more effectively manage the conflicts in order to
protect the long-term sustainability of Ghana’s fishing industry. Improved management of the conflicts in the fisheries will ensure fish food and nutrition security not only in coastal communities but in the whole of Ghana and beyond, the sustenance of fish-related incomes, livelihoods and employment opportunities and improve fisheries and human development.

Effective management of conflicts in marine fisheries is currently lacking in the country. A sound understanding of the nature of the conflicts and their underlying causes is required in order to improve upon how the conflicts are currently managed. The nature of the conflicts and the underlying causes of the conflicts must be identified and well analyzed through extensive research to generate the requisite information and knowledge required for improved management. Much work on marine fisheries research has been done in Ghana but none of them fully focuses on providing in-depth understanding of the issues of conflicts within marine fisheries, conflicts between marine fisheries and the oil and gas sector, as well as governance and inter-agency conflicts. Existing fisheries management and policy documents in Ghana (for example Ghana’s Marine Fisheries Management Plan 2015-2019) emphasize on the management of some of the issues related to conflicts in the fisheries but none of them clearly identifies types and causes of conflicts in the fisheries and their management mechanisms.

This research focuses on identification and analysis of existing and emerging issues of conflict in the marine fisheries of Ghana and proposes solutions for redress. It gives an account of the analysis of the nature of the conflicts, analysis of effectiveness of their existing management mechanisms and puts forward proposals for improving the management of the conflicts in a more efficient manner. The findings from the research are documented in this thesis.

1.3 PROBLEM STATEMENT
The research was based on the following problem statements:
1. There has been a stagnation of Ghana’s total fish production and a continuous decline in small pelagic catches over the last two decades leading to fish scarcity, competition in fishing and conflicts within the fisheries;

2. In addition to conflicts within marine fisheries, offshore oil and gas production and exploration activities also create more conflicts with the fisheries;

3. There is lack of information and knowledge required for developing a comprehensive framework for managing marine fisheries conflicts in Ghana; and

4. Lack of comprehensive framework for fisheries conflicts management threatens the sustainability of the marine fishing industry and fish food security in Ghana.

These problems are reflected in the objectives of the research.

1.4 AIM AND OBJECTIVES OF THE RESEARCH
The purpose of this research was to contribute to the data needs, information and knowledge required for understanding and managing conflicts within marine fisheries and conflicts between marine fisheries and key ocean sectors like the oil and gas sector in Ghana. The aim of the research is to develop in-depth understanding of existing and emerging conflicts within Ghana’s marine fisheries sectors and conflicts between marine fisheries and the oil and gas sector. Consequences of the conflicts are analyzed, the effectiveness of their existing management mechanisms is assessed, in order to make recommendations and suggestions for improving the management of the conflicts. The objectives of the research are to:

1. Review the recent history and the current state of Ghana’s marine fisheries including production trends of commercially important fish stocks;

2. Identify and analyze the causes of the decline in marine fish production in Ghana and the implications for the decline;
3. Identify and analyze the types of existing and emerging conflicts within marine fisheries sectors in Ghana, conflicts between marine fisheries and the oil and gas sector, the causes of the conflicts, and the consequences of the conflicts; and

4. Generate information and knowledge required for developing a comprehensive framework for improved management of conflicts in marine fisheries in Ghana.

These objectives guide a range of hypotheses in the thesis.

1.5 RESEARCH HYPOTHESES
The research was based on the following hypotheses:

1. Overfishing is causing a decline in marine fish production in Ghana which has resulted in increased competition and conflicts within the fisheries;

2. Conflicts within Ghana’s marine fisheries sector and conflicts between marine fisheries and the oil and gas sector undermine fish food security in Ghana; and

3. Marine fisheries conflicts management systems in Ghana are weak and ineffective in managing conflicts within fisheries and conflicts between marine fisheries and the oil and gas industry.

So combining the above hypotheses, key research questions can be proposed.

1.6 RESEARCH QUESTIONS
The research was based on the following research questions:

1. How have the catches of commercially important marine fish stocks changed over time and what is the current state of the fisheries in Ghana?

2. Are there any declines in marine fish production in Ghana and how should possible declines be addressed?

3. Are possible fish declines leading to conflicts within the fisheries?
4. Are there conflicts between marine fisheries and other ocean sectors in Ghana?

5. What are the types, characteristics and causes of conflicts within marine fisheries and conflicts between marine fisheries and other sectors in Ghana? ;

6. What are the consequences of the conflicts within marine fisheries and conflicts between the fisheries and other ocean sectors?

7. Are there existing frameworks for managing conflicts within marine fisheries and conflicts between the fisheries and other ocean sectors in Ghana and are they adequate? ; and

8. How should these conflicts be more effectively managed, and what are the impacts of current policies on the management of marine fisheries conflicts in Ghana?

The research questions are addressed by the methods described below.

1.7 RESEARCH METHODOLOGY
The research used a qualitative methodology which reflects the unquantifiable nature of fisheries conflict issues. The research was descriptively quantitative where data was available, but primarily qualitative. Primary sources of data and information were local ecological knowledge provided by fishers and fishing community leaders and work experience knowledge provided by fisheries experts in Ghanaian fisheries management institutions through conversations. Local ecological knowledge has been defined by Charnley et al. (2008) as knowledge, practices, and beliefs regarding ecological relationships that are gained through extensive personal observation of and interaction with local ecosystems, and shared among local resource users. Fieldwork in the form of direct observation, and conversations with fishers were conducted in major fishing villages and landing sites across the coast of Ghana throughout 2013 and 2014. Secondary data (fish catch and effort data, official fisheries records and documents) were collected from the
Ghana Fisheries Commission and analysed. Data and relevant information for the research was also collected by participating in fisheries meetings at different levels. Therefore, the methods used in the collection of data and information were review and analysis of official marine fisheries and oil and gas records and documents, direct observations, conversations with fishers, the collection and analysis of fisheries catch and effort data, and participation in stakeholder meetings as outlined below.

1.7.1 Review and analysis of official marine fisheries and oil and gas documents
One important method employed to gather data and information for this research was the review and analysis of official fisheries and oil and gas documents. Some of the documents collected for review and analysis include Ghana’s Fisheries Law, Fisheries Regulations, National Fisheries and Aquaculture Policy, Ghana’s Marine Fisheries Management Plan, Ghana National Aquaculture Development Plan, Tullow Oil Ghana Limited Jubilee Field Public Consultation and Disclosure Plan (PCDP) 2013 as well as project documents and reports. Such documents were collected from government agencies, universities and other research institutions and private organizations. Extensive desk-based online search and review of international literature on fisheries conflicts, natural resource use conflicts, governance and management within fisheries as well as literature on fisheries and oil and gas interactions was conducted. These included books, thesis dissertations, presentations, meeting proceedings and other reports. Materials including published articles from international journals were also examined.

1.7.2 Direct observations and conversations with fisheries and oil and gas stakeholders
Direct observations of fishing activities (types of fishing vessels, fishing gears and fish catching techniques) and conversations with fishers in fishing communities and landing sites were conducted to have an impression of the types of interactions among fishers along the fish value chain and how conflicts arise from those interactions. This was also to collect first-hand
information from fishers on their perceptions about the recent past, current state and the future of Ghana’s marine fisheries. Direct observations and conversations were held in both high and low fishing seasons to get an impression of fishing activities all year round. Different conversations were held with community leaders, fishermen, fishmongers, fish processors and boat owners. Conversations were also held with representatives of fisheries arbitration committees, fisheries experts of the Fisheries Commission in fishing communities and at the national level as well as experts in fisheries research institutions. To get an impression of the existing and emerging conflicts between fisheries and the oil and gas sector, conversations were held with stakeholders in coastal communities in the Western Region of Ghana, where the impacts of oil and gas production activities on fisheries are more visible. During conversation processes, detailed notes were taken and later processed and analyzed.

1.7.3 Collection and analysis of national fisheries catch and effort data
In order to have a clear picture of trends in marine fish catches and changes in fishing effort, raw data on annual fish production estimates were collected from the Fisheries Commission, compiled and analyzed. These have been presented in the form of graphs in chapter three. There are challenges with national marine fisheries data systems as have been identified by (Mills et al., 2010; Ministry of Food and Agriculture, 2011; Nunoo and Asiedu, 2013; FAO, 2014; Nunoo et al., 2014). Nunoo et al. (2014) for instance reported that national marine fisheries data is incomplete and substantially under-reported. This presents some doubts about the quality of the data collected by the Marine Fisheries Research Division but overall, the data is a reflection of the status of fisheries in Ghana. Official data reported to the Food and Agriculture Organization (FAO) shows a decline in catch due to over-exploitation of stocks. Therefore, despite the challenges, the quality of the data is high, representing a good snapshot of the biological and economic conditions associated with the fisheries. FAO (2014) also states that the fisheries data
is mainly limited to total catch information and effort which is not always available. Biological information including length composition is almost nonexistent. The work involved in developing annual and time series data partially explains why there are few other studies reporting Ghana’s fisheries data.

The Marine Fisheries Research Division occasionally conducts surveys (canoe frame surveys) on small-scale marine fisheries in Ghana to determine existing canoe numbers, types of fishing gears, number of existing canoe fishermen and socio-economic issues in the fisheries. The latest of such surveys was conducted in 2013. In order to have the most current and detailed information on the small-scale marine fisheries sector, the 2013 canoe frame survey report was also collected from the Fisheries Commission and analyzed to show how parameters such as number of fishing boats, crew members and fish catch have changed over time. Findings from the canoe survey report were also compared with the information gathered from fishers through conversations.

1.7.4 Fisheries stakeholder consultation meetings and workshops
During the data and information gathering process, a lot of useful information was collected and analyzed by participating in fisheries stakeholder meetings at community, regional and national levels. Information was also gathered by participating in national fisheries dialogue workshops involving wide range of fisheries and oil and gas stakeholders including government and non-governmental officials, international donor organizations, civil society organizations (CSOs), research institutions, and national fisheries associations. Useful information on fisheries and oil and gas conflicts was also obtained by participating in meetings of the national-level platform for fisheries and oil and gas interactions. Fisheries and oil and gas seminars, workshops and
conferences were also some of the avenues used for more information gathering. These different methodologies will be applied to different issues in this thesis.

1.8 THESIS PRESENTATION OUTLINE
This thesis has been organized into seven chapters. An introduction to the research, the background, significance and justification for the research, aim and objectives, hypotheses, problem statements, research questions and the research methodology are presented in chapter one. Theoretical perspectives on fisheries conflicts globally as a background for the analysis of fisheries conflicts in Ghana in subsequent chapters are presented in chapter two. A current review of Ghana’s marine fisheries is presented in chapter three as an understanding of the issues which drive conflicts in the fisheries and to set the stage for an analysis of conflicts within the fisheries (internal fisheries conflicts) in chapter four. Chapter five focuses on the analysis of conflicts between fisheries and the oil and gas sector (external fisheries conflicts) to fully understand the nature of the conflicts between the two sectors. Chapter six contains comprehensive analyses and discussion of the findings presented in the previous chapters, and chapter seven summarizes the conclusions drawn from the analyses of the issues as well as conclusion of the thesis including a review of the research undertaken, its significance and contribution to knowledge, and recommendations for marine fisheries policy formulation and further research.

1.9 CONCLUSION
The review of the literature on marine fisheries concludes that global marine fish production is on the decline leading to fish scarcity, competition and conflicts in fisheries as numbers of people engaged in fishing and related activities, particularly in developing countries, have continued to increase. The conflicts in marine fisheries in Ghana due to high increases in number of fishers and decline in fish catches are a good example. Different types of conflicts occur at
different levels within marine fisheries in Ghana and between marine fisheries and other competing sectors of the ocean, notably the offshore oil and gas sector. The prevalence of these conflicts threatens fish food security, employment, income generation and other goods and services derived from marine fisheries in Ghana which support the livelihoods of tens of thousands of rural poor people. For these rural poor people to continue to cope with life and also for the Government of Ghana to ensure progress towards the realisation of the Sustainable Development Goals (SDGs) by 2030 and beyond, and to achieve the first Millennium Development Goal of eradicating extreme poverty and hunger, it is crucial that conflicts in the fisheries are well managed. Science-based management of the conflicts should be a top priority.

This research uses mixed methods as described above to explore the types and causes of marine fisheries conflicts in Ghana, the consequences of the conflicts and analyzes the adequacy and effectiveness of their existing management mechanisms. It aims to generate information and knowledge which are critical for improving marine fisheries conflicts management in Ghana. Conflict issues are identified, analysed and presented in the context of fisheries in Ghana. The findings of this research are documented in this thesis. This thesis is expected to serve as a reference document for teaching, learning and research in marine fisheries and also as a guide for the formulation of marine fisheries policy and advice in Ghana. The next chapter of this thesis examines the literature on marine fisheries and natural resource use conflicts, which will provide a comprehensive background for the conflict issues associated with marine fisheries in Ghana, which will be addressed in later chapters of the thesis.
CHAPTER TWO

2.0 THEORY OF MARINE FISHERIES CONFLICTS

2.1 INTRODUCTION
For the purpose of having a sound knowledge of conflicts in Ghana’s marine fisheries, underlying causes of the conflicts and to propose appropriate mechanisms for managing the conflicts, it is important to know why conflicts occur in fisheries and also what drives fisheries stakeholders to conflicts. To determine why marine fisheries are prone to conflicts globally, the types of conflicts that occur in marine fisheries at different levels, driving factors of the conflicts and mechanisms for managing conflicts at different levels worldwide, available literature was consulted to gain knowledge on marine fisheries conflicts pertaining in different areas. The purpose of this chapter is to present findings from the consultations with literature in order to gain insights into theoretical perspectives of marine fisheries conflicts worldwide. Definitions of conflicts in the common sense, and conflicts in marine fisheries to be specific, have been provided in this chapter based on findings. The chapter also provides insights into theoretical perspectives of natural resource use conflicts related to fisheries resource use conflicts, conflicts within fisheries, conflicts between fisheries and other sectors and conflict management strategies.

2.2 DEFINITIONS OF CONFLICT
Thinking about conflicts in theoretical terms only became a recognized field of scholarship after the Second World War. In recent decades, many theories such as game theory, coalition theory, structural theory, Marxist theory, International Capitalist theory, Economic theory, Realist theory, Biological theory and Psychological theory have emerged to describe the phenomenon of
conflict that is so much a part of human life\textsuperscript{2}. In the literature, the phenomenon of conflict is defined differently by many scholars based on context, the nature and type of the conflicts. Sandole \textit{et al.} (2009) say that conflict is part of the social integration process and that in social life, everything can be conflicting. This is particularly true for marine fisheries in Ghana. Issues with access and exploitation, management and conservation have been found to be conflicting, emphasizing the need for meaningful conflict management and resolution. According to Oberschall (1978), social conflicts can be defined as the demonstration of open antagonism between different actors concerning specific challenges. Conflicts are a characteristic of human society and emerge in many forms (Ramsbotham \textit{et al.}, 2011). It is no wonder that conflicts occur in marine fisheries in Ghana, which can be described as a human society with many interactions. Daniels and Walker (2001) define conflict in its broadest sense as an incompatibility involving issues, parties, processes and outcomes. Conflicts in marine fisheries in Ghana have been found to arise due to mismatch objectives regarding issues and processes. Diets \textit{et al.} (2006) define conflict as the incompatibility of subject positions. Conflict is also defined as a struggle or contest between people with opposing needs, ideas, beliefs, values, or goals\textsuperscript{3}. Vestergaard \textit{et al.} (2011) describe conflicts as disagreements that lead to tension within and between people such as those that are found within fishers and between fishers and managers in Ghana. The disagreement concerns the issue, whereas the tension leads to the relation. This suggests that conflict always has the duality of dealing with both an issue and a relation which therefore means that effective conflict resolution must address both issue and relation. In the context of fisheries, conflicts have been described (FAO, 1998; Bennett \textit{et al.}, 2001) to be a

\textsuperscript{2} http://pjp-eu.coe.int/documents/1017981/7110680/3-Understandingconflict.pdf/0f63c846-6942-4e8f-83c0-3626f2f73dfa (Accessed on 20th May 2016, 9:30 a.m. GMT).

situation of non-cooperation between parties with contradictory objectives. Some of the wider multiple sea-use literature in the 1990s sets a background to multi-sectoral issues (Smith and Vallega, 1991; Vallega, 1992; Smith and Vallega, 2002). However, conflicts can be more than the consequences of sharing marine spaces.

Glasl (1999) is of the opinion that, conflicts come about as a result of individual differences but conflict only happens if a person feels weaker from the acts of another person due to these differences. Conflicts between small-scale and industrial fishers in Ghana basically are due to the differences between the two sectors and the fact that small-scale fishers consider themselves as a smaller player in the system. Schmid (1998) opined that conflict emerges when two or more parties believe that their interests are incompatible. FAO (1998) explained that conflict appears when the interests of two or more parties clash and one party tries to assert its interests at the expense of another party’s interests. This is a major issue that drives conflicts in marine fisheries in Ghana. The extent to which the parties are seen to assert their interests at the expense of others can be influenced by disagreement amongst parties (Alston et al., 2000). Jehn (1997) states that conflicts become more challenging when they involve larger numbers of people. In the context of marine fisheries in Ghana, conflicts may have serious consequences and management can become difficult as a result of the large numbers of fishers involved in the small-scale fisheries sector.

Parola and Maugeri (2013) explained the phenomenon of conflict based on the game theory by referring to the fact that conflicts may be perceived in terms of zero-sum games when conflicts result in a situation in which a participant's gain is equivalent to the loss of the other participant. There are also negative-sum conflicts, when an opponent's gain is smaller than the loss of the other. Some types of conflicts evoke the positive-sum game, in which all opponents can profit,
but not equally. Eatwell et al. (1989) define game theory as a tool for explaining and analyzing problems of strategic interaction. Game theory dwells on mathematics to describe player strategies in sources of conflict and common interest, and predicts what rational players should do, and not what they actually do. It concerns the strategies decision makers choose to maximize their outcome in a given situation (Luce and Raiffa, 1957). This is likened to the strategies fishers adopt in the exploitation of the resource and management decision making options by fisheries managers.

Game theory is particularly applicable to the study of resource management, as many of the world’s natural resources are common pool in nature (Sumaila, 1999). The issues of fisheries management are embedded in the game-theoretic framework as fishers and/or managers seek to maximize the benefits from a given fishery. Game theory can offer insights into the challenges of achieving cooperative fisheries management (Bailey et al., 2010). It is applicable in fisheries to understand why fishers may be driven to adopt strategies that seem to be irrational (Kaitala and Lindroos, 2007). Munro (1979) was the first to analyse fisheries in the context of the game theory. He had an opinion that a joint approach by coastal states is required to manage transboundary fish stocks and as such, he applied the theory of bargaining, or cooperative games, to the problem. Levhari and Mirman (1980) highlight two important game-theoretic features of fisheries management and explain that the underlying fish stock is affected by both fishery players’ decisions; and that each player must take into account the other players’ actions. Clark (1980) applied the game theory to restricted access fisheries and showed that, for a limited entry system with at least two players, the competitive (or non-cooperative) game results in overfishing. Drawing on the game theory, the decisions that fisheries players make, the strategies they use and the competitive games they play potentially end up in conflict and cooperation in
fisheries. This is seen in the conflict between commercial handline and inshore bottom trawl fisheries on the eastern Agulhas Bank off the southern Cape coast of South Africa (Visser, 2015). These are explained in more detail in the next section.

2.3 THEORETICAL PERSPECTIVES OF NATURAL RESOURCE CONFLICTS
Natural resource conflicts have been given significant research attention in recent years (Castro and Nielsen, 2001), but only a few of the literature on natural resource conflicts focus on conflicts over fisheries resources (for example Charles, 1992; Bennett, 2000; Bennett et al., 2001; Wilson, 2003; DuBois and Zografos 2012). Review of the literature shows that conflicts regarding the utilization and management of fisheries resources are similar in nature to other natural resource conflicts in general. Since the literature on conflicts over fisheries resources are few, theoretical perspectives on natural resource conflicts in general is needed to support available information and knowledge on conflicts in fisheries.

According to Homer-Dixon and Blitt (1998), natural resources can become increasingly scarce due to environmental change, increase in demand, and their unequal distribution. FAO (2005) states that the scarcity of a natural resource determines how access to resources could become contested. As the supply of natural resources diminishes or the demand for them increases, resource competition increases and the likelihood for the generation of conflict also increases (Turner, 2004). Data and information on marine fisheries in Ghana suggest that fish is now a scarce commodity. Fish is exploited by the industrial, semi-industrial and the small-scale sectors of the industry and by different ethnic groups who have different interests. Industrial fishers have more power to influence fisheries decisions than small-scale fishers, the small-scale sector in particular relies heavily on the resource and there is lack of access to alternative sources of livelihood. These determine the level of competition and conflicts associated with the fisheries.
Generally, natural resources are increasingly being characterized by intense competition which serves as an incentive for people to over-exploit them. Natural resources often are shared among users with different interests, which often create conflict (FAO, 2005). Competition for limited resources, different beliefs and institutional factors can cause conflicts over natural resources (Homer-Dixon, 1994; Germain and Floyd, 1999; Hellstrom, 2001). Resource use conflicts are common in coastal areas because of competition, conflicting uses and multiple stakeholders associated with these ecosystems (Buckles and Rusnak, 1999; World Bank, 2000).

According to Mohamed and Ventura (2000), conflict over natural resources can be a result of disputes within one or among several communities. Suliman (1999) says that conflicts over natural resources can take place at a variety of levels, from local, regional and global scales. Resource conflicts can result in violence, resource degradation and the undermining of livelihoods. Even though conflicts may have negative effects they may also work as a medium for social change (Castro and Nielsen, 2001; Yasmi et al., 2006).

2.4 THEORETICAL PERSPECTIVES OF FISHERIES CONFLICTS

This thesis is situated within the theoretical context of fisheries conflicts. This section examines theoretical perspectives of conflicts within marine fisheries, conflicts between marine fisheries and other sectors as well as theory of marine fisheries conflict management. These are then applied within the context of marine fisheries conflicts in Ghana.

2.4.1 Theory of conflicts within marine fisheries
Historically, land and water use conflicts and wars have been characteristic of human life. Fisheries conflicts have been found to be also common but have been less discussed (Pomeroy et al., 2007). The utilization of ocean resources has been characterized with conflict since the early part of the 20th century (Castro and Nielsen, 2001). Conflict in fisheries is a common occurrence
when different kinds of stakeholders interact (Stevenson and Tissot, 2013). Conflicts happen when the interactions among the different stakeholders are in disagreement with one another (Mursheed-e-Jahana et al., 2009; Salayo et al., 2006).

Marine fisheries management is particularly difficult because of social, legal, political, economic, technological and biological reasons. One overriding factor which has impeded the rational management of fisheries is their status as a common property resource (Mitchell and King, 1984). Traditionally, fishing has been a common property resource with open access to anyone who wanted to exploit it (Blake and Campbell, 2007). Fisheries resources, or at least the oceanic ones, have continued to be regarded predominantly as common property (Kearney, 2001). Open access results in increases in number people utilizing a common-pool resource, thereby flouting the rules that safe-guard the long-term sustainability of the resources (Wilson, 2006; Defeo et al., 2007; Gutberlet et al., 2007).

The growing scarcity of fishery resources, due mainly to increases in fishing effort, overfishing and user competition is a big global challenge (Garcia and Moreno, 2001). Currently, it is widely agreed that most of the fisheries in developing countries are overfished. As a result, the fisheries are presently plunged with higher degrees of conflict which threatens their long-term sustainability (Williams, 1996). Coastal fisheries over the world have been overfished which has ended up in the dwindling or collapse of important fish stocks, creating increased levels of conflict among competing resource user groups (Pomeroy et al., 2016; Pauly, 1990). Increased fishing pressure results in increased resource competition. This forces fishery resource users to engage in unsustainable fishing practices which further reduces the few remaining fish stocks. These contribute to more increased user competition, and higher degrees of conflict (Pomeroy et al., 2007).
When fish become scarce because of increased fishing pressure, user competition increases in fertile fishing grounds (Baker, 2000). Conflicts occur over access to the most valued fishing grounds which aggravate as populations go up (Pauly, 1990). The competition for resources can result in either cooperative or conflictual responses (Tiller et al. 2012). Conflicts can precipitate positive change. They act as means for interactive engagements within communities. They shape the specific roles and responsibilities of informal and formal institutions in managing change (Murshed-e-Jahana et al., 2009). Conflicts in fisheries may start at any levels such as the local level, the district level or the national level and can transform into violence when no appropriate strategic management mechanisms are present (Murshed-e-Jahana et al., 2009).

According to Charles (1992), conflicts in fisheries can be grouped as in Table 2.1 below:

<table>
<thead>
<tr>
<th>Jurisdiction</th>
<th>Management mechanisms</th>
<th>Internal allocation</th>
<th>External allocation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conflicts over who owns and controls access to what;</td>
<td>Conflicts over how policy is carried out</td>
<td>Conflicts resulting from how different fishery stakeholders interact</td>
<td>Conflicts resulting from how fishery groups and other sectors’ activities interact</td>
</tr>
</tbody>
</table>

Charles (1992) explains that fisheries that are characterized with lower degrees of conflict are those where a high degree of harmony has been reached among all stakeholders over the objective of the fishery. To understand why fisheries conflicts happen and to determine the factors that plunge resource users to conflicts, Charles (1992) further developed a framework for analyzing conflicts by describing three fishery paradigms which are conservation, rationalization and social paradigms as shown in Figure 2.1.
Figure 2.1: Framework for understanding and resolving conflicts according to Charles (1992).

Charles (1992) explained that these paradigms and the policy direction which guide a fishery are responsible for conflicts in the fisheries. The corners of the triangle in Figure 2.1 represent the extreme cases of the paradigms and their different policy objectives. The policy objective of the conservation paradigm is to protect exploited fish stocks. To save fish stock fishing fleet must be controlled. The first four key objectives of the Marine Fisheries Management Plan of Ghana (2015 – 2019) conform with the conservation paradigm described by Charles (1992) and they read as follows:

i. To reduce the excessive pressure on fish stocks;

ii. To ensure that fish stocks within the marine waters of Ghana are exploited within biologically acceptable levels;
iii. To ensure that effective fisheries legislation is implemented to protect the nation’s fish resources; and

iv. To protect marine habitats and biodiversity.

The sixth target of the Republic of Ghana Fisheries and Aquaculture Sector Development Plan (2011 – 2016) also conforms with the conservation paradigm described by Charles (1992) and reads as follows:

i. Developing fisheries management to allow effective control of all commercial fishing effort in Ghanaian waters.

The rationalization paradigm stresses the pursuit of economic performance and increased wealth in the fishery. The policy objective of this paradigm is based on the assumption that, society should maximize fishery rents. Key objective five of the Marine Fisheries Management Plan of Ghana (2015 – 2019) conforms with the rationalization paradigm described by Charles (1992) and it reads as follows:

i. To contribute to enhancing export opportunities and strengthening value addition.

The second and third targets of the Republic of Ghana Fisheries and Aquaculture Sector Development Plan (2011 – 2016) also conform with the rationalization paradigm described by Charles (1992) and read as follows:

i. Increasing revenue and profitability in capture fisheries by at least US$50 million per year.
The social paradigm focuses on fishers as members of coastal communities and their welfare rather than as components of a fishing fleet. The sixth key objective of the Marine Fisheries Management Plan of Ghana (2015 – 2019) conforms with the social paradigm described by Charles (1992) and it reads as follows:

i. To strengthen participatory decision making in fisheries management (co-management).

But it appears as if none of the targets of the Republic of Ghana Fisheries and Aquaculture Sector Development Plan (2011 – 2016) conforms with the social paradigm described by Charles (1992).

Since all the three paradigms described by Charles (1992) appear in Ghana’s fisheries policy documents, it could be concluded that the framework for analyzing conflicts developed by Charles (1992) is therefore suitable for analyzing marine fisheries governance and management conflicts in Ghana. These are applied in the analysis of conflicts in subsequent chapters of the thesis.

Warner (2000) also described four matters that may be responsible for the generation of conflict:

i. Demographic change;
ii. Natural resource competition;
iii. Developmental pressures; and
iv. Structural injustices.

The typology of conflicts developed by Charles (1992) as presented in Table 2.1 looked inadequate in summarizing the key factors of fisheries conflicts identified through literature review. Bennett et al. (2001) modified the typology developed by Charles (1992) into five
conflict categories as in Table 2.2 to include relationship between fishers and non-fishery issues such as politics, which appeared to be more suitable for summarizing the key factors of fisheries conflicts identified through literature review. It must be emphasized, however, that the first four categories of conflicts by Bennett et al. (2001) are similar to those of Charles (1992). This is clear from comparisons between Table 2.1 and Table 2.2. For these reasons, therefore, the typology of conflicts according to Bennett et al., (2001) was adopted to summarize and describe the types of fisheries conflicts prevailing in Ghana.

Table 2.2: Typology of fisheries conflicts according to Bennett et al. (2001)

<table>
<thead>
<tr>
<th>Type I</th>
<th>Type II</th>
<th>Type III Relations between fishery users</th>
<th>Type IV Relations between fishers and other users of the aquatic environment</th>
<th>Type V Relationship between fishers and non-fishery issues</th>
</tr>
</thead>
<tbody>
<tr>
<td>Who controls the fishery</td>
<td>How the fishery is controlled</td>
<td>e.g. Issues between different groups, issues between different scales of users</td>
<td>e.g. Issues with tourism, conservation and industrial development</td>
<td>e.g. Issues over the environment, politics, economic change</td>
</tr>
<tr>
<td>e.g. Access issues</td>
<td>e.g. Enforcement issues, quota allocation issues, co-management issues</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2.4.2 Perspectives of conflicts between marine fisheries and other sectors

The increasing diversity of activities in the maritime domain promote potential use conflicts. Users may have overlapping claims to spaces or resources, or their activities may have adverse effects on other stakeholders. Hence, there is the need for management solutions that can meet the challenge of conflicts between different forms of use (Arbo and Thuy, 2016). New sea uses exerts more pressure on coastal and marine ecosystems which elucidates the need to combine
multiple uses and societal requirements within a given sea area (Kannen, 2014). In developing countries, multiple-use conflicts are exacerbated by their often rapid and uncontrolled economic growth (Prestrelo and Vianna, 2016). Coastal areas attract a variety of interests and activities within a limited space which can lead to issues in sea-use between different sectors (Smith and Vallega, 1991; Vallega, 1992; Smith and Vallega, 2002). More stakeholders are involved in the use of coastal resources than in other non-coastal places. This makes the stakes higher and perhaps conflicts more intense (Bramati et al., 2014). Many more activities are expected to join traditional uses of the ocean such as fisheries in the future (Johnson et al., 2013). This raises concerns about their coexistence with traditional uses of the sea which needs to be regulated in order to ensure safety at sea as well as an orderly development to balance the conflicting interests of all ocean users. (Wahiche, 1983).

The development of offshore energy resources involves highly complex processes that take place in the ocean and so are their effects on wildlife and the environment (Bolze and Lee, 1989). The probability of conflict between the fishing and the offshore oil interests in any part of the world is bound to be great (Grant, 1978). Efforts to mitigate negative effects of the development of offshore oil and gas operations on the fishing industry have been made with mixed results (Cicin-Sain and Tiddens, 1989). Small-scale fisheries are the most vulnerable to multiple-use conflicts (Prestrelo and Vianna, 2016). Small-scale fisheries face considerable problems and many developing countries are incapable of managing multiple-use conflicts (Andrew et al., 2007). There has been discussion in the literature about marine conflict management.

2.4.3 Perspectives of marine fisheries conflicts management
According to Bloomfield and Reilly (1998), conflict management is the constructive handling of difference and divergence. Rather than seeking to avoid conflict, efforts should instead be put on
the effective management of conflicts (Buckles, 1999; Yasmi et al., 2006). Sound and robust conflict management approaches are required to minimize the negative consequences of conflict. These require a good understanding of the underlying causes and impacts of conflict (Yasmi, 2003; Druckman, 2005; Gritten et al., 2009). Communication between stakeholders is a key important activity for understanding, resolving and managing conflicts (Murshed-e-Jahana et al., 2009). Understanding the institutional structures that mould conflicts and their management is necessary for understanding why conflicts happen and can also help in constituting management mechanisms to resolve the conflicts (Bennett et al., 2001). Glasl (1999) suggests that conflict management strategies should be based on conflict intensity. Understanding escalation helps people anticipate and manage conflict constructively. Trust is at the core of conflict resolution (Marcus, 2006). When parties trust each other they can more easily resolve conflicts but when they do not trust each other, their resolution is more difficult (Lewicki, 2006). Social, economic and political aspects of conflicts also need to be taken into account when analyzing and resolving conflicts (O’Rourke, 2014). Techniques for reducing conflicts in marine resource use arising from development of seabed hydrocarbons include multiple-use ocean planning, buffer zones, coordinating planning and permit processes, and providing compensation for unavoidable conflicts (Hildreth, 1989). Many conflicts are solved through arbitration (Gray et al., 2007; Grewal and Darlow, 2007). Stakeholder analysis is also a central theme in conflict management (Ramirez, 1999). Stakeholder analysis identifies the key actors in the system and assesses their respective interests in that system (Grimble and Chan, 1995).

In the literature on conflict management, Blake and Mouton (1964) theoretically describe five styles of conflict management in a framework referred to as the managerial grid. They proposed that the styles varied on two dimensions - concern for people and concern for production. People
are classified into the five styles on the basis of which of the five two-dimensional locations in the grid they psychologically occupy. Blake and Mouton (1964) define the respective styles as follows: avoiding, accommodating, compromising, competing, and collaborating. Van de Vliert and Kabanoff (1990) viewed the managerial grid as a scientific theory. They were of the view that, Blake and Mouton (1964) did not interpret the styles as simple additive combinations of people and production dimensions. Instead, they viewed each style as a distinctly different compound resulting from an interaction of the two underlying dimensions. Warner (2000) identified five strategies for managing conflicts; force, withdrawal, accommodation, compromise and consensus. He describes that conflict can be managed through force, where one party has the means and inclination to win regardless of whether the other party losses, and whether or not the process of winning causes damage to personal relationships. He explains further that the use of force largely depends upon the power that one party holds relative to another. He classifies withdrawal is an approach to conflict management suited to those parties whose desire to avoid confrontation outweighs the goals they are trying to achieve and that withdrawal can be used as a threat to force reluctant and sometimes more powerful parties to negotiate in a more consensual fashion. A party may elect to accommodate the other parties’ goals, conceding to all or most of their demands. Warner says this happens when one party in a conflict situation values a strong and continuing relationship with one or more of the other parties above the attainment of its own specific goals. According to the conflict management strategies by Warner (2000), compromise means that at least one of the parties perceives that it has had to forgo something while consensus-building seeks to achieve a ‘win-win’ outcome.

2.5 CONCLUSION
This chapter has provided theoretical perspectives of marine fisheries conflicts including different definitions of conflicts in general, conflicts with the use of natural resources and
conflicts in fisheries to be precise as well as multiple sea-use conflicts. The available literature suggests that conflicts are characteristic of human society including fisheries systems and emerge in many forms. Some insights into why conflicts occur in fisheries and what drives fishers and other stakeholders into conflicts globally have also been provided. An important lesson learned from the literature on fisheries conflicts globally is that instead of trying to avoid conflict in fisheries, more emphasis should be placed on their effective management. These provide the basis for analyzing the different types of marine fisheries conflicts in Ghana, which are described in chapter four, the causes of the conflicts, how the conflicts are currently being managed and to suggest more effective mechanisms for improving on the management of the conflicts. In the next chapter, fisheries in Ghana are described to give a background to the national fisheries resources, their utilization and the conflicts associated with their use.
CHAPTER THREE

3.0 THE MARINE FISHERIES SECTOR IN GHANA

3.1 INTRODUCTION
To effectively analyze conflicts in Ghana’s marine fisheries, it will be worthwhile to, first of all, have a good knowledge of the nature of the fisheries and how the system operates. This chapter provides documentation based on an account of the fisheries and an analysis of the history and the current state of exploited stocks. An analysis of the fisheries and the exploitation rates of the most common marine fishes from a data and research point of view is given, and from the point of view of fishers. This gives a fair assessment of the state of the fish resources and their implications. This is then related to the conflict scenario to provide the knowledge on the types of conflicts within the fisheries and as well as the types of conflicts between the fisheries and other sectors, the reasons why conflict happen, the causes and the consequences of the conflicts, the components and the different actors involved as well as the levels at which the conflicts take place.

3.2 OVERVIEW OF THE MARINE FISHERIES SECTOR IN GHANA
Marine fisheries have been the most important aspect of fishing in Ghana in terms of fish landings, accounting for over 80% of total fish catch (Amador et al., 2006). Three groups of fishing fleet engage in Ghana’s marine capture fisheries. These are the canoes (motorized with outboard engines or un-motorized), semi-industrial boats and industrial vessels (Directorate of Fisheries, 2003). Ghana borders the Gulf of Guinea to the south with a shoreline of about 550 km (Figure 3.1).
Ghana has a continental shelf area of 20,900 km\(^2\) (Directorate of Fisheries, 2004) which varies in width from 20 to 100 kilometers (Quaatey, 1997; Bannerman and Cowx, 2002). Ghana’s Exclusive Economic Zone (EEZ) has an area of 218,100 km\(^2\) (GCLME, 2006). The Volta Basin is located at the center of Ghana which has an area of about 8,480 km\(^2\) (Directorate of Fisheries, 2004). The lake is important for inland fisheries and fish farming and accounts for about 90% of annual fish landings from inland waters in Ghana (IDAF-Yeji, 1993). In 2013, capture fisheries production in Ghana was 298,000 metric tons. Production from inland fisheries (90,000 metric tons), mostly based on Lake Volta, accounted for about 24% of this production (FAO, 2016).
Fishing is an essential economic activity in Ghana, especially in coastal communities and in communities around lakes and rivers (Odotei, 2002). Marine and inland water bodies are the two main sources of fish production in Ghana. Inland fish production comes mainly from the Volta Lake, other lakes, major rivers and aquaculture (FAO, 2016). In addition, there is also the coastal lagoon fisheries operated on both subsistence and commercial scales. Ghana's coastline consists of more than 90 lagoons that support the production of marine fisheries (Yankson and Obodai, 1993; Entsua-Mensah et al., 2000). Domestic fish production in Ghana was about 444,000 metric tons in 2008, 291,000 metric tons and 150,000 metric tons from marine and inland fisheries respectively and 3,000 metric tons from aquaculture. Amador et al. (2006) were not precise and estimated that on the average, marine fisheries has accounted for over 80% of total fish catch across the past years. More precisely, MoFAD (2013) reports that marine fisheries accounted for 73%, inland fisheries accounted for 21% and aquaculture accounted for 6% of total fish production in 2012. According to Agrer (2011), marine fisheries provide 75% of Ghana’s total annual catch of which the majority is from inshore artisanal fishing.

Fish is central to the Ghanaian diet and is a significant food source, which constitutes about 60% of animal protein (Directorate of Fisheries, 2004). The average contribution of fish to animal source food consumption in Ghana appears to be one of the highest in the world with a per capita requirement of about 26 kg/year (Sarpong et al. 2005). Ghana places sixth in the world in terms of fish for nutrition, after Maldives, Cambodia, Vietnam, Thailand and Bangladesh and ranks number one in Africa (Allison et al., 2011).

### 3.2.1 The fishing industry in Ghana and its contribution to the national economy
Ghana has continued to experience a shift in the structure of its economy. The Services Sector has over the years contributed the largest share to the economy, accounting for 54.1% of Gross
Domestic Product as at the end of 2015, with Industry and Agriculture (including fishing) representing 26.9% and 19% respectively. Expansion and growth in the Agriculture Sector would contribute significantly to reducing youth unemployment and ensure sustainable economic growth (PWC, 2015). Agriculture is a key sector of Ghana’s economy, which employs almost half of the national labour force (FAO, 2015). Since 2002, the Agriculture Sector’s contribution to Gross Domestic Product has averaged 35%, with fisheries contributing 3-5% (Ministry of Food and Agriculture, 2012). However, Ghana Statistical Service in 2014 reported exact figures of 2.5% and 1.4% for fisheries in MoFA’s contribution to GDP in 2009 and 2013 respectively (Table 3.1), which are inconsistent with the average 3-5% reported by the Ministry of Food and Agriculture in 2012. This shows challenges in the data collection and reporting systems in Ghana.

Ghana’s economy is based predominantly on natural resources and agriculture, oriented around primary commodity production and export. Agriculture in Ghana has great potential for enhancing economic growth, reducing poverty and increasing food security. Agriculture has been and continues to be the mainstay of the Ghanaian economy despite efforts by previous and current government regimes to transform Ghana into an industrialized country (Adjei, 2010). New exports such as wood products, textiles, jewelry, pineapples, cotton and fish are rapidly diversifying Ghana's agricultural export profile.

Fish is Ghana’s most prominent non-traditional export commodity, making more than 50% of earnings from the export of such commodities (Bennett, 2000; Sarpong et al., 2005). Annual national fish production is estimated at about 420,000 metric tons which falls short of national requirements by about 460,000 metric tons, equivalent to more than 50% deficit. The deficit is balanced by importing fish annually worth more than US$ 200 million (Ministry of Food and
Agriculture, 2012). Fish imports increased dramatically in 2013 to some US$ 373 million (FAO, 2016).

Fisheries are important in Ghana for employment creation, income generation, nutrition, wealth generation and poverty reduction, livelihoods and food security. Fishing, fish processing and marketing make up an important source of livelihood for people in Ghana (Fabio et al., 2003). Marine fisheries have been found to be the backbone of Ghana’s coastal economy (Hen Mpoano, 2013). The sector produces more than US$1 billion annually (World Bank, 2009). An estimated 210,000 people work directly in Ghana’s fisheries. The sector employs, directly or indirectly, 2.2 million people, representing some 20% of the Ghanaian workforce (Atta-Mills et al., 2004; World Bank, 2009). FAO (2016) estimates that the fisheries take care of more than 29,300 fishing vessels and involve over 250,000 fishers. World Bank (2011) estimated that a total of 372,049 fishermen, fish processors, traders and boat builders are employed in the fisheries sector. In spite of the importance of fisheries, the sector’s economic contribution has continued to decline as shown in Table 3.1 below.

Table 3.1: Distribution of Ghana’s Gross Domestic Product by Economic Activity (%)

<table>
<thead>
<tr>
<th>Sector</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>31.8</td>
<td>29.8</td>
<td>25.3</td>
<td>23.0</td>
<td>22.0</td>
</tr>
<tr>
<td>Crops</td>
<td>23.6</td>
<td>21.7</td>
<td>19.1</td>
<td>17.3</td>
<td>16.9</td>
</tr>
<tr>
<td>Cocoa</td>
<td>2.5</td>
<td>3.2</td>
<td>3.6</td>
<td>2.6</td>
<td>2.2</td>
</tr>
<tr>
<td>Livestock</td>
<td>2.0</td>
<td>2.0</td>
<td>1.8</td>
<td>1.6</td>
<td>1.5</td>
</tr>
<tr>
<td>Forestry and Logging</td>
<td>3.7</td>
<td>3.7</td>
<td>2.8</td>
<td>2.6</td>
<td>2.2</td>
</tr>
<tr>
<td>Fishing</td>
<td>2.5</td>
<td>2.3</td>
<td>1.7</td>
<td>1.5</td>
<td>1.4</td>
</tr>
<tr>
<td>Industry</td>
<td>19.0</td>
<td>19.1</td>
<td>25.6</td>
<td>28.6</td>
<td>28.6</td>
</tr>
<tr>
<td>Mining and Quarrying</td>
<td>2.1</td>
<td>2.3</td>
<td>8.4</td>
<td>9.5</td>
<td>9.8</td>
</tr>
<tr>
<td>Crude Oil</td>
<td>0.0</td>
<td>0.4</td>
<td>6.7</td>
<td>7.8</td>
<td>8.1</td>
</tr>
<tr>
<td>Sector</td>
<td>2013</td>
<td>2014</td>
<td>2015</td>
<td>2016</td>
<td>2017</td>
</tr>
<tr>
<td>---------------------------------------------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>6.9</td>
<td>6.8</td>
<td>6.9</td>
<td>6.4</td>
<td>5.8</td>
</tr>
<tr>
<td>Electricity</td>
<td>0.5</td>
<td>0.6</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>Water and Sewerage</td>
<td>0.7</td>
<td>0.8</td>
<td>0.8</td>
<td>0.7</td>
<td>0.6</td>
</tr>
<tr>
<td>Construction</td>
<td>8.8</td>
<td>8.5</td>
<td>8.9</td>
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**Services**  

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| Gross Domestic Product                      | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

*Source: Ghana Statistical Service 2014*.

### 3.2.2 The marine ecosystem productivity

Ghana’s Exclusive Economic Zone is part of the Guinea Current Large Marine Ecosystem. The Guinea Current has an intensive seasonal upwelling especially off the coast of Ghana from July to September (Koranteng, 2001). The Guinea Current Large Marine Ecosystem is one of the world's most productive marine areas that are rich in fishery resources (FAO, 2004). Coastal and open-ocean upwelling are major oceanic processes (Berger *et al.*, 1989; Brink *et al.*, 1995).

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Upwelling systems of the ocean are areas with high primary production (Chavez and Barber, 1987). The high primary productivity of coastal upwelling systems (Minas et al., 1982) sustains large fisheries of small pelagic species (Freon et al., 2009). According to Cushing (1971), West African fisheries resources are relatively abundant partly because of the higher primary production from the upwelling systems in the Canary Current Large Marine Ecosystem and the Guinea Current Large Marine Ecosystem. Although upwelling systems represent less than 1% of the global area of the ocean, they are the most productive regions around the world (Carr, 2001; Carr and Kearns, 2003).

Ghana’s highly productive marine ecosystem is sustained by a reliable regime of vertical mixing of the waters which ensures almost all year-round productivity. According to Cury (2004), the productivity is supported by a coastal upwelling system known as the Central West African Upwelling. Upwelling systems are directly linked with ocean and atmospheric circulation (Mills et al., 2010). On the continental shelf of Ghana, there are two seasonal upwelling periods; a major upwelling occurring from late June/early July to September/early October, and a minor upwelling lasting up to a month, and occurring mainly in January or February (Longhurst and Pauly, 1987; Mensah and Koranteng, 1988).

3.2.3 Types of fish caught in Ghana’s marine waters
Ofori-Adu (1988) identified 347 exploited fish species in Ghana’s coastal waters. Fish resources that occur in areas within the continental shelf of Ghana’s marine waters are classified as pelagic and demersal species. The pelagic species are those that feed near the surface of the water but the demersal species live on, in, or near the bottom. Pelagic and demersal species make up to about the same quantities in fish landings (Nunoo et al., 2014). Koranteng (1997a) classified the fish
resources of the Western Gulf of Guinea into four broad categories; small pelagic species, large pelagic species, coastal demersal species and deep-water demersal species.

Small pelagic species of high economic value in Ghana are mainly the sardinellas, the anchovies and the mackerels. These species usually account for over 80% of total landings of the small pelagic resources annually. The sardinellas are the most abundant of all small pelagic catches in Ghana (Nunoo et al., 2014). The sardinellas are important in the entire Gulf of Guinea (Ansa-Emmim, 1973).

Large pelagic species are the tuna and tuna-like species; Yellow-fin tuna, Big-eye tuna and Skip-jack tuna. Skip-jack tuna has been the most abundant species in tuna catches in Ghana over the years (Directorate of Fisheries, 2004). Other large pelagic species commercially fished in Ghanaian waters are sailfish, swordfish, blue marlin and white marlin.

Nunoo et al. (2014) state that coastal demersal fish species of economic importance include those of the families Haemulidae or grunts, Lutjanidae or snappers, Mullidae or goatfishes, Serranidae or groupers, Sparidae or seabreams, Sciaenidae or croakers and Polynemidae or threadfins. The most important deep water demersal species include blackmouth croaker, silver-rag driftfish, deep-sea red crab, spinous spider crab and deep-water rose shrimp.

### 3.2.4 Coastal fishing communities and fisheries infrastructure

Directorate of Fisheries (2004) indicates that there are about 189 coastal fishing villages, 310 beach landing sites, and major fishing ports in Ghana where fish is landed. Tema and Sekondi fishing ports are the only deep-water ports with berthing and landing facilities for industrial fishing vessels. These ports have good fisheries support services and facilities for bunkering, stevedoring and handling. Tema fishing port is the main hub of the marine fishing industry with a number of mechanical, fabrication and electrical workshops. There are many private companies in Tema, Accra, Sekondi and Takoradi that run engineering workshops which engage in boat
building and construction activities and provide services for all kinds of marine equipment repairs. Tema and Sekondi fishing ports are also equipped with cold storage facilities and ice plants which produce ice in large quantities for sale to fishermen for preservation and storage of their catch. There are two tuna processing plants (Pioneer Foods Cannery and Ghana Agro-Foods Company) in Tema which produce canned tuna for local consumption and export to other countries.

A unique characteristic of coastal fishing communities in the country is their ethnic diversity and composition. In some of the fishing communities, native and migrant fishers live and work together. Both permanent (settled permanently) and temporary (migrate seasonally) migrant fishers are found in some of the fishing communities. An identical feature of fisher folks living in coastal communities is their social cohesion. Community members are usually organized into groups forming fisher associations at the community, regional or national levels (depending on the particular fisheries sector) to pursue the interest of fishers and fish processors. There are all-men, all-women as well as men and women fisher associations. The major associations include Ghana National Canoe Fishermen’s Council, National Association of Canoe Fishermen, Ghana Inshore Fisheries Association, Ghana Industrial Trawlers Association, Ghana Tuna Association and Fish Processors Association of Ghana. Men and women have chief fishermen and chief fishmongers respectively as their leaders. The chief fisherman and the chief fishmonger have a responsibility to address fisheries issues relating to men and women respectively at the community level and also represent them at higher levels of fisheries decision making. The chief fisherman and the chief fishmonger essentially work for men and women respectively but may also work together in addressing issues though this may vary from community to community. Management powers of chief fishermen and chief fishmongers appear to differ from one
community to the other. In some communities, their roles are quite limited to the landing site and in others they work with the traditional leaders of the wider community.

3.2.5 Fish processing and marketing
Fish processing and marketing provide jobs for many people in coastal communities. Fish processing and marketing livelihoods are affected by access to markets, quality of roads, access to extension services, inputs and preservation methods. Gendered division of labour is quite clear in the fishing industry in Ghana. Men fish while women process and market. However, at higher levels of marketing, men are also involved in fish trade. Women sometimes pre-finance fishing trips in order to have access to the catch. The chief fishmonger determines the price of fish landed on daily basis depending on the availability and quantities of fish landed. Fish prices are normally high in the low fishing seasons when fish supply is low while prices are relatively low in the high seasons when large quantities of fish are landed. There is considerable diversity in the level of cooperation and collaboration between men fishers and women buyers. In some instances, only a ‘cash and carry’ system is in operation, but others are able to buy fish on credit. Buying fish on credit seems to be more prevalent when the fisherman and the fishmonger are married and during the high fishing season.

Smoking, salting and drying, frying and canning are the commonest fish processing methods in Ghana. Small pelagic species and tuna landed by canoes and semi-industrial vessels are mostly smoked and sold at the local community markets or transported elsewhere for sale in different parts of Ghana and beyond while the more quality and more expensive demersal species landed by the industrial and semi-industrial trawlers end up in the cold stores and restaurants as fresh fish or exported to other countries in Africa and beyond. Smoking is usually done with the use of traditional ovens fueled by firewood. In fishing communities, the further a community is away
from a major commercial town or city, the more often smoked fish fetches a higher price. This differs in the major towns and cities due to access to markets and to cold storage. Tuna landed by the industrial tuna fleet in Ghana is processed for local consumption and for export either through the traditional practices of smoking for the local market or value addition through canning by two main tuna processing companies in Tema; Pioneer Food Cannery and Ghana Agro-Foods Company.

3.2.6 Fishing inputs and subsidies
Fisheries subsidies have existed for hundreds of years (FAO, 2004; UNEP, 2004). Westlund (2003) defines fisheries subsidies as “government actions or inactions that are specific to the fishing industry and that modify the potential profits by the industry in the short-, medium- or long-term”. Concerns of overcapacity of global fishing fleets and unsustainable harvests have resulted in increased attention being directed to subsidies to fishing (Gooday, 2002). It is known that subsidies can create unexpected incentives for increased exploitation of fisheries leading to a degradation of fishery resources (UNEP, 2004).

The Government of Ghana provides Ghanaian fishers with a variety of fishing inputs. Major Government subsidies concern the small-scale sector which include pre-mix fuel subsidy, tax free on imported fishing inputs such as nets, ropes, twines, cork/floats and subsidy on the importation of outboard motors through the Agricultural Development Bank in a special arrangement with the Fisheries Commission. Pre-mix fuel is a social product which is 50% subsidized according to the Chairman of the National Pre-mix fuel Committee of the Fisheries Commission. It is sold to local fisheries committees at production cost which is then sold on to fishermen at slightly higher prices to take care of administrative costs. For reasons of equity with similar fuel subsidies for crop farmers, the subsidy on pre-mix fuel was established by the
Ministry of Food and Agriculture and administered by chief fishermen in the early 1990s to maintain the viability of the canoe fleet.

### 3.2.7 Legal and regulatory framework for marine fisheries in Ghana

The lead agency for fisheries governance and management in Ghana is the Ministry of Fisheries and Aquaculture Development. The Ministry’s mission is to promote sustainable fisheries management. The Ministry has an oversight responsibility of a Fisheries Commission that has an overall objective to regulate and manage the fishery resources of Ghana and coordinate fisheries policies. The Fisheries Commission advises the Minister in all matters pertaining to the industry. The Directorate of Fisheries is the technical and executing arm of the Ministry and therefore also of the Fisheries Commission. The Directorate of Fisheries comprises Marine Fisheries Management Division, Marine Fisheries Research Division, Inland Fisheries Management Division, and Monitoring, Control and Surveillance Divisions.

Atta-Kesson and Atuguba (2007) give a historical account of the evolution of legal framework for fisheries management in Ghana as follows. They note that the first attempt at regulating fishing came with the Fisheries Regulations LI 364 (1964). In 1972, the Fisheries Decree 1972 was promulgated to amend the Fisheries Regulations LI 364 (1964). In 1977, the Fisheries Regulations 1977 (LI 1106) were also passed. In 1979, the Fisheries Decree 1979 was promulgated. In that same year, the Fisheries Regulations 1979 (LI 1235) were promulgated. In 1991, the Fisheries Law 1991 was promulgated to repeal the LI 1235. In 1993, the Fisheries Commission Act 1993 (Act 457) was passed to amend the Fisheries Law 1991. In 2002, the Fisheries Act 625 (2002) was enacted to consolidate with amendments all the laws on fisheries. In 2010, the Fisheries Regulations (LI 1968) was also passed in support of the Fisheries Act to complete the legal framework for fisheries management in Ghana. Fisheries in Ghana are

3.3 THE MARINE FISHING FLEET IN GHANA

3.3.1 The artisanal (small-scale) or canoe fleet
Small-scale fisheries have a global importance because they employ about 90% of the world’s fishermen (Mathew, 2001). The small-scale fisheries sector provides an economic activity and livelihood to rural-based African populations (Njaya, 2007). Small-scale fisheries employ 50 of the world’s 51 million fishers, virtually all of whom are from developing countries (Berkes et al., 2001). Koranteng (1992) describes the small-scale fishery sector in Ghana as the most important sector because it dominates in terms of vessel numbers, employment and fish landing. The sector operates on open access basis to all Ghanaians (Akpalu, 2002). According to the 2013 Ghana Canoe Frame Survey report\(^5\), the fisheries provide employment for over 130,000 fishermen in Ghana. In addition to this, many people such as fish sellers, fish processors, porters, canoe carvers, and mechanics depend on artisanal marine fisheries in Ghana for their livelihoods (Odotei, 2002). The sector employs over 80% of Ghanaian fishers. Men fish and women process and sell the fish (Akrofi, 2002).

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Artisanal marine fisheries are operated from more than 300 fishing villages along the coast of Ghana (Directorate of Fisheries, 2004). The fleet comprises of dug-out wooden canoes of various sizes which employ different types of fishing gears. The fishing gears used are the purse seine net which is popularly referred to as Ali/Poli/Watsa, drift gill nets, hook and line, cast nets, set nets and beach seine. Purse seines and beach seines exploit mainly small pelagics during the upwelling periods. Beach seines and hook and line are the main artisanal gears used to exploit demersal resources. Drift gillnets are used offshore to exploit mainly large pelagics such as sharks, tunas, sailfish and swordfish (FAO, 2007). Canoes are carved from “wawa” (Triplochiton scleroxylon) tress (Bannerman et al., 2001), and are categorized by size and type of fishing gear used. Based on this classification, there are four types of canoes; small-sized or one man canoes (4-5m long), medium-sized or hook and line canoes (6-11m long), large-sized Ali/Poli/Watsa canoes (12-18m long) and large-sized beach seine canoes (12-18m long) (Doyi, 1984). Small-sized canoes are propelled by wooden paddles and are principally used to operate bottom set long lines, hand lines and also cast nets in the lagoons. Medium-sized net and line canoes are propelled by paddle, sail or outboard engines. They are used to operate bottom set and floating gill nets. Large Ali/Poli/Watsa canoes are the largest canoes which are motorized with outboard engines having 20-25 crew members. They are used to operate gill nets as well as purse seine nets. Large beach seine canoes are old big canoes which are propelled by paddles or outboard motors and are used for beach seine operations. Canoe outboard motors are powered by pre-mix fuel which is a subsidized commodity by government. Canoes operate a multi-species fishery but the dominant species caught in sizeable quantities are the small pelagics. The canoe sector is

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6 Information on the classification of canoes based on size and type of fishing gears used was orally provided by a Senior Member of the Fisheries Commission using the knowledge gained from his long-term professional and work experience at the Commission.
responsible for about 90% of total landings of small pelagic fish (Bard and Koranteng, 1995). Aheto et al. (2012) reported that for small-scale fisheries, Sadinella species are the main fish species driving profits for fishermen in the artisanal sector.

In Ghana, small-scale fisheries are governed by informal structures at the community level (Bennett, 2000). Fishermen work under the governance of chief fishermen and in many fishing communities the fishmongers work under chief fishmongers who are otherwise referred to as fish queen mothers. Artisanal fishermen practice the catch share system, where the proceeds from fishing are divided into two, half shared among members of crew and half dedicated for the maintenance of fishing equipment and the fishing business by the canoe owner. Generally, chief fishermen and chief fishmongers are not entitled to portions of the catch share but in some communities, chief fishermen and chief fishmongers may be given some fish after each landing out of respect, courtesy or in recognition of their roles and responsibilities in the community. Fish porters may be given some fish to compensate for their services.

3.3.2 The semi-industrial (inshore) fleet
Semi-industrial vessels are locally-built, wooden, multi-purpose fishing vessels with diesel engines of 90-400hp (Nunoo et al., 2009; DoF, 2003) and ranging between 8-37m long. Semi-industrial vessels are stationed at and operate from only a few fish landing sites and ports along the coast. They are classified as small semi-industrial vessels (8-10m long) and large semi-industrial vessels (10-37m long). Small semi-industrial vessels are mostly purse seiners which fish within the 30m depth zone or the Inshore Exclusive Zone (IEZ) while large semi-industrial vessels are mostly trawlers which are not permitted by Ghana’s fisheries law to fish within the IEZ. Medium-sized vessels have lengths between 12-22m (Quaatey, 1997).
Semi-industrial vessels fish with purse seiners during upwelling periods and trawl in the non-upwelling seasons. The purse seiners have about 20-25 while the trawlers have about 7-10 crew members. Semi-industrial purse seiners fish alongside the canoe fleet during the upwelling seasons but trawling occurs in waters deeper than 30m (Koranteng, 1997b). Fishing alongside the canoes often results in conflict between the two fleet (Marquette et al., 2002). Major fish species targeted and caught by the semi-industrial purse seiners are the small pelagics while the trawl fishery targets shrimps, seabreams and cuttlefish for export (Heinbuch, 1994).

3.3.3 The industrial trawler fleet
According to Directorate of Fisheries (2004), industrial vessels are foreign-built steel-hulled vessels that only operate from Tema and Sekondi fishing ports where there is deep-water infrastructure. They operate on joint venture arrangements facilitated by foreigners with Ghanaians. These vessels are categorized into industrial trawlers, shrimpers and tuna. The trawlers and shrimpers fish for demersal species mainly for export. Industrial trawlers possess on-board freezing facilities for storing fish at sea.

3.3.4 The industrial tuna fleet
Even though Ghanaian fishermen have been fishing for tuna with canoes, hand lines and gill nets traditionally, industrial tuna fishing started some time in 1959 (Bortier-Verstraaten, 2002). Foreign-flagged tuna fishing vessels were the first industrial vessels to start tuna fishing in Ghana’s waters with active vessel numbers reaching a maximum of 80 in 1970. Ghanaian-flagged vessels started operating from 1973. The tuna vessels are part of the industrial fleet but often considered as a separate entity because they exploit offshore waters which are further away from shore and also target different fish resource with different fishing gear types. The fishing grounds extend beyond Ghana’s Exclusive Economic Zone into high seas where foreign-flagged vessels from other countries also exploit the resource. In addition, the tuna fleet also operate
under a different governance system and are regulated by international conventions. Ghana’s tuna is managed by the International Commission for the Conservation of Atlantic Tunas (ICCAT). Industrial tuna vessels only operate from the Tema fishing port. Ten tuna companies were found to operate from the Tema fishing port. These companies operate on joint-venture basis between Ghanaian and foreign owned companies. In a tuna joint-venture, at least 25% of the interest should be owned by the Ghanaian counterpart. The law also requires at least 75% of crew members on-board any tuna vessel to be Ghanaian citizens (Directorate of Fisheries, 2004).

Tuna fishing in Ghana occurs all year round. According to Asiama et al. (2008), Ghana is the fourth largest producer of tuna in the world. The industrial tuna fishing sector comprises of tuna pole and line (bait-boats) and tuna purse seiners. Tuna bait-boats are the main vessels that fish for tuna in Ghana’s waters. On certain occasions, juvenile sardinellas are also used as bait. In 1991, the Ghanaian tuna bait-boat fleet accounted for 61% of all the Skip-jack tuna landings (Bortier-Verstraaten, 2002; Mensah, 2010). The history of tuna pole and line fishery in Ghana dates back to 1962 when Starkist Foods International of the United States of America completed a one-year survey of tuna resources in Ghanaian waters and concluded that Ghana’s waters serve as habitats for a significant quantity of tuna to begin an economically profitable capture tuna industry (Kwadjosse, 2009; Mensah, 2010). After the survey, Starkist Foods entered into an agreement with the Government of Ghana to develop the tuna industry by allowing foreign-flagged tuna vessels at the Tema fishing port to exploit tuna resources in Ghanaian waters mainly for export.

3.4 STATE OF THE FISHERIES AND THE FISH RESOURCES
Raw marine fisheries data records were accessed and the figures compiled to assess the state of the fisheries and the fish resources. Analysis of available national marine fisheries data suggests
an increase in fishing effort in relation to the number of fishers, vessel numbers, and numbers and types of fishing gears. Fish catching capacity continues to increase while annual fish production continues to be on the decline, which are indications of overfishing. Catches of the critically important pelagic species have been decreasing since the mid-1990s (Lazar *et al.* 2017). Recent fish landings have been attained by high levels of fishing effort and by targeting smaller and less-valuable species. This is clearly an example of a fishing industry which is severely overcapitalized and overfished. Hen Mpoano (2013) supports the observation that the major fish stocks that, for centuries, have sustained Ghana’s marine fisheries are severely over-exploited and threatened with collapse. Efforts to land smaller annual harvests have been intensifying as fishing fleets compete with one another to catch fewer and fewer fish. These challenges have persisted partly because of a regulated open access canoe fishery where a fishing license is not required for a canoe to fish (World Bank Group, 2015).

Recent trends in annual marine fish production of commercially important species by all sectors of the fisheries, changes in number of fishers and fishing vessels as measures of fishing effort based on data analysed from the national fisheries agency are presented in the figures shown (Figures 3.2 – 3.21). The analyses focus on the period covering the last three decades (between 1980 and 2014) because these are periods that clearly show the decrease in quantities of fish landed and the corresponding increase in fishing effort. Figure 3.2 shows that total annual fish production increased considerably in the early 1980s, from about 200,000 metric tons (tons) to about 350,000 tons in the late 1980s. This level of production was maintained until there was a further increase in the early 1990s to almost 400,000 tons in the mid-1990s. The fisheries then recorded a decline in production after the mid-1990s to about 260,000 tons in the year 2000. Production figures after the year 2000 fluctuated between 280,000 and 350,000 tons generally
indicating a decline in catch. The general decline in total production from the mid-1990s to the end of the period in 2014 is not very clear from Figure 3.2 because it is masked by production from the tuna fleet in particular which increased continually over the period. Declines in catch over the period are more visible from production figures by the canoe, the semi-industrial and the industrial trawler fleet as presented below. Data analysis showed that total fish production by all fleet declined by 21% between 1992 and 2014 (Figure 3.2), total fish production by the canoe fleet declined by 35% (Figure 3.3), total fish production by the semi-industrial fleet declined by 21% (Figure 3.10), fish production by the industrial trawler fleet declined by 6% (Figure 3.13), and total fish production by the industrial tuna fleet increased by 102% (Figure 3.15).

![Figure 3.2: Total marine fish production by all fleet (canoe, semi-industrial, industrial and tuna) from 1980 to 2014.](image)

### 3.4.1 State of canoe fisheries and the fish resources
Canoe fisheries are the most important of all the fleet in terms of number of people engaged in the fisheries, vessel numbers and fish production. The canoe fleet is by far the greatest
contributor to fish landings in Ghana. The canoe fleet produces about 70% of the catch (FAO, 2016). It is not surprising therefore that total fish production (all species put together) by the canoe fleet (figure 3.3) shows a similar trend to that of the total fish production (all species put together) by all the fleet (Figure 3.2). Figure 3.3 shows that there was a sharp rise in canoe fish production in the 1980s from about 150,000 tons in the early parts of the 1980s with a historical peak of about 300,000 tons in 1992, which was about twice the catch in 1980. There was a decline in catch dropping to about 200,000 tons in 1995 and increasing again in 1996 to almost the peak value of 300,000 tons in 1992. Catches decreased steadily from 1996 to about 160,000 tons in the year 2000 with another sharp increase to about 280,000 tons the following year. The canoe fishery has since 2001 generally recorded a continuous decline in catches to about 150,000 tons in 2010 and increasing to about 200,000 tons in 2014 (Figure 3.3). Catches of the most important sardinella species exploited by the canoe fleet increased from 30,000 tons in 1980 to 130,000 tons in 1992 (Figure 3.4). Catches of the sardinella species by the canoe fleet declined continuously from 1992 to about 30,000 tons in 2014 with a record low of about 26,000 tons in 2011 which indicated a near collapse of the canoe sardinella fishery.
Figure 3.3: Total marine fish production (all species) by the canoe fleet from 1980 to 2014.

Figure 3.4: Round and flat sardinella (Sardinella aurita and Sardinella maderensis) production by the canoe fleet from 1980 to 2014.
The most frequently reported fish catch statistics in Ghana is landings which only show the quantities of fish caught and brought to the port (Nunoo and Asiedu, 2013). It must be cautioned here that using landing data alone to assess the state of a fishery is sometimes deceptive. To have a good picture of the state of the fishery, it is important to consider other parameters such as the time spent in fishing, the number of vessels, and the number of people who participate in the fishing activity, which describe the fishing effort. If the fishing effort is known, a catch per unit effort could be measured. The canoe sector catch per unit effort (catch/fisherman/year) for all species from 1977 to 2014 (Figure 3.5) is presented below. Catch/fisherman/year could only be calculated for years when canoe frame surveys were conducted.

**Figure 3.5:** Total canoe catch per unit effort (catch/canoe fisherman/year) from 1977 to 2014.

Between 1977 and 1986 catch per fisherman per year remained fairly constant but increased from 1986 to 1992, dropping sharply again in 1995 and remaining relatively constant until 2004.
Fish catch/fisherman/year dropped from about 2 in 2004 to 1.5 tons in 2014. It is concluded from Figure 3.4 that on the average, every canoe fisherman landed about 2 tons of fish every year between 1977 and 2004 with the exception of 1989, 1992 and 2014 where the catches per fisherman per year were approximately 2.5, 3.0 and 1.5 tons respectively. The canoe catch per unit effort (catch/vessel/year) for all species from 1968 to 2012 based on data availability is also presented in Figure 3.6. It is deduced from Figure 3.5 that catch per canoe per year has generally been declining since the early 1990s from about 35 tons per canoe per year in 1992 to about 17 tons in 2014. Catch/canoe/year could only be calculated for years when canoe frame surveys were conducted.

Figure 3.6: Total canoe catch per unit effort (catch/canoe/year) from 1986 to 2014.
The canoe sector has generally operated on open access basis where entry to the fishery is free for all Ghanaians. The canoe fleet has expanded quickly in the past few years particularly between 1997 and 2014 when the last canoe census was conducted as there are no stringent entry requirements for fishing with a canoe. Figure 3.6 shows changes in number of canoes that have been operating in Ghana’s waters between 1977 and 2014. Canoe numbers over the years have increased from 8,728 in 1969 to 12,728 canoes in 2014 which represents some 45% increase over the period. The 2013 canoe frame survey report indicated that the number of canoes operating in the marine waters of Ghana increased by some 13% from the previous survey in 2004. Generally, a continuous increase in the number of canoe fishermen has occurred since 1977. Similar to the increases in numbers of canoes, the number of canoe fishermen has also expanded rapidly from 8,100 fishermen in 1997 to a record high of 139,155 fishermen in 2014 representing some 35% increase over the period (Figure 3.8). Number of canoe fishermen increased from 124,219 in 2004 to 139,155 in 2013, representing an increase of about 12% during the period. In summary, the decrease in landings and sizes of fish caught by the canoe fleet coupled with increases in numbers of canoes and canoe fishermen are indications of a fishery which is severely overcapitalized and overfished (Hen Mpoano, 2013).

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Figure 3.7: Changes in number of canoes from 1969 to 2014.

Figure 3.8: Change in numbers of canoe fishermen from 1977 to 2014.
3.4.2 State of semi-industrial fisheries and the fish resources

Figure 3.9 shows that in 1986 there were 201 operational semi-industrial vessels which decreased to 146 in 1991 probably following the high operation costs that affected the fisheries sector during that period. There was no remarkable change in vessel numbers from 1991 until 2003. Vessel numbers increased considerably in 2004 following the introduction and uptake of the use of light in fishing (light fishing) by the semi-industrial vessels. Light fishing is now widely practiced by the semi-industrial sector which has become widely accepted by fishermen as a very efficient method of fishing without which little or no fish can be caught due to fish scarcity. Number of active vessels has been on the decline since 2006 due to high operational costs and enforcement of the fisheries law and regulations which prohibit the use of light in fishing.

Figure 3.9: Change in numbers of semi-industrial vessels from 1986 to 2013.
Marine fish production by the semi-industrial fleet has also seen a remarkable decline in the last three decades since the mid-1980s after a maximum production value of 21,894 tons was recorded in 1986 (Figure 3.10). Total fish harvested by the fleet averaged about 10,000 tons since the late 1980s. This represents about half the quantity of fish produced by the fleet in the mid-1980s. Catch per vessel per year (Figure 3.11) decreased dramatically from about 115 tons in 1986 to about 50 tons in 1990. Average catch per vessel per year oscillated around 40 tons between 1990 and 2014. This means that catch per vessel per year levels in 2014 were approximately half of those recorded two decades earlier. This supports the notion that fisheries in Ghana are currently heading towards a crisis point.

**Figure 3.10:** Marine fish production by the semi-industrial fleet from 1980 to 2014.
Figure 3.11: Semi-industrial catch per unit effort (catch/vessel/year) from 1986 to 2014.

3.4.3 State of industrial trawler fisheries and fish resources
Unlike the industrial tuna fleet which engage in purse-seining and pole-and-line fishing for the large pelagics (tuna and tuna-like species), Ghana’s industrial trawler fleet largely engage in demersal trawling for good quality demersal fish. There is a group of the industrial fleet which specifically fish for shrimps (shrimpers). There used to be a group of the industrial trawler fleet that engaged in pair-trawling (fishing activity carried out by two fishing vessels with one vessel pulling each towing cable). Pair-trawling was introduced in the year 2000 with vessel numbers growing up to about 20 before pair-trawling was banned in the country in 2008. After the ban in 2008, many pair-trawlers were rendered inactive. Even though pair-trawling has been banned, fishers perceive that some vessels still engage in pair-trawling.
National vessel statistics data show that, the industrial trawler fleet has expanded in numbers since the mid-1980s. Analysis of change in the industrial trawler fleet over the years indicates a steady growth in vessel numbers since the mid-1990s (Figure 3.12). This has been suggested to be the result of a Government of Ghana policy (Ghana Economic Recovery Program) which targeted the industrial fleet to develop fisheries and improve income generated from the sector (Quaatey, 1997). Operational trawler numbers increased from 38 in 1986 to 110 in 2014. Moreover, vessel numbers almost doubled between 2012 and 2014.

![Figure 3.12: Change in numbers of industrial trawler vessels from 1986 to 2013.](image)

Fish production by the industrial fleet increased from about 15,000 tons in the early 1980s to almost 28,000 tons in the early 1990s after which production decreased steadily reaching a minimum of about 10,000 tons in 2003 (Figure 3.13). Production increased again from 2003 to about 20,000 tons in 2007 after which production stagnated to the end of the period in 2014 with
a historical minimum production value of about 10,000 tons in 2004 even as vessel numbers increased over the period. The average catch per vessel per year also reduced in the early 1990s from a peak of 1,394 tons in 1991 to a lowest value of about 50 tons in 2014 (Figure 3.14).

Figure 3.13: Marine fish production by the industrial trawler fleet from 1980 to 2012.
3.4.4 State of industrial tuna fisheries and fish resources
As at the time of data collection in 2014, there were 37 active tuna fishing vessels (19 bait-boats and 18 purse-seiners). Out of the 37 active vessels, 34 were Ghanaian flagged which operated directly from the Tema fishing port while the remaining 3 were from Belize but operated in Ghana under an agreement with Tema Tuna Ventures, one of the leading tuna fishing companies in Ghana. The Government of Belize and the Tema Tuna Ventures had an access agreement where tuna vessels from Belize could fish in Ghanaian waters and Tema Tuna Ventures vessels from Ghana could also fish in Belizean waters. Apart from Belize, there were no other such arrangements between Tema Tuna Ventures in Ghana and any other country that allowed foreign tuna fleet to fish in Ghanaian waters. There were also 10 tuna fishing companies that were active in Ghana at the time; Afko Fisheries, Agnespark Fisheries, Clear Skies Fisheries, G-L Fisheries, Panofi, World Marine Fisheries, D-H Fisheries, Rico Fisheries, Trust Allied Fisheries and Tema
Tuna Ventures. These companies were set up as joint ventures between Ghanaians and Koreans but Clear Skies Fisheries was wholly owned by Ghanaians. These tuna companies were found to be registered members of the Ghana Tuna.

Unlike other fisheries sectors, tuna fisheries production generally increased in the last three decades. Figure 3.15 shows total annual tuna catches by all tuna vessels (all species) from 1980 to 2012 according to available national fisheries statistics data. The annual total catches for all 3 species of tuna averaged about 35,000 tons between 1980 and 1996 and about 70,000 tons between 2000 and 2012. Catches generally increased from 10,000 tons in 1980 to 90,000 tons in 2012. There was a sharp increase from about 10,000 tons to about 30,000 tons in the early 1980s which increased to about 40,000 tons in the mid-1980s. Production levels remained at about 40,000 tons until the mid-1990s after which there was a sharp increase to about 88,000 tons in 2001. Production was generally sustained after 2001 reaching 90,000 tons in 2012.

Figure 3.15: Total fish production (all species) by the tuna fleet from 1980 to 2012.
The increase in production of tuna in the last three decades was achieved by a stable number of tuna vessels that averaged about 35 throughout the period as shown in figure 2.15. Average catch per vessel per year (Figure 3.17) consistently increased over the period from a low of 1,000 tons per vessel per year in 1986 to more than 3,000 tons per vessel per year in 2005. Catch per vessel per year dropped from about 2,500 tons in 2012 to about 1,000 tons in 2014.

![Figure 3.16: Change in numbers of tuna vessels from 1987 to 2014.](image)
Figure 3.17: Tuna catch per unit effort (catch/vessel/year) 1986 – 2014.

Comparing catches of the three species of tuna caught by the tuna fleet indicates that Skip-jack tuna makes up majority of tuna landed in Ghana followed by Yellow-fin and the Big-eye (Figure 3.21). Figure 3.18 shows that on the average about 30,000 tons of Skip-jack tuna were landed every year from 1980 to 2010. Skip-jack tuna catches increased from less than 10,000 tons in 1980 to about 20,000 tons in 1982. Catches then stagnated between 1982 and 1996. Catches generally increased steadily from 1996 to more than 50,000 tons in 2010. Figure 3.19 shows that Yellow-fin tuna catches averaged about 15,000 tons per year. Catches of Yellow-fin increased sharply from about 2000 tons in 1980 to about 13,000 tons in 1985 and remained at that level until 1996. From 1996, there was a sharp increase to about 35,000 tons in 2001 followed by a steady decline to about 12,000 tons in 2010. Of all the 3 species of tuna, Big-eye tuna catches (figure 3.20) were generally the lowest with an average of about 8,000 tons landed every year.
between 1980 and 1986. The highest quantity (about 18,000 tons) of Big-eye tuna landed over the period occurred in 1999 with the lowest quantity (about 2,000 tons) landed in 1980.

**Figure 3.18:** Skip-jack tuna catches by all fleet (1980 – 2010).

**Figure 3.19:** Yellow-fin tuna catches by all fleet (1980 – 2010).
Figure 3.20: Big-eye tuna catches by all fleet (1980 – 2010).

Figure 3.21: Skip-jack, Yellow-fin and Big-eye tuna catches by all fleet
3.5 THE REASONS FOR THEDECLINE IN THE FISHERIES
Developing and analyzing annual and time series data and information from raw marine fisheries data systems showed that several factors have contributed to the decline in marine fish production in Ghana. These include the open access nature of canoe fisheries, Illegal, Unreported and Unregulated (IUU) fishing, innovations in fishing techniques (changes in fishing gears and methods), increase in fishing effort as to the number of fishers and fishing vessels, motorization of canoes, and the lack of alternative livelihoods for fishers. Weak and ineffective governance of the fisheries sector and poor management practices particularly the lack of compliance on the side of fishers and the enforcement of the fisheries law and regulations by fisheries authorities have also contributed to the problem of overfishing and consequently the decline in fish stocks.

3.5.1 Open access canoe fisheries and increase in fishing effort
Canoe fisheries in Ghana has over the years thrived on open access where entry is free for all Ghanaian fishermen even though there have been attempts by government to register and license all the canoes and gradually migrate to a restricted access canoe fishery. Canoe numbers and sizes, and their members of crew have continually increased over the years mainly because of the open access nature of canoe fisheries. Number and size of fishing gears have also increased with corresponding decrease in mesh sizes. There is increase in number of motorized canoes which makes it possible for canoes to travel longer distances from their home ports to fish. Time spent in fishing has considerably increased due to the use of ice at sea. These developments are signs of massive increases in fishing effort over the years exerting a lot of pressure on fish stocks leading to their overexploitation.

3.5.2 Illegal, Unreported and Unregulated fishing
In Ghanaian context, the term ‘Illegal, Unreported and Unregulated fishing’ encompasses a broad range of fishing practices which pose significant threat to the overall sustainability of
fisheries. Some of these activities have been described in detail in the sections that follow. According to the FAO, illegal fishing includes fishing in an area without permission or fishing with disregard to fisheries laws. Unregulated fishing covers fishing that is not well governed by the relevant regulations, either because such regulations are non-existent or there is ineffective enforcement of the regulations if they exist. Unreported fishing occurs where catches should be reported and recorded but which are not. In such circumstances, the information available for management is incomplete, which can seriously undermine sustainability. There have been reported cases of foreign-flagged industrial vessels fishing illegally in Ghana’s Exclusive Economic Zone. Ghanaian-flagged vessels have also been reported to compete with semi-industrial vessels and canoes in fishing within Ghana’s Inshore Exclusive Zone which is exclusively reserved for canoes and small semi-industrial vessels. This illustrates illegal fishing in Ghana’s waters which has been found to be one of the major factors that have contributed to the problem of overfishing and the decline in marine fish productions. Ineffective governance of the fisheries in Ghana particularly the lack of compliance and adequate enforcement of fishing regulations constitutes unregulated fishing. Some amount of fisheries data is collected in Ghana but the data collection system and the data that is collected is inadequate to appropriately inform fisheries management decision making. This is a good example of unreported fishing. To better illustrate IUU fishing in the country, the following are described.

3.5.3 Change and innovation in the fisheries
Ghanaian fishermen are very innovative by nature and are good at developing, implementing and adopting new fishing techniques to maximize their catch as conditions change in the fisheries (World Bank Group, 2015). Change in fishing net systems, the use of light and other unorthodox methods in fishing are a typical example. It was observed in course of this research that there have been significant innovations in fishing gear construction over time involving the
combination and use of different netting materials and increases in net lengths with corresponding decrease in mesh sizes which render fish more easily caught and thereby increasing fishing effort. The adoption and use of more efficient monofilament fishing nets is worth discussing. Monofilament nets are fishing nets made from a single fibre of plastic. These nets are now widely used by fishers in many fishing communities because they are considerably cheaper than multifilament or twine nets. Also, monofilament nets are perceived by fishers as having very low visibility to fish and are hence more efficient in catching fish compared to twine nets. Change and innovation in the fisheries with respect to catch efficiency as well as the wide acceptance and use of monofilament nets by fishers have also contributed to the problem of overfishing and subsequent decline in fish landings over the past few decades. In addition to the innovation in fishing net system, the use of Fish Aggregating Devices was also noticed as an innovation that attracted juvenile fish and non-target species and make them more easily caught. Through the use of Fish Aggregating Devices, juvenile fish are not given the opportunity to spawn before they are caught. The use of Fish Aggregating Devices as an innovation in the fisheries is also partly responsible for the decreasing fish catch.

3.5.4 Adoption and use of destructive and unsustainable fishing practices

The adoption and use of destructive and unsustainable fishing practices is considered very high among the issues that account for the decline in Ghana’s marine fisheries. This is perhaps the most important as well as the most critical because these are widely practiced by all fisheries sectors including canoe fishers who constitute bulk of the operators in the fishing industry. The adoption and use of irresponsible fishing practices has come about because of the increases in number of fishing vessels and members of crew who actively compete to fish for already unhealthy fish stocks. As a result of the competition to maximize their catch, fishers employ all kinds of methods in fishing irrespective of the harm that these may cause to the fish, their
environment as well as the health of fish consumers. The situation is so alarming to such an extent that fishers now think their survival in the industry simply depends on the use of these illegal practices. Fishers now employ all means possible to fish which has enhanced the further depletion of major stocks particularly the small pelagics that have sustained the industry for centuries. It was recorded that fishers now engage in chemical fishing involving the use of poison and other noxious substances such as calcium carbide and cyanide in what was referred to as ‘bomb fishing’. These chemicals were used as explosives to stun, disable or kill shoals of fish before they are caught. There were also reported cases of fishers using formalin to preserve their fish catch at sea before landing, an act that poses serious threats to the health of both fish handlers and consumers. Illegal fishing in the Inshore Exclusive Zone by the industrial trawlers results in high fish by-catch, which also destroys bottom habitats that are critical for fish production. These activities have significant adverse impacts on fish growth and their overall estimated annual production.

3.5.5 Introduction and use of light fishing in Ghana
Another development in the marine fisheries in Ghana that has generated a lot of controversies in recent times which therefore deserves special attention is light fishing; the use of light as a fish aggregating device to render fish more easily caught. Ghanaian fishermen (mostly large-sized canoe fishermen and semi-industrial purse seiners) carry onboard their fishing vessels light generator sets which are used to power big lamps that are immersed in water to attract fish. Light fishing targets, in particular, the small pelagics which are fished with large purse seine nets. Information gathered from fishers confirmed that fishers were able to fish all year round because of light fishing which attracts resting fish stocks (both young and old) in deep water columns to the surface instead of allowing the fish to grow to maturity during the low fishing season and catching them in the high season.
According to Bannerman and Quartey (undated), initial trials to investigate the potential benefits of light fishing in Ghana dates back to 1962. Canoe fishermen were convinced with the positive results recorded in the trials but its potential benefits were not too clear. Also, the light fishing equipment was too expensive at the time which the fishermen could not afford to own. Consequently, light fishing did not become popular at that time. Light fishing is known to have been later re-introduced through research activities by the Marine Fisheries Research in their quest to find ways of supporting canoe fishermen to enhance their catch in the lean fishing season. The research had an overall aim of reducing poverty and increasing fish food availability. The justification for that research was that canoe fishermen found it difficult to cope outside the fish bumper harvest season because their target stocks were not readily available to be exploited.

Semi-industrial vessels were designed to fish with purse seine nets in the main fishing season targeting small pelagics and to trawl in the lean season for high quality demersal fish. Because most semi-industrial vessels did not have suitable engines to pull trawl nets they were motivated to do purse seining using light in the lean season which ensured that fishing occurs almost throughout the year. Semi-industrial fishermen therefore adopted the technology in the early 1990s on realizing the benefits after which canoe fishermen also joined. Light fishing has since gained popularity and in fact it is believed that the number of fishermen who use the technology has increased over the years. Despite attempts by regulators to stop light fishing, it is still being practiced widely across the coast. Fishers were of the view that it was impossible to catch fish especially in the low season without engaging in light.

3.5.6 Lack of alternative livelihoods for fishers
Lack of alternative livelihoods for fishers has also played an important role in contributing to the decline in fish catch in the last couple of decades. Historically, fishing has been the predominant
pre-occupation in the communities along coastal Ghana. The only activity that people know and are used to is fishing which is part of their tradition and culture. In some of the communities there are no other livelihood and employment options. In addition to the unavailability of other livelihood options, people also lack the required specialized skills to engage in other jobs even if available at all. In these prevailing circumstances of alternative sources of income, people tend to focus only on fishing by so doing creating a lot of stress on available fish stocks. Consequently, there is overexploitation of stocks which becomes evident in the subsequent decline in their annual production.

3.5.7 Weak and ineffective governance and management practices
The fisheries have continued to decline largely because governance and management systems for fisheries in Ghana have not adequately responded to the challenging issues in the industry such as compliance and enforcement of the fisheries law and regulations. Ineffective governance leads to overfishing, which in turn results in loss of wealth. World Bank (2009) estimated that with improved management, US$50 million more could be made as annual net economic gain from Ghana’s fisheries. On one hand, fisheries authorities lack the capacity and the logistics to effectively perform their functions and fishers have also taken undue advantage of the inadequate capacity of fisheries managers to enforce the fisheries law and regulations and have engaged in all sorts of fisheries malpractices for their selfish interests. The fisheries Monitoring, Control and Surveillance Division and the fisheries Enforcement Unit of the Fisheries Commission have been established to monitor and control all fishing activities within Ghana’s waters but the Division and the Enforcement Unit have not been very effective in controlling fishing activities both on land and at sea including monitoring and regulating activities of the trawler fleet which sometimes compete with canoes and small semi-industrial vessels to fish illegally in the Inshore Exclusive Zone. The lack of control on fishing effort results in overfishing. For the canoe fleet,
this had occurred partly because of the subsidies on pre-mix fuel and other fishing inputs. Subsidy on pre-mix fuel is a government policy which is perceived to be a motivation for more fishers to engage in fishing which contributes to increased fishing effort. The high increases in the number of canoes and their crew members which have impacted negatively on fish landings are perhaps due to the sustainability of fisheries subsidies.

3.6 CONCLUSION
A detailed description of the fisheries and a comprehensive analysis of the exploitation rates and status of the fish resources support the argument that the marine fishing industry in Ghana is rapidly approaching a crisis point. World Bank Group (2015) states that, a large proportion of Ghana’s fish stock is overfished and catch per unit effort has been declining overtime. Ghana’s marine fisheries output has decreased significantly in recent decades (Tanner et al., 2014). Between 1996 and 2011, there was a 66% decline in catches from 252,112 to 84,980 metric tons (CRC, 2013). Direct observations show decrease in sizes of fish caught. Decreasing fish production trends implies that fisheries contribution to GDP of the country has decreased over the period. Quantities of the major small pelagic species targeted and landed by the canoe fleet have consistently reduced. With the ongoing decreasing trends in the production of major fish stocks, commercially important species are threatened with collapse. Decline in catches of the small pelagics is a major concern for the canoe fleet in particular and the overall local economies of coastal communities. Livelihoods and incomes of the people living in coastal communities who directly depend on the resource, and food security are at risk. The fishing industry is a complex system in view of the different types and the number of fishing vessels, crew members, fishing methods, gears used and species exploited as well as governance of the fisheries. All sectors of the fishing industry continue to expand in size and in numbers. Technological innovation in the sector conspires to further increase fishing effort to a point well beyond
sustainability. Meanwhile, management, regulatory and control measures for the fisheries are weak and ineffective to address the challenge of overfishing.

The downward trends in fish production imply that fish demand now exceeds supply meaning that fish has become a scarce commodity\(^8\). Fish scarcity translates into competition among fishers in attempts to maximize their catches. Increased competition among fishers gives rise to the occurrence of different forms of conflicts within the fisheries. Competition and conflicts within the fisheries enhance overfishing causing further depletion of stocks. The prevalence of conflicts within the fisheries also undermines the peaceful co-existence of fisheries sectors which impacts negatively on fisheries development and long-term viability of the sector. Conflicts within the fisheries must be well managed if sustainability of the fisheries is to be ensured. The conflicts cannot be well managed without a firm knowledge of the nature of the fisheries, and the issues of conflicts within the fisheries. Issues that have been discussed in this chapter provide a background for analyzing conflicts within the marine fisheries sectors in Ghana in the next chapter.

\(^8\) Republic of Ghana Fisheries and Aquaculture Sector Development Plan (2011 – 2016).
CHAPTER FOUR

4.0 CONFLICTS WITHIN GHANAIAN MARINE FISHERIES

4.1 INTRODUCTION

The review and analysis of Ghana’s marine fisheries, and the state of the fish resources in the previous chapter revealed a diverse fisheries social-ecological system that is characterised by four different fisheries sectors, a highly complex open access artisanal fisheries with a variety of fishing gears, and operating from more than 300 coastal fishing villages with thousands of canoes and canoe fishermen who engage in all sorts of fisheries malpractices and also compete to have access to fishing inputs, continuous decline in fish landings and ineffective governance and management systems with an inadequate capacity to enforce fishing rules and regulations. The artisanal sector operates alongside the semi-industrial and the industrial sectors. These characteristics of the fisheries make them susceptible to a wide range of conflicts.

Conversations with fishermen and fisheries authorities confirmed that conflicts within the fisheries have escalated in the past decade especially in the high fishing seasons when there is high level of fishing activities and more interactions among fishers. Fishers compete for space and resources both on land and at sea. The occurrence of conflicts in the fisheries is a threat to human life and property especially in violent conflict scenarios and has the potential to cause further depletion of fish stocks thereby threatening livelihoods, income and food security in coastal communities in particular and in the country at large. This will negatively affect social well-being, which is a matter of national security concern. There is the justification therefore to effectively manage conflicts in the fisheries to protect fish stocks from further depletion and to safeguard the life, property and the well-being of people and to ensure national security.

Managing the conflicts in the fisheries well requires a good knowledge of the types and causes of the conflicts (Yasmi, 2003; Druckman, 2005; Gritten et al., 2009), what drives fisheries
stakeholders to conflicts, the existing management mechanisms for the conflicts and second, analysing the effectiveness of existing fisheries conflicts management mechanisms in lieu of making good proposals for a more effective and efficient management of the conflicts.

The purpose of this chapter is to determine what drives fisheries stakeholders to conflicts, identify and analyse the types and causes of the conflicts within Ghanaian marine fisheries and their existing management mechanisms in order to provide an opportunity for critique and hence the justification for the need for evidence-based recommendations for improved management of the conflicts. To ascertain whether or not conflicts really occur in the fisheries, and between the fisheries and other sectors, and to examine the conflict types, the parties in the conflict, and the specific conflict issues, focus group conversations and discussions were conducted with individual fishers, groups of fishers, traditional fisheries authorities, fisheries managers and through direct observations in the field. Some of the questions asked and issues discussed are presented in Appendix A of this thesis. Responses from the conversations and discussions were recorded and later analysed. The analysis of these informal open-ended questions gathered together the frequency of issues occurring from conversation notes and also appraised the strength of responses from the conversations. Results from the analysis of the responses are presented in Table 4.1 and discussed below.

4.2 RESULTS FROM THE ANALYSIS OF MARINE FISHERIES CONFLICTS

Table 4.1 was developed to describe the types of internal and external conflicts which occur in Ghana’s marine fisheries using the typology of fisheries conflicts developed by Bennett et al. (2001). It summarizes types of marine fisheries conflicts, the parties involved in the conflicts and the specific conflict issues.
Table 4.1: Typology of conflicts within the marine fisheries in Ghana

<table>
<thead>
<tr>
<th>Typology of conflicts</th>
<th>Parties involved and specific conflict issue</th>
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<tr>
<td><strong>Type I</strong></td>
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<tr>
<td>Who controls the fishery</td>
<td>Open access community-based canoe fishers and semi-industrial fishers versus industrial trawl fishers and industrial tuna fishers over types of fish species fished, gears used and fishing methods</td>
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<tr>
<td></td>
<td>Open access community-based small-scale canoe fishers and small semi-industrial purse seine fishers versus industrial trawlers and large semi-industrial fishers who fish in the Inshore Exclusive Zone meant for small-scale canoe fishers and small semi-industrial purse seine fishers</td>
</tr>
<tr>
<td><strong>Type II</strong></td>
<td></td>
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<tr>
<td>How are the fisheries controlled</td>
<td>Open access community-based small-scale canoe fishers versus national fisheries authorities over ineffective governance and management of pre-mix fuel for canoe outboard motor engines</td>
</tr>
<tr>
<td></td>
<td>Fishers and national fisheries authorities over ineffective centralised and top-down governance and management approach to the fisheries</td>
</tr>
<tr>
<td></td>
<td>Legal fishers versus illegal fishing gear and methods operators over inadequate enforcement regarding the use of illegal gears and fishing methods</td>
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<tr>
<td><strong>Type III</strong></td>
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<tr>
<td>Relations between the fishery users</td>
<td>Canoe fishers versus semi-industrial and industrial trawlers over the destruction of fishing gear</td>
</tr>
<tr>
<td></td>
<td>Competition among fishers for fish at sea and space at the landing site</td>
</tr>
<tr>
<td></td>
<td>Competition among small-scale canoe fishers</td>
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for pre-mix fuel for outboard motor engines

Competition among women fish traders and fish processors over access to landed fish in terms of fish pricing, buying and selling of the fish

Boat owners versus members of crew regarding discrepancies in fish catch shares

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<th>Type IV</th>
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<tbody>
<tr>
<td>Relations between fishers and other users of the aquatic environment</td>
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<tr>
<td>Fishers versus offshore oil and gas sector operators over exclusive zone around oil and gas installation</td>
</tr>
<tr>
<td>Fishers versus security agencies over new areas of the sea demarcated for oil and gas exploration and production operations</td>
</tr>
<tr>
<td>Fishers versus oil and gas operators, security agencies over areas of the sea traversed by oil and gas pipelines</td>
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<th>Type V</th>
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<tbody>
<tr>
<td>Relationship between fishers and non-fishery issues</td>
</tr>
<tr>
<td>Fishers and enforcement authorities over selective enforcement of the fisheries law and regulations and the excessive use of military force by the Fisheries Enforcement Unit to enforce the fisheries law and regulations</td>
</tr>
<tr>
<td>Conflicts due to the overlapping of functions of fisheries and other ocean governance agencies such as the Ghana Maritime Authority and the Environmental Protection Agency</td>
</tr>
<tr>
<td>Fishers versus central government over the devolution of management functions and empowerment of chief fishermen/local fisheries authorities</td>
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</tbody>
</table>
The results in Table 4.1 resulted from diverse stakeholder consultations at different levels as well as direct observation. As shown in Table 4.1, Type I conflicts involve open-access community-based small-scale canoe fishers and semi-industrial fishers who compete and come into conflict with industrial trawl fishers and industrial tuna fishers over types of fish species targeted, fishing methods and gears used. Also, canoe fishers and small semi-industrial purse-seine fishers come into conflict with industrial trawl fishers and large semi-industrial fishers who fish illegally in the Inshore Exclusive Zone reserved for canoe fishers and small semi-industrial purse-seiners.

Examples of Type II conflicts are those which occur between canoe fishers and government authorities over pre-mix fuel management issues, all categories of fishers and government authorities over command-and-control system of management as well as legal fishers and illegal fishers concerning inadequate enforcement regarding the use of illegal fishing gears and fishing methods. Type III conflicts include canoe fishers against semi-industrial and industrial trawlers due to the destruction of fishing gears belonging to canoe fishers, competition among all categories of fishers for fish and space both at sea and at the landing sites as well as competition among canoe and other fishers for pre-mix fuel and other fishing inputs. Type IV conflicts describe those which occur between fishers and oil and gas sector operators for not allowing fishers to fish close to the oil and gas platform, fishers and security agencies for keeping fishers off areas of the sea reserved for oil and gas exploration and production activities and fishers against oil and gas sector operators and security agencies concerning the prohibition of fishing activities in parts of the sea traversed by underwater gas pipelines. Type V conflicts encompass conflicts such as those that occur between fishers and fisheries law enforcement authorities regarding selective enforcement and the excessive use of military force to enforce the law, fisheries and other governance agencies due to overlapping of roles and responsibilities that arise
from inadequacies in the legal framework for ocean governance as well as fishers versus central
government officials for lack of decentralization of management functions and the devolution of
management powers by central government officials to local fisheries authorities. From the
analyses and discussion of the different types of conflicts, which are described in detail in
subsequent sections, it could be said that Type III conflicts are the most important of all the
conflict types identified in terms of occurrence perhaps followed by Type I, Type II, Type IV
and then Type V in that order.

4.3 ANALYSES OF INTERACTIONS AND THE OCCURRENCE OF CONFLICTS
WITHIN GHANA’S MARINE FISHERIES
For a good understanding of the conflicts, it is imperative to determine whether or not
interactions exist between different fisheries sectors, within each fisheries sector, and between
the fisheries sectors and government. Then it is also important to determine whether spatial
interactions are a cause of conflicts (Smith and Vallega, 1991; Vallega, 1992; Smith and Vallega,
2002) or whether it is other reasons (Bennett et al, 2001). It is also important to know whether
one fisheries sector has conflicts with another sector and vice versa, and also whether the
fisheries sectors have conflicts with government and vice versa. Results obtained from the
analysis of occurrence and patterns of conflicts within Ghana’s marine fisheries have been
presented in Table 4.2 which indicate that interactions and conflicts exist between different
fisheries sectors, within same fisheries sectors, and between the fisheries sectors and
government.

Canoe fishers have conflicts with semi-industrial sector and semi-industrial fishers also have
conflicts with canoe fishers over the issues described in Table 4.2. Both sectors have the
potential to offend each other in their interactions. Canoe fishers have conflicts with the
industrial sector and the industrial sector also has conflicts with the canoes. Canoe fishers have
conflicts with government over issues related to pre-mix fuel supply and distribution by
government to canoe fishers also concerning the enforcement of fishing rules and regulations and
other management issues and government also has conflicts with canoe fishers regarding the
enforcement of fishing rules and regulations and other management issues.

Semi-industrial sector has conflicts with the industrial sector and industrial sector also has
contlicts with the semi-industrial sector because semi-industrial trawlers fish within the same
space as industrial trawlers, targeting the same species. Semi-industrial sector has conflicts with
government over the supply of fishing inputs, enforcement of fishing rules and regulations and
the registration and licensing of vessels. Government also has conflicts with semi-industrial
regarding the enforcement of fishing rules and regulations and other management issues.
Industrial fishers have conflicts with government also concerning the supply of fishing inputs,
enforcement of fishing rules and regulations and the registration and licensing of vessels and
government also has conflicts regarding same issues. These results conform to the observation by
Sandole et al. (2009) that everything can be conflicting.
Table 4.2: Occurrence and patterns of internal marine fisheries interactions and conflicts

<table>
<thead>
<tr>
<th></th>
<th>Canoe</th>
<th>Semi-industrial</th>
<th>Industrial sector</th>
<th>Government</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Canoe</strong></td>
<td>Conflicts occur within the canoe fishery sector; e.g. competition for inputs such as pre-mix fuel, fishing space, fish, fish catch shares fishing gear and fishing methods, fish marketing and installation of chief fisherman.</td>
<td>Canoe sector has conflicts with semi-industrial sector; e.g. competition for fishing space, fish, fishing gear and fishing methods, and fish marketing.</td>
<td>Canoe sector has conflict with the industrial sector; e.g. competition for fishing space, fish, fishing gear and fishing methods.</td>
<td>Canoe sector has conflicts with Government; e.g. pre-mix fuel and other fishing inputs, top-down management approach and enforcement of fishing rules and regulations.</td>
</tr>
<tr>
<td><strong>Semi-industrial</strong></td>
<td>Semi-industrial sector has conflict with the canoe sector; e.g. competition for fishing space, fish, fishing gear and fishing methods.</td>
<td>Conflicts occur within the semi-industrial sector; e.g. competition for fishing space, fish, fishing gear and fishing methods, and fish marketing.</td>
<td>Semi-industrial sector has conflicts with the industrial sector; e.g. competition for fishing space, fish, fishing gear and fishing methods.</td>
<td>Semi-industrial sector has conflicts with Government; e.g. over supply of fishing inputs, top-down management approach, vessel registration and licencing and enforcement of fishing rules and regulations.</td>
</tr>
<tr>
<td><strong>Industrial</strong></td>
<td>The industrial sector has conflicts with the canoe sector; e.g. competition for fishing space, fish, fishing gear and fishing methods.</td>
<td>Industrial sector has conflicts with the semi-industrial sector; e.g. competition for fishing space, fish, fishing gear and fishing methods.</td>
<td>Conflicts occur within the industrial sector; e.g. competition for fishing space and fish.</td>
<td>Industrial sector has conflicts with Government; e.g. over supply of fishing inputs, top-down management approach, vessel registration and licencing and enforcement of</td>
</tr>
<tr>
<td><strong>Government</strong></td>
<td>Government has conflicts with the canoe sector; e.g. enforcement of fishing rules and regulations.</td>
<td>Government has conflicts with the semi-industrial sector; e.g. over catch returns, vessel registration and licensing.</td>
<td>Government has conflicts with the industrial sector; e.g. over catch returns, vessel registration and licensing.</td>
<td>Ocean governance and management institutions come into conflict due to overlaps in roles and responsibilities and inadequacies in legal framework for ocean governance and management.</td>
</tr>
</tbody>
</table>
Table 4.3 also shows the degree of interactions within fisheries sectors and between fisheries sectors on a scale of 1 – 3 indicating the assessed strength of the interaction (3 is strongest). The numbers presented in Table 4.3 are derived based on the intensity of the positive or negative interactions that occur within the same fisheries sector or between fisheries sectors, between fisheries sectors and government, and within government agencies. The positive numbers indicate positive interactions where the interactions are mutually beneficial and lead to cooperation in fisheries while the negative numbers depict negative interactions which lead to conflicts. The highest level of interactions which translates into conflicts occurs among canoe fishers within their group due to their large numbers, methods of fishing, gears employed, the wide range of fish post-harvest activities associated with canoe fisheries and their traditional governance system. This means that the canoe sector is most prone to conflicts therefore more attention should be given to this group by policy makers and managers when it comes to conflict resolution. Interactions within the canoe sector are not all negative. There is some level of positive interaction within canoe fisheries which is as a result of the cooperation that exists within the sector. This is also true for the other fisheries sectors and government as well which is why there is no score of -3 in Table 4.3. Conflicts within the canoe fisheries sector, which are analysed and discussed in more detail subsequently, come about as a result of the high level of interactions that occur among players in the sector. Less interactions occur between the canoe sector and the semi-industrial sector compared to the level of interactions within the canoe fishery and hence less conflicts between the two sectors. There are fewer numbers of industrial vessels which fish further offshore than semi-industrial vessels which means that there are much less interactions between the canoe sector and the industrial sector and hence less conflicts between them over the issues described.
The degree of interactions among the semi-industrial sector is less than that which exist within the canoe sector because semi-industrial vessels are fewer than canoes. This also translates into fewer incidences of conflict within the semi-industrial sector. Interactions within and between fisheries sectors could be described as negative of course as fisheries sectors compete in many aspects over limited resources. Government agencies largely interact positively among themselves and also government interacts more positively with all the three fisheries sectors because government has oversight responsibilities for managing the fisheries and all other matters related to fishing. This happens because if government interacts negatively with fishers, that will negatively affect the image of government who is rather supposed to be leading by example. This does not mean government never has conflict with fishers but this rarely happens. Ocean governance agencies also interact positively as they are supposed to be working towards common goals but conflicts sometimes occur in the performance of their duties. However, there was a signal of negative interactions between government agencies because of overlapping roles and responsibilities which is why their level of interaction is rated +1 and not +3 as shown in Table 4.3. The nature of the interactions and the conflicts arising from them are described and analysed in more detail in the next section.

Table 4.3: Assessed interaction matrix of fisheries sector interactions and interactions with government

<table>
<thead>
<tr>
<th></th>
<th>Canoe</th>
<th>Semi-industrial</th>
<th>Industrial</th>
<th>Government</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canoe</td>
<td>-3</td>
<td>-2</td>
<td>-1</td>
<td>+1</td>
</tr>
<tr>
<td>Semi-industrial</td>
<td>-2</td>
<td>-2</td>
<td>-2</td>
<td>+1</td>
</tr>
</tbody>
</table>
4.4 DRIVERS OF THE CONFLICTS WITHIN THE MARINE FISHERIES SECTOR


Prior to the establishment of UNCLOS and subsequently, the implementation of Exclusive Economic Zones of coastal states, coastal states had a 12-mile territorial sea. Foreign fishing vessels could fish in the high seas up to 12 miles from the shore of a coastal state. After the coming into force of UNCLOS 1982, Exclusive Economic Zones were extended to 200 miles offshore. Before the law was instituted, many Ghanaian flagged vessels were fishing in waters off other African countries like Mauritania, Senegal, Liberia, Cape Verde, Angola, Sao Tome, Namibia and Congo. After the law was enforced, all these vessels could no longer fish in those waters because fishing was no more profitable. These vessels therefore had to return to Ghana to fish in Ghanaian waters where other vessels were already present. This resulted in increased competition among fishing vessels for space and other resources including fish, and sometimes causing industrial vessels to fish illegally within the Inshore Exclusive Zone reserved for canoes and small semi-industrial purse seiners. This created tensions and hostile relations that often resulted in conflicts among fishermen at sea particularly between industrial and canoe fishermen whose canoes sometimes collided with other vessels causing loss of life and property. This situation has persisted in the fishery waters of Ghana with high increases in number of fishing vessels and fishers coupled with decrease in fish catch recorded over time.

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9 This is the transcription of a narrative provided by a Senior Member of Staff at the Fisheries Commission in Ghana with many years of professional and work experience at the Commission.
4.4.2 Nature of the fisheries, motorization and increase in number of canoes
Ghana’s marine fisheries are highly dispersed where the canoe fisheries dominate in number of landing sites, vessel numbers, number of fishers and fish production. The canoe fishery is a complex multi-species fishery with different kinds of fishing gears. The nature of the fisheries suggests a high level of interactions among fishers which often drive fishery disputes. Canoe fishermen were the sole operators in marine fisheries in Ghana before the introduction of semi-industrial and industrial vessels. Also, there were only few canoes at the time then which had the freedom to operate both at sea and on land with less competition for space and fish resource and hence low incidence of conflicts among users. Moreover, at that time canoes were manually operated and powered by paddles and sails meaning that they were limited as far as to sea they could go and fish until the introduction of outboard motors. After the introduction of outboard motors, canoe fishermen were able to exploit fishing grounds further away from their home ports by travelling longer distances. The introduction of outboard motors ended up in significant increases in canoe numbers as well as members of crew. The increase in number of operators and the corresponding decrease in fish catch gave rise to more competition and hence conflicts in the fisheries.

4.4.3 Introduction and expansion of semi-industrial, industrial and tuna vessels
According to Ocran (1973), the earliest motorized fishing vessels were introduced into Ghana from the United Kingdom in 1946 purposely for experimental fishing. Due to successes recorded in the experimental fishing in terms of fish catch, the Government of Ghana constructed a boatyard in Sekondi in 1952 that started building boats that were similar to those imported from the United Kingdom which led to the construction of several semi-industrial vessels. In view of expanding the sector, the Tema boatyard was also constructed in 1962. More semi-industrial vessels were built for the fishing industry as a result. The introduction and proliferation of semi-
industrial and industrial vessels gave rise to competition and conflicts among semi-industrial and industrial fishermen and conflicts with canoe fishermen who were already present. Semi-industrial and industrial trawls conflict with fishing methods by the canoes as trawling sometimes destroys other gears used by the canoe sector. Different sectors of the fisheries fishing together in the same space created a situation of non-cooperation and lack of compliance of fishing and regulations as semi-industrial and industrial vessels tried to fish illegally in the Inshore Exclusive Zone reserved for canoes. The introduction of industrial tuna fishing vessels and innovation in tuna fishing techniques like the use of Fish Aggregating Devices in fishing added to the existing conflicts within the fisheries as fishers compete to catch fish that aggregate near these devices.

4.5 NATURE OF THE CONFLICTS WITHIN THE FISHERIES
This section describes in detail the nature and characteristics of the issues of conflicts summarized in Table 4.1 and the occurrence and patterns of the conflicts described in Table 4.2 above in order to have a deep understanding of the conflicts as a basis for the analysis and recommendation of appropriate mechanisms to manage the conflicts as and when they occur. Recommendations for potential mitigation strategies for the identified conflicts in subsequent chapters are guided by the practices (closed season) adopted by the Philippines in the management of the sardine fishery of Zamboanga Peninsula (Israel et al. 2016). Israel et al. (2016) propose that improved stakeholder participation and collection action would provide the missing stimulus for instituting more effective enforcement and coordination mechanism necessary to minimize the unintended consequence of overfishing.
4.5.1 Destruction of fishing gear and property

Destruction of fishing gear and property is an issue that generates Type III conflicts when compared with the typology of conflicts developed by Bennett et al. (2001) which was used to create the framework for the typology of marine fisheries conflicts in Ghana as described in Table 4.1. Conversations with fishing operators in Ghana about the occurrence and types of conflicts in the fisheries revealed that the most common issue which often generates conflict at sea is the destruction of fishing gear and other property belonging to canoe fishermen by semi-industrial and industrial trawlers when they fish close to one another. Fishing gear damage, loss or destruction was cited as the commonest conflict issue at sea. Canoe fishermen use different kinds of fishing gears, both active and passive, which sometimes cross the paths of semi-industrial and industrial trawl vessels. Canoes floating on water may be visible but not the fishing gears in water. Canoe fishing gears are usually not marked and so there is the potential that they may get swept away easily by semi-industrial and industrial trawlers particularly at night when visibility is poor. In addition to the fact that fishing gears are not fitted with reflectors, canoe fishermen mostly have poor or no lighting systems on their canoes which makes it difficult for them to be detected by approaching semi-industrial and industrial trawl vessels at night.

Destruction of canoe fishing gears may be accidental but there were reported incidence of semi-industrial and industrial trawl vessels intentionally destroying gears of canoe fishermen in order to reduce competition with canoe fishers. Sometimes, canoe fishers also place their gears intentionally in the paths of oncoming semi-industrial and industrial vessels so that in case of destruction they will be liable for compensation by the semi-industrial and industrial vessels. Ghanaian canoe fishermen often have little or no knowledge of basic marine navigation
procedures and are usually not equipped with the necessary navigation equipment so they normally operate without compliance to local and internationally accepted navigation rules. In addition, majority of fishers are not adequately educated and trained in maritime operations, regulations and enforcement and also do not have the necessary skills to man vessels at sea. In course of disputes or disagreements concerning the destruction of gears, other fishing equipment such as canoe outboard motors may be intentionally destroyed by semi-industrial or industrial fishers involved in the conflict so that it becomes difficult for the canoes to move to shore. Canoes may also be partially destroyed during physical and violent clashes. Issues of conflict regarding the destruction of fishing gear and equipment as described by Ghanaian fishers and documented here are similar in nature to those described by DuBois and Zografos (2012) in their work on conflicts between small-scale and industrial fishers in Senegal.

It was reported that fish scarcity forces large semi-industrial and industrial trawlers to fish illegally alongside canoes in the Inshore Exclusive Zone which is perceived as being more productive thereby destroying the gears of canoe fishermen in the process. The trawlers take advantage of the weak capacity of fisheries enforcement authorities to detect their presence in the Inshore Exclusive Zone and cause their arrest. Fishers also encountered that fishing alongside and close to one another at sea sometimes ends up in vessel collisions that cause damage to the weaker vessels mostly the canoes. These may end up in violent disputes which may cause loss of life. Sections 82 and 129 of the Ghana’s fisheries law highlights on issues related to the destruction of fishing gears and damage to other fishing equipment. They read as follows; 82 (1) A person aboard a motor fishing vessel shall not destroy or damage any appropriately marked fishing gear of an artisanal fisherman inside the Inshore Exclusive Zone; 129 A person who willfully damages or destroys a fishing vessel, gear or other fishing appliance which belongs to
another person is liable on summary conviction to a fine. The heavy penalty associated with the destruction or damage of fishing gear and property shows the high frequency of occurrence of conflicts regarding this issue, the importance that fisheries authorities attach to the issue and their willingness to deter offenders from engaging in such acts.

4.5.2 Conflict over space and fish resources
According to Bess and Rallapudi (2007), spatial conflicts occur when there is competition between different sectors that use the same marine area and with those who have an interest in protecting the same area for some particular reasons. Spatial conflicts in marine fisheries in Ghana occur both on land where preparations for fishing take place and also at sea where the actual fishing takes place. Competition for more productive fishing space, fishing zones and fish spots at sea as well as competition for operational space at the landing sites, struggles by women fish buyers and sellers were also cited as important issues of conflict within the fisheries. These types of conflicts also fall within the category of conflicts described by Bennett et al. (2001) as Type III conflicts (relations between the fishery users). Fishers compete among themselves to fish for limited fish stocks in a limited marine space within the continental shelf. In the course of fishing, arguments often occur among fishers concerning the crew to have first spotted a shoal of fish in certain areas. Struggles among different members of crew to catch the fish often end up in conflict. Struggles between the canoe fishery sector and the industrial fishery sector are a typical example. Canoe and industrial vessels have different fishing efficiencies. Industrial vessels generally have more efficient fishing capacities and employ technologies that give them more advantage to exploit available fish resources. Canoe fishers have a notion that industrial vessels often have more access to fish and more share of the catch. This generates tension and conflict between them.
Competition over fish spots and territories was described as common in seasons when there is high mobility of fish. As the fish move, both industrial and canoe fishers make attempts to locate particular spots where fish could easily be intercepted. Canoe fishers most often do not have access to fish finding devices like industrial fishers and so they sometimes monitor and follow industrial vessels to locate fish. As they follow the vessels, they capitalize on the industrial vessel’s inability to move around swiftly to catch fish ahead of the industrial vessels. Similarly, sometimes industrial vessels also try to look for areas where there are large concentrations of canoes knowing that those are areas with high concentrations of fish. Industrial vessels and canoes keep moving together in the same area which results in high risks of damage to fishing gear and other equipment leading to territorial conflicts and disputes similar to what was described by DuBois and Zografos (2012).

Fish by-catch was also reported as an important issue of conflict in the fisheries. Canoe fishers make allegations against industrial fishers over by-catch from landings of industrial vessels. Industrial fisheries by-catch comprises mainly of the targeted species for the canoes. Canoe fishers were of the view that industrial fishers use smaller mesh-size nets than those recommended by law to fish which accounts for high amounts of by-catch. This notion leads to tensions between the two sectors that bring about conflict. In one of the conversations with canoe fishermen on the issue of by-catch, canoe fishermen mentioned that they always lost the argument with the industrial vessels because the owners and beneficiaries of industrial vessels are very wealthy and influential people who have the power to influence decisions on the issue in favour of industrial vessels. In such circumstance, the only option for the canoe fishers is to indulge in violence against industrial fishers. The issue of by-catch and the conflict arising from it has recently taken a different dimension in the fisheries where industrial trawl vessels illegally
fish for small pelagics of all species and sizes and sell them to local canoe fishers at sea, a practice commonly referred to as “Saiko” fishing. Saiko fishing is a form of transshipment of fish at sea between industrial vessels and local canoe fishermen which is illegal according to Ghana’s fisheries law. Canoe fishermen buy packaged frozen fish from the industrial vessels at sea and sell them in turn to fish buyers at the landing site which has now become a lucrative business for both industrial vessels and canoe fishermen. Canoe fishers compete with industrial vessels to fish for species that are targeted by canoe fishers which creates conflicts between the two groups of fishermen and also conflicts between canoe fishermen who engage in Saiko fishing and those who do not. Hen Mpoano (2015) reported a court case in 2001 which involved canoe fishers who engaged in Saiko fishing and those who did not. Non-Saiko fishers filed a case against Saiko fishers at the Cape Coast High Court asking for Saiko fishing to be banned. Saiko fishers finally won this conflict case that lasted about three years in court which empowered Saiko fishers to continue to engage in the illegality.

Another commonest issue which triggers spatial conflict in the fisheries is fishing within restricted zones of the marine space by unauthorized vessels. Incursion by industrial vessels into the Inshore Exclusive Zone for canoe fishers creates friction between them. Incursion into Ghana’s Exclusive Economic Zone by merchant ships and illegal fishing vessels from Europe and Asia is a popular concern raised by both canoe and industrial fishers as a potential source of conflict. Industrial vessels often stray into the Inshore Exclusive Zone to fish illegally and disrupt activities of canoe fishermen which may end up in fierce spatial and resource competition that lead to conflict. Canoe fishers reported that industrial trawlers normally come closer to fish within the Inshore Exclusive Zone especially in periods of the year (October to March) when demersal fish occur in abundance in this zone but there is no problem of incursions between
April and September when the occurrence of demersal fish is low in the zone. They also mentioned that semi-industrial and industrial trawlers perceive that canoe fishermen do not have the power to keep them off the Inshore Exclusive Zone because canoes are not officially licensed which motivates semi-industrial and industrial vessels to engage in frequent intrusions.

Competition for the utilization of space for landing, offloading, marketing of fish and related activities at the landing sites was also discussed as one of the issues of conflict in the fisheries. At many of the landing sites, vessel numbers far outweigh available space for fish landing and post-harvest activities. The rise in vessel numbers and fishers as well over the years has not been accompanied with the needed expansion of landing site facilities. This is particularly a problem for the fishers as they come in to land fish, as they prepare to go out for fishing and during fishing holidays when a lot of vessels are present at the landing site for repairs and preparations for the next fishing trips. Fishers that are not able to find space at the landing sites for berthing and to offload fish may be forced to do so away from the landing sites in deeper waters and attempt to swim towards the seashore which poses a lot of danger to the lives of these fishermen.

4.5.3 Compliance and enforcement of fisheries law and regulations
Compliance and enforcement issues were also found to be associated with conflicts in the fisheries which are categorized as Type V conflicts using the framework developed by Bennett et al. (2001). Fisheries enforcement authorities sometimes come into conflicts with fishers as they conduct their law enforcement obligations. A case in point is the enforcement of the ban on the use of light in fishing. Section 11 (1a) of the Ghana Fisheries Regulations, Legislative Instrument 1968 states that: A person shall not within the fishery waters of this country (a) use any fishing method that aggregates fish by light attraction. Information gathered from fishers indicated that large canoe and semi-industrial purse-seiners are the sectors of the fisheries which engage in
light fishing for small pelagics and are therefore the parties involved in conflicts related to issues of light fishing. Light fishing is currently considered by fishers as the most efficient method of fishing to maximize catch. The fishers justified the use of light in fishing by arguing that with the current trends in fish production they could not offset their input costs without the use of light.

The following is a typical example of these kinds of conflicts. There was once a fisheries enforcement exercise that was carried out by the Fisheries Enforcement Unit of the Fisheries Commission to enforce the ban on light fishing. The heavily armed Enforcement Unit moved from landing site to landing site and used military force to seize portable generator sets, switchboards, bulbs, cables and illegal monofilament fishing nets in accordance with the law. This exercise ended up in battles between the Enforcement Unit and fishers that led to a lot of injuries, loss of human life and destruction of property including vehicles belonging to the Ghana Navy who are part of the Fisheries Enforcement Unit. Canoe fishers argued that they were not adequately consulted before the regulations banning light fishing were passed and if that was the case why should they be required by government to comply. They thought that even if they were not consulted in the process of making the law, they should have first been sensitized, educated and agreed on it before the enforcement exercise. They criticized the Enforcement Unit of practicing selective enforcement of the law. The canoe fishers were of the view that industrial vessels also engaged in a lot of illegal activities both at sea and on land and were not being monitored by the Enforcement Unit, caught and reprimanded according to the law.

There are some fishermen who conduct responsible fishing as defined by the fisheries law and regulations and yet there are others who engage in illegal fishing. Those who fish right often come into conflict with those who do not when illegal fishers are confronted by those who do legal fishing. Illegal fishers may also be reported to fisheries authorities by legal fishers for the
necessary punitive measures to be taken against them. Conflicts arise in both circumstances through the confrontation process and as wrong doers get reported to the authorities for sanctions. Illegal fishers may want to revenge against legal fishers after they have been punished by the authorities. This creates hostile relations among fishers that amount to more conflict.

District Assemblies in Ghana are permitted by law to create community and district fisheries by-laws to safeguard and protect fishers and fish resources in selected communities within their jurisdiction. Some coastal districts have used that power to put in place fisheries by-laws that are specific to the communities in their districts, and which are enforced by the community people themselves. Fisheries by-laws only allow certain fishing practices to be performed in particular areas and not others. For instance, in most fishing communities, by-laws set aside at least one day of every week as a fishing holiday where fishers are not allowed to go to sea and fish. Fishing holidays have been instituted as a traditional fisheries management practice with an objective to reduce pressure on fish stocks. Fishers who do not observe fishing holidays are sanctioned by traditional fisheries authorities. Some fishers respect and observe fishing holidays in their communities yet there are others who do not. Due to the current situation where fish has become scarce, some fishers want to fish every day of the week to maximize their catch. Conflict occurs between those who respect and obey fishing holidays and those who do not. In addition, because fishing holidays differ from community to community along the coast, sometimes fishers come from outside the communities observing fishing holidays to fish when resident fishers do not fish on those days. This often results in conflict between resident fishers and those who come from other places.
4.5.4 Fishing gear and fishing method conflicts
Based on the information collected from fishers, fishing gear conflicts in the fisheries occur in
different forms both within and between different fisheries sectors and are classified as Type III
conflicts using the typology of conflicts by Bennett et al. (2001). One fishing gear, drift nets in
particular, may entangle with another to bring about conflicts between the owners at sea when
one person tries to cut the other person’s net to free his. Conflicts of this kind may become
violent and fatal resulting in the death of fishers involved. Conflicts between the use of active
fishing gears like trawl nets by industrial and semi-industrial trawlers and passive fishing gears
like set nets or purse seine nets by the canoe sector is a classic example of fishing gear conflicts
in the fisheries. When trawl nets are towed, they scoop everything including untargeted fish
species and nets that come across their path and also scrape important bottom habitats that serve
as fish nursery grounds. Set nets are often deployed, left in the water and inspected later by
canoe fishers. There is a high potential of set nets or purse seine nets to be swept away by trawl
nets especially at night and in bad weather conditions particularly when they are not fitted with
reflective buoys to alert approaching vessels. Canoes themselves may also be drifted in the
process which poses danger to the lives of canoe fishers. Canoe fishers accuse the trawlers of
destroying important fish habitats and catching their targeted (the small pelagics) with their
trawling activities. Canoe fishers are always in conflict with the trawlers as a result and in fact
some canoe fishers expressed their desire and called for trawlers to be completely banned from
the fisheries. These fishers were of the opinion that trawlers are the cause of the problems in the
fisheries including the decline in catches. While the canoe fishers blame the trawlers, the trawlers
also blame the canoes. Flaherty and Karnjanakesorn (1993) concluded that the decline of fish
stocks will persist and the conflict between different scales of fishers will increase if necessary
steps are taken to regulate trawling practices.
Conflicts also arise between groups of fishers using the same type of fishing gears that target the same species and fish closely together in the same area. Conflicts of this kind are common in the beach seine fishery. Beach seine fishery is operated close to the beach using drag nets spanning long distances that are hauled from their two ends by canoe fishers who normally operate from the same fishing community. The normal practice in the fishery is for groups of beach seine fishers to operate in turns in order to avoid clashes which may lead to conflict. Due to competition in the fisheries and the scarcity of fish, some fishers sometimes do not have the patience to wait for their turn before they can fish. Disagreements between different members of crew regarding fishing times often results in conflict. Beach seine operators may also sweep set nets intentionally to collect the fish caught in the set nets or unintentionally when the set nets are not visible. A similar situation also occurs in the purse seine fisheries when one crew attempts to fish within an area already being fished by another crew. Hook and line fishers sometimes also come into conflict with other fishers when their hooks or anchors become entangled with the nets of other fishers. In such circumstances, net operators cut off the hooks or the anchor in their nets to free them which bring about conflict between net and hook and line fishers.

4.5.5 Conflicts in the buying and selling of fish at the landing site
Apart from conflicts that happen at sea involving those who do the fishing, conflicts also occur at the fish landing sites where fish post-harvest activities take place often among women fish traders and fish processors. These are also examples of Type III conflicts based on descriptions in the work of Bennett et al. (2001). Due to the scarcity of fish, women fish buyers and sellers compete to buy fish that is landed onshore just as fishermen compete to fish at sea. Women fish traders also compete in buying the few quantities of fish landed by the fishermen. Fish prices are determined and fixed every day at the landing sites by chief fishmongers. This practice is no longer being strictly enforced in some of the fishing communities which create an avenue for
people to determine and sell at their own prices that are usually higher than would have been
determined by the chief fishmonger and generally accepted by all fish traders. Some people can
afford to buy at higher prices while others cannot. This usually results in conflict between those
selling the fish and those that cannot afford to buy at higher prices or conflict between those that
can afford to buy at higher prices and those that cannot afford to buy. Also, sometimes fishermen
are not able to neither land enough fish to cover input costs nor to make profits which is an
incentive for the fishermen to sell the fish at higher prices. Others may land enough fish and may
decide to sell it at a lower price which indirectly affects those who land fewer quantities and
want to sell at higher prices. Disagreements regarding unacceptable fish pricing occur in the
process that triggers conflicts between buyers and sellers of landed fish. These types of conflicts
hardly end up in violence but may cause the use of abusive language against people and tarnish
the relations among the parties involved.

Moreover, with challenges in financing their fishing trips, fishermen venture into special
arrangements with the women traders and processors where the women pre-finance fishing trips
so that they will in turn be supplied with the fish that is landed by the fishermen they sponsor.
There are ways that conflicts may occur with this kind of arrangement. Fishermen may decide to
sell their catch at higher prices to women other than those who pre-financed their trips. These
women propose to pay higher prices for the fish which motivates the fishermen to sell the fish to
them instead. This may end up in conflict either between the fishermen and the women who did
the pre-financing or between the women who did the pre-financing and those who want to pay
higher prices for the fish. Conflict also arises between fishermen and women traders when the
women buy the fish from the fishermen on credit and are not able to pay them back on time as
agreed, pay back in full or pay back at all. The women are not able to pay back because they are sometimes not able to make enough money due to marketing constraints.

4.5.6 Conflicts in fish catch shares between boat owners and members of crew
Conflict also occurs between boat owners and members of crew in course of sharing the proceeds from fish catches. These are also part of Type III conflicts which describe the relations between boat owners and members of crew. Conflict usually arises when boat owners go contrary to established catch share rules. In many of the fishing communities, catch share rules establishes that proceeds from the catches are equally divided into two, the first half is kept by the boat owner for the maintenance of the fishing business and the second half is shared among members of crew which also includes the boat owner. Information gathered from crew members indicated that some boat owners sometimes may want to be given more of the catch shares than they are worth which is viewed by crew members as cheating. Conflict arises in the process when members of crew register their protest against catch share irregularities. Some fishermen continue to change jobs and leave from boat to boat to work because they are not satisfied with catch share arrangements of the boats they abandon. Also, sometimes boat owners and members of crew discuss and agree on a system for sharing their catch. Just when it is about time to share the proceeds from the catch, the boat owner intentionally or unintentionally decides not to continue to work with some of the crew members and also decides not to pay them any benefits. This also ends up in conflict between boat owners and members of crew who bay be affected. Sometimes also senior members of crew would like to cheat in sharing the catch which junior crew members may disagree with. This also results in conflict between senior and junior members of crew. These may lead to violent clashes among senior and junior crew members.
4.5.7 Conflicts associated with the distribution and sale of pre-mix fuel

Competition and conflicts over fishing input supplies are issues worthy of discussion in the fisheries and those associated with the distribution and sale of pre-mix fuel merit special attention. These are also categorized as Type III conflicts which arise due to relations between canoe fishery users. The production, distribution, sale and the overall management of pre-mix fuel for canoe outboard motors were found to be surrounded by a lot of controversies and conflicts in the canoe fishery sector. In order to identify and analyze the nature of pre-mix fuel conflicts, there is the need to describe the production process, the distribution, sale as well as management of the fuel at all levels. Pre-mix fuel is prepared by blending petrol and lube oil at the Tema Oil Refinery in Ghana. Bulk Distribution Companies purchase the lube oil from Ghana Oil Company Limited, access petrol from other sources and supply both to the Tema Oil Refinery for blending. The Bulk Distribution Companies pay the Tema Oil Refinery for the blending. In the production process, the fuel is mixed with a dye that gives it a blue colouration which differentiates it from other types of fuel. Pre-mix fuel is a social product and so the production cost for the fuel is subsidized by government up to about 50%. Subsidies from government go to the Bulk Distribution Companies to facilitate the production, distribution and sale of the fuel in designated fishing areas to canoe fishermen at subsidized prices. As at August 2016 a gallon of pre-mix fuel was selling at GhC 7.50 at the subsidized price but prices sometimes fluctuate depending on changes in international fuel market price. Government price was GhC7.30 per gallon but there was approval from government at that time that allowed the Landing Beach Committees to sell it for GhC 7.50 and use the profit for community development projects like health centers, public toilet facilities, community recreational centers and scholarships to brilliant but needy students. This arrangement was widely accepted by the general fishing community.
A National Pre-mix Committee that operates from a National Pre-mix Committee Secretariat in Accra has been formed by government to supervise all activities related to pre-mix fuel distribution and sales and also conduct periodic auditing of pre-mix fuel activities at the landing sites. The National Pre-mix Committee comprises a chairman, secretary, four regional representatives from all four coastal regions, one inland fisheries representative, government appointees and a representative from the Ghana National Canoe Fishermen’s Council who coordinates activities between the Committee and the Council. It was gathered through conversations with a prominent member of the National Pre-mix Committee that fuel tankers from the Bulk Distribution Companies transport pre-mix fuel directly from the Tema Oil Refinery to specified fish landing sites where it is then distributed and sold to canoe fishermen. At the community level, the sale, management and administration of the fuel and utilization of the profits that accrue from the sale of the fuel are entrusted in the care of Landing Beach Committees. The Landing Beach Committee presents statements of accounts to the general fishing community at the end of every quarter. A Landing Beach Committee comprises a chief fisherman as the chairman, representatives of boat owners, fishermen, fishmongers, the Ministry of Fisheries and Aquaculture Development, and the District Chief Executive. Landing Beach Committees employ the services of a secretary and a pump attendant who take records and physically sell the fuel respectively. The National Pre-mix Committee prepares distribution plans and schedule fuel allocations for all the pre-mix depots/outlets every week depending on the number of canoes and the level of fishing activity at particular depots/outlets. These plans are sent directly to the Tema Oil Refinery with copies to the Bulk Distribution Companies.

It is a requirement for all Landing Beach Committees to operate bank accounts to handle all monetary transactions related to the supply and sale of pre-mix fuel at their landing beaches. The
chairman, the secretary and the canoe owners’ representative are the signatories to the account. Once a Landing Beach Committee is formed at a landing site and officially recognized, the chief fisherman can request for fuel consignments to his landing site on behalf of the Landing Beach Committee in writing to the National Premix Committee in Accra. The supply of the fuel is made on credit basis where the Landing Beach Committee can pay for the fuel delivered after the sales into a bank account provided by the National Pre-mix Committee.

It appeared as if there were good structures in place to manage the distribution and sale of the fuel however the system was associated with management challenges that accounted for the occurrence of conflicts. It was reported during the investigations that there used to be many Bulk Distribution Companies in the pre-mix fuel business but there was only one at the time because government didn’t pay the companies for their services on time to allow them to remain in business. These companies had no option than to leave the pre-mix business which affected the regular supply and hence frequent shortages of the product at the fuel outlets. This meant that there was competition over access to the smaller quantities of fuel at the landing site which resulted in conflicts among canoe fishers. Some people also took advantage of shortages of the fuel to act as middlemen who used their social networks to buy the fuel and sold them at higher prices to other people who did not have the fuel. It was also highlighted that pre-mix fuel issues had also become highly political because of government subsidies where selective allocations were made based on political party affiliations. Fishing communities which were perceived to be sympathizers of the political party in government had a fair share of the fuel whereas others did not. There were also reported cases from some of the landing sites where sympathizers of the political party in government rather manage the fuel instead of the Landing Beach Committees and only sell it to their colleague party members. Politicians also used their influence sometimes
to intercept fuel distribution plans and divert tankers to places where they could liaise with middlemen to sell the fuel at higher prices for profit. Conflicts occur due to the unfair and inequitable distribution of the fuel.

Utilization of the resources that accrue from the sale of the fuel is another conflict issue. There were clear procedures for disbursing accumulated funds which showed that 52% of profits goes to authorities of the Traditional Council for community development projects, 12% goes to the office of the chief fisherman for maintenance, 5% as salary to the pump attendant and the rest (31%) is shared among the other members of the Landing Beach Committee. Authorities of the Traditional Council then decide on what to do with the funds in consultation with the fishers but disagreements sometimes occur as to what the funds should be used for due to different interests of the people. There are also conflicts with accountability issues when the funds are not properly accounted for. Profits may not be fairly distributed according to the laid down procedures, funds may not be duly transferred to the Traditional Council by the Landing Beach Committee or funds received by the Traditional Council may not be used for any development projects in the community.

4.5.8 Fisheries conservation conflicts
The management of fishing effort, or of catch, are regarded as pure conservation measures as a way of achieving the biological conservation of fish stocks. Sub-purposes (i) and (iv) of the recently launched Ghana National Marine Fisheries Management Plan (2015 - 2019) seek to minimize the current pressure on fish stocks and to protect marine habitats and bio-diversity respectively. The strategies indicated in the plan to achieve those aims are to reduce the number of active fishing vessels, better protect sensitive marine ecosystems, closure of critical fish

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10 [http://www.fao.org/docrep/005/y3427e/y3427e06.htm](http://www.fao.org/docrep/005/y3427e/y3427e06.htm) (Accessed on 16th August, 2016 at 10:00 a.m.)
habitats (Marine Protected Areas), and the implementation of fishing holidays and closed fishing seasons. Such management tools are currently not in force in the fisheries in Ghana but research conducted confirmed that discussions on the implementation of these strategies were far advanced between government and other fisheries stakeholders suggesting that they were going to be established sooner than later. Reducing the number of active fishing vessels, establishing Marine Protected Areas and implementing closed fishing seasons have their related social consequences that serve as potential conflict issues in the fisheries in addition to the existing conflicts if their establishment and implementation are not very well thought through. Implementing such interventions are likely to result in the kind of fishery conflicts explained by Charles (1992) in his framework for analyzing conflicts in fisheries by describing conservation, rationalization and social paradigms and the policy objectives of a particular fishery as responsible for conflicts in the fisheries. Lessons could be drawn from the conservation of mangroves by some fishing communities along the coast of Ghana. Mangroves are one of the most unique ecosystems that sustain fish production. Mangrove trees are harvested and used as fuel wood for smoking fish. Sustainable harvesting of the trees is practiced by some communities but a major challenge in other communities is their overexploitation. Some fishers and other community members who have been sensitized and educated on the importance of mangrove ecosystems have an interest to protect these ecosystems especially in areas that have been set aside for conservation purposes. This is usually an issue of conflict between those with interests to protect mangrove ecosystems and those who want to exploit them for fuel wood for smoking fish.

4.5.9 Conflicts with the institution of chief fishermen
Traditionally, fisheries are controlled and managed at the community level by chief fishermen and their council of elders. The council of elders is a seven-member committee that is made up
of the chief fisherman as the chairman, a secretary, treasurer, financial secretary, chief linguist, and two senior advisors who are all unanimously selected by the fishing community. In some communities, the installation of chief fishermen is purely by inheritance through succession by individuals from the same family not necessarily from father to son. In other communities, inheritance does not play any role in the installation of chief fishermen but rather chief fishermen are duly elected by members of the fishing community. These depend on the history of leadership succession in the different fishing communities. In cases where they are elected, fishers prefer to elect respectable people from the fishing community with fishing experience that are honest, fair and firm and have adequate knowledge of fisheries issues to become their chief fisherman. If chief fishermen are installed without the prior approval by the general fishing community based on the qualities they are looking for, fishers rebel against that decision, do not respect the authority of the chief fisherman and may end up in Type I conflicts (who control the fishery). Instances have occurred where fishers have protested against the installation of chief fishermen who didn’t perform up to expectation to be overthrown and replaced by more competent people. Some of those cases ended up in court when they were not able to be resolved by the fishing communities themselves. Such matters are taken seriously by the courts since the courts respect the fact that fishers have the right to choose who they deem fit to become their chief fishermen. When such matters get to the court, the court rules in favour of the protesters and asks the families concerned to nominate another person for the office of the chief fisherman if the installation is done through inheritance. Fishers are given the power by the court ruling to elect and install another person they deem fit as the chief fisherman if the installation is done through the electoral process.
4.6 GOVERNANCE, MANAGEMENT AND INTER-AGENCY FISHERIES CONFLICTS
Most of the conflicts described in the previous sections are more of conflicts that occur at the community level and are associated with fish production activities at sea and at the landing sites during fish post-harvest operations. Apart from those types of conflicts in the fisheries, there are also issues with governance and management of the fisheries which create conflicts both at the community and national levels involving fisheries agencies and other ocean governance agencies. These are examples of Type V conflicts which characterize the relationships between fishers and non-fishery issues. The Fisheries Act 625 recognizes the multi-sectorial nature of fisheries and hence recommends the collaboration and cooperation with other relevant agencies to effectively carry out the mandate of the Fisheries Commission. Section 2 (2) of the Act states that, *the Commission shall in relation to fisheries perform the following functions* some of which are: (i) correlate fisheries with other water uses, (m) in collaboration with the competent authority, establish requirement for manning fishing vessels and boats and (o) in collaboration with District Assemblies with fishing communities, ensure the enforcement of the fishery laws. Section13 reads; *in the discharge of its functions under the Act, the Commission shall, cooperate fully with all government departments and agencies and other public authorities.*
Overlaps in management roles and responsibilities of ocean governance institutions are impetus for fisheries conflicts at the national level. Management conflicts also occur between central government fisheries agencies and traditional fisheries authorities. Some of these conflicts are presented below.

4.6.1 Conflict between central government fisheries and traditional fisheries authorities
According to Lane and Stephenson (2000), fisheries management has traditionally been top-down which normally causes a rift between regulators and those being regulated. In Ghana, the Ministry of Fisheries and Aquaculture Development and the Fisheries Commission are the
central government fisheries institutions with the oversight responsibility to manage fisheries and 
fisheries matters in the country. The Fisheries Commission provides a general administrative 
structure for fisheries and functions more at the national level by formulating fisheries policy, 
managing regional fisheries staff and also conducting fisheries research. Traditional fisheries 
authorities (chief fishermen and council of elders) are more effective at managing fisheries at the 
community level. Traditional fisheries authorities implement local fisheries regulations, 
command authority, and are respected locally by fishers at the community level. For a more 
efficient management system, it will be argued that responsibility for certain fisheries 
management functions should be devolved to the community level, while the Fisheries 
Commission keeps the responsibility for performing functions such as policy formulation. 
Fishers, including chief fishermen, are sometimes of the view that they have the right to fish and 
manage their own activities without any control by the Fisheries Commission because fish in the 
water is a common property which belongs to the community. Management approaches for 
fisheries in Ghana has largely been top-down. Chief fishermen sometimes resist the management 
authority of the Fisheries Commission because they feel that their traditional leadership positions 
are threatened in those circumstances. The Fisheries Commission sometimes finds itself in 
conflict with local fisheries authorities due to what fishers perceive as the Fisheries Commission 
failing to recognize the authority of chief fishermen. Devolution of management functions by the 
Fisheries Commission to the community level creates an avenue for conflict in the fisheries. This 
has negatively impacted on the success of fisheries co-management and has contributed to the 
decline in marine fisheries in Ghana.

4.6.2 Conflict between the Fisheries Commission and the Directorate of Fisheries

Aside conflicts between fisheries and other sectors, management conflicts also occur between 
different arms within the Fisheries Commission. Conflict between the Fisheries Commission and
the Directorate of Fisheries is a good example of such conflicts. The Directorate of Fisheries perceives that some of their management roles and responsibilities are sometimes overshadowed by the Fisheries Commission. The Fisheries Commission is a 10-member Commission with a specific role in the coordination of policies while the Directorate of Fisheries is the implementing arm of the Fisheries Commission and the Ministry. The Directorate of Fisheries performs the day-to-day operations and implementation of management activities in relation to the policy directives of the Commission and the Ministry. Section 6 (1) of the Fisheries Act states that: *the Commission shall meet for the dispatch of business at times and places determined by the members but shall meet at least once in every two months.* This supports the argument that, the Commission does not have a day-to-day management responsibility. Sections 14 and 15 (1) of the Act also provide respectively as follows: *there shall be a secretariat of the Commission; and the Commission may establish such Divisions in the Secretariat of the Commission as the Commission considers necessary.* The Secretariat of the Commission is the Directorate of Fisheries where the Director of Fisheries and other fisheries officers are situated. Section 15 (3) continues as follows: *the functions and numerical staff strength of each Division of the Commission shall be determined by the Commission and the head of each Division shall answer to the Director in the performance of the duties of the office.* This also indicates that the Divisions of the Commission which carry out the actual implementation of program activities report directly to the Director of the Commission and not directly to members of the Commission. Section 17 (1) reads; *there shall be appointed for the Commission a Director of Fisheries who shall be the head of the secretariat of the Commission; and 18 (1) (b) The Director shall subject to policy directives of the Commission, be responsible for the day-to-day management and administration of the Units of the Commission.* To conclude, implications are
that the Fisheries Commission and the Directorate of Fisheries are two separate but interconnected management structures with specified roles and responsibilities.

In spite of all the directives provided by the Act, there were instances that the Chairman of the Commission operated on full-time day-to-day basis from the offices of the Directorate of Fisheries and assumed some of the everyday responsibilities of the Director of Fisheries. Information gathered indicated that the Chairman had to see all letters addressed to the Directorate and influenced actions needed to be taken in response to those letters, had to decide on the use of resources meant for running the affairs of the Directorate and was also there at the office to see to people who came to the Directorate to discuss trivial issues which under normal circumstances should have been addressed by other officers employed by the Commission or at most the Director of Fisheries. In addition, the Chairman was the one who always had to represent fisheries in meetings and at all functions even if it was the responsibility of the Directorate to do so. The Chairman of the Commission took over the administrative responsibilities of the Director and therefore of the Directorate which created the conflict between the Fisheries Commission and the Directorate of Fisheries.

4.6.3 Registration and licensing of industrial and semi-industrial vessels
One other important issue that acts as a driver of inter-agency conflicts is the procedure involved in the registration and licensing of industrial and semi-industrial fishing vessels. The registration and licensing procedure is a long process that involves government agencies like as the Fisheries Ministry and Aquaculture Development, the Fisheries Commission, Registrar General’s Department, the Ghana Maritime Authority, the Transport Ministry, the Registrar of Ships as well as the Bank of Ghana. All these agencies have roles to play before industrial and semi-industrial vessels are registered and licensed to commence operation which makes it a complex
process. Conflicting inter-agency issues occur in such very complex circumstances when there is non-cooperation between agencies due to different registration and licensing requirement and other hidden interests.

Acquisition, registration and licensing procedures for industrial and semi-industrial vessels are clearly outlined in the Fisheries Regulations 2010 (LI 1968) and are described in the “Guidelines for the Registration and Licensing of Fishing Vessels (Industrial and Semi-industrial) in Ghana” document. The procedures are described as follows: With respect to the acquisition and registration of local industrial vessels, the applicant has to register a company in Ghana at the Registrar General’s Department and obtain a certificate of registration, certificate to commence business and company’s code, apply for a permit for importation of vessel from the Fisheries Minister and attach other supporting documents such as reports and certificates issued by other agencies such as the Ghana Maritime Authority. The application is forwarded to the Transport Minister for advice on the sea worthiness of the vessel. The Transport Minister then replies to the Fisheries Minister as to whether the said vessel should be allowed into the country or not. The Fisheries Minister may grant the permit for the importation of the vessel if the application is approved. When the vessel is imported, an application is made to the Registrar of Ships for registration under the national flag and issued with a Certificate of Registration and an official number. For the vessel to have a fishing license, an application for fishing registration and licensing is made to the Director of the Fisheries Commission who refers it to the Fishing License Evaluation Committee of the Commission for vetting and approval. A fishing registration number is then issued to the vessel after the submission of supporting documents that are issued by other agencies such as the Registrar General’s Department, the Ministry of Transport, the Ghana Maritime Authority and the Bank of Ghana and the inspection of the vessel
is done by the Fisheries Commission. A fishing license is then issued upon payment of a license fee.

With semi-industrial vessels, the applicant first submits an application to construct a fishing vessel to the Fisheries Minister for approval in consultation with the Transport Minister and the Minister responsible for Industries. Upon approval, the applicant then commissions a licensed surveyor to design and build the fishing vessel under the supervision of Ghana Maritime Authority in accordance with section 6 of the Ghana Shipping Act 645 (2003). Application for registration and licensing of fishing vessel is then submitted to the Director of the Fisheries Commission. Fisheries registration number is then issued to the vessel after submission of supporting documents such as reports and certificates issued by other agencies like the Ghana Maritime Authority, the Registrar General’s Department and an insurance company and inspection of the vessel by the Fisheries Commission. A fishing license is then issued upon payment of a license fee. These are very complex procedures associated with conflict of interest by the responsible government agencies.

4.7 EXISTING MARINE FISHERIES CONFLICT MANAGEMENT MECHANISMS
In order that marine fisheries continue to be of benefit to coastal communities in Ghana, it is important to have effective mechanisms in place for the management of these conflicts. In order to assess the effectiveness of existing conflict management mechanisms, there is the need for them to be identified, critically examined and subjected to critique. In this regard, the following conflict management and resolution strategies at different levels were identified and analyzed. Information gathered from fishers and fisheries authorities indicated that disputes that arise from conflicts within the fisheries are normally settled informally between the parties involved. In instances where the parties involved are unable to reach an agreement for informal settlement,
disputes are often resolved by the traditional fisheries authorities (chief fishermen and council of elders) depending on the parties involved, or through mediation by a fisheries settlement committee or a national fisheries arbitration committee set up by the Fisheries Commission, or through the judicial system in the courts. Generally, conflicts between the canoe and semi-industrial sectors are resolved at the community or national level depending on the home ports of the vessels. Industrial versus semi-industrial and canoe versus industrial conflicts are resolved mainly in Tema or Accra because industrial vessels mainly operate from the Tema fishing port which is close to the capital in Accra where the headquarters of the Fisheries Commission is located. However, based on the kind of conflict, especially in cases of violent clashes that become fatal, such conflicts are handled at the national level even if they occur at the community level. Violent conflicts which lead to the loss of human life and the destruction of property may also be treated as civil cases by the police. Below are the existing conflict management and resolution mechanisms for marine fisheries in Ghana which were identified through the research.

4.7.1 Informal conflict resolution mechanisms
Destruction of fishing gear and other equipment is the most reported issue that generates conflict within the fisheries at sea. Such conflicts and other forms of disputes may be resolved informally and immediately between the parties involved as and when they occur. Immediate resolutions are possible where an agreement is reached between the two parties. The parties in the conflict typically discuss and negotiate for a common understanding and agreement for settlement. Settlement does not always occur on the spot at sea. Issues may be verbally discussed and the parties may agree in principle for settlement of issues at a later time when they return home after fishing. Settlement comes in many forms depending on the nature of the incident, damage caused to life and property and the parties involved. It could be in the form of payment of compensation as in physical cash, portion of fish catch or replacement of damaged equipment. Also, the
affected party may just accept to pardon the offender and may not ask for any compensation depending on the extent of damage. When both parties are not able to come to a common understanding and agreement for an appropriate settlement, the affected party may report the incident to the traditional or national fisheries authorities for mediation. If the traditional or national fisheries authorities are unable to find an appropriate means to resolve the matter, it is then referred to the court.

4.7.2 Settlement of conflicts by traditional fisheries authorities
When parties involved in conflicts are unable to reach an agreement for settlement informally by themselves, issues may be settled by mediation through the chief fisherman and his council of elders through an arbitration committee which is chaired by the chief fisherman. One of the major duties performed by the chief fisherman and his elders is to mediate and resolve conflicts at the landing site. Normally, the affected party in the conflict first reports the case to the chief fisherman who listens carefully to the complaint and asks a few questions to get a good understanding of the issue. The chief fisherman and his council of elders typically invite those involved in the conflict to sit in a meeting at the office of the chief fisherman to discuss the issue and to find an amicable solution. Such meetings are usually held on fishing holidays when people are free to attend. When those involved in the conflict are present at the office of the chief fisherman, they are asked to tell their sides of the story. The chief fisherman further interrogates by asking more questions to have a clearer understanding of issues before making his judgment which are normally based on his experience as a fisherman, the presentations from the parties and the supporting evidence which may be a display of the item destroyed. The chief fisherman may ask those found guilty to pay fines or compensations or replace damaged equipment in case of damage to equipment and property. Payment of compensation may be full or partial
depending on the extent of damage caused. An appropriate compensation arrangement is made and agreed upon by all parties and documented in the presence of the chief fisherman.

Some fishing communities have Community-Based Fisheries Management Committees chaired by the chief fisherman which have the primary responsibility to manage fisheries at the community level. Conflict issues may also be resolved by Community-Based Fisheries Management Committees if the fishers or the fishing vessels involved operate from the same landing site and there is a functional Community-Based Fisheries Management Committee. When fishers from different communities are involved cases may be handled at the regional level by the office of the Regional Director of Fisheries. If issues are not resolved at the regional level, then they may end up at the national arbitration committee in Accra. However, fishers indicated that most cases are usually resolved informally between the parties involved or at the level of the chief fisherman. If cases are not resolved at that level, they may be sent to the police or a formal court but the police and the court usually redirect them back to chief fishermen because the police and the courts normally do not have very good knowledge of fisheries issues and the law. Conflict cases about the sale and marketing of fish at the community level are mediated and resolved by the chief fishmongers and their council of elders through a similar procedure but chief fishmongers may seek support from the chief fishermen especially when they are unable to resolve cases on their own.

4.7.3 Settlement of conflict by national arbitration committee
In instances where conflicts are not resolved by the traditional fisheries authorities at the community level, cases are reported to a national arbitration committee formed by the Fisheries Commission for mediation and settlement. The national arbitration committee works from the premises of the Greater Accra Regional Fisheries Commission located at the Tema fishing
harbour which is the busiest in the country in terms of representation of fisheries sectors and the
degree of fishing activity. According to one of the members of the national arbitration committee
who is a Senior Member with a long-time experience in the industry representing the semi-
industrial fisheries sector on the committee, the national arbitration committee was constituted
by the Fisheries Commission as a response to tackling the growing incidence of fisheries
conflicts that has besieged marine fisheries in the past couple of decades. However, frantic
efforts to acquire records as evidence of growing incidence of conflicts proved futile, which
gives a sense of poor records keeping by the arbitration committee. The committee comprises
representatives from the Fisheries Commission, chief fishermen and representatives from semi-
industrial and industrial fisheries but information gathered indicated that representatives from
industrial fisheries hardly attend meetings of the committee. The committee has a Chairman, a
Vice-Chairman and a Secretary who are all representatives from the Fisheries Commission.
Members of the committee work on voluntary basis who are not paid for the work they do.
Meetings of the committee take place as and when cases are brought forward to the committee.
Meeting proceedings of the committee are normally documented and copies of such reports are
sent to the Director of Fisheries in Accra on monthly basis.

Normally fisheries conflict cases are reported to the committee through a chief fisherman if a
canoe is involved. Members of the committee reported that the canoe sector has the highest
number of reported cases since the establishment of the committee in the mid-1990s. When cases
are reported to the committee canoe fishermen normally provide samples of equipment destroyed
in cases of damage as evidence to support their plea. Some canoe fishers sometimes present
photos of the incident taken with their cameras at sea as evidence. When semi-industrial vessels
are affected, cases are reported to the Ghana Inshore Fisheries Association. If both parties
involved are semi-industrial vessels, the Ghana Inshore Fisheries Association tries to handle the matter at their level. If issues cannot be resolved at the level of the Association, cases may be referred to the arbitration committee. If different sectors of the fisheries are involved, issues are resolved directly by the arbitration committee.

The procedure for handling issues of conflict by the arbitration committee is the same regardless of the fisheries sectors involved in the conflict. The affected party reports the issue to the chief fisherman in the case of a canoe or to the Ghana Inshore Fisheries Association if a semi-industrial vessel is involved. The chief fisherman or the Ghana Inshore Fisheries Association will then inform the arbitration committee about the incident in form of writing. In case of damaged equipment, the arbitration committee will then conduct an inspection of the equipment. After the inspection, the arbitration committee will then invite the parties involved for a meeting to discuss and resolve the issue. In the meeting, the affected party is first asked to present his side of the story. A few questions are asked by members of the committee for more information and clarity if necessary. Such questions normally include whether the affected party complied with relevant fishing and navigation rules. After that, members of the committee then ask the party alleged to have committed the offence to respond. Members of the committee will again ask a few questions about the response before making a decision. After a decision is made, the committee then decides on an appropriate fine or compensation to be paid to the affected party when the offender is found guilty. It could be payment for the fishing equipment or item destroyed or compensation for time lost in fishing since the equipment or item was destroyed, or both. In most cases, the big fishing companies have the means to pay if an industrial vessel is involved so they just agree to the decision of members of the committee and pay the fine. If immediate payment
becomes difficult, an appropriate payment agreement plan is recommended by the arbitration committee.

In case of damage, there is valuation of the damage by the arbitration committee to estimate the cost of the item destroyed before a final decision is made. After valuation of the damage, the affected party will be asked to provide an invoice for the damaged equipment from a recognized input supply shop. In order to ensure transparency in this process, both parties often work together to acquire a genuine invoice from a trusted supply shop. After the invoice is prepared the offender is asked to pay two-thirds of the total estimated cost while the affected party pays for the rest. After an agreement for payment is reached and the offender also accepts to pay then the conflict is resolved. If the party at fault does not accept the decision by the arbitration committee or accepts the decision but does not pay the fine, the case may be referred to the police who may either resolve the issue at their level or process and refer it to an appropriate court if the issue is such that the police are unable to come to a conclusion for a resolution. If the police or the court are unable to settle the matter, it is referred back to the traditional fisheries authorities or the national arbitration committee to find an amicable solution.

It was described that offenders usually have no objection to the decision taken by the arbitration committee so they willingly agree to the charges and accept to pay fines and compensation or replace damaged equipment. In instances where the offenders deny having committed the offence the disputants engage in long arguments and so the arbitration committee has to postpone the meeting for further investigations to be conducted. During the investigations, the arbitration committee organizes separate meetings to question both parties more into detail to gather more evidence to make an informed decision. Conducting further investigations to arrive at an appropriate decision is usually difficult for members of the arbitration committee.
4.7.4 Settlement of fisheries conflicts in court
The law court is the final point of conflict resolution when the parties involved in a dispute are not able to settle matters informally by themselves, through the chief fisherman and his elders or through mediation by the national arbitration committee. Fishers may seek justice through Ghana’s judicial system to resolve fisheries conflicts and disputes. In most circumstances, fisheries conflict cases particularly those involving canoe fishermen are resolved informally between the parties involved, through the chief fisherman or through mediation by the national arbitration committee because canoe fishermen are simply not interested in attending lengthy court proceedings which may take several months. They also cannot afford the costs involved in going back and forth as well as the costs involved in hiring the services of legal practitioners to represent them in court. Again, most fishermen are people who are not well educated about legal processes and are not familiar with attending court proceedings. Even if people are willing to go to court, they are discouraged to do so because they are afraid of getting prosecuted in court for other offences they might have committed with regards to fishing regulations and navigation rules. In view of this, fisheries cases that normally end up in court are those involving industrial and semi-industrial vessels and the Fisheries Commission for committing offences relating to non-compliance of the fisheries law and regulations.

4.7.5 Settlement of conflicts by the Fisheries Commission at the national level\textsuperscript{11}
The Fisheries Act 625 gives the Fisheries Commission the power to constitute a Fisheries Settlement Committee to address fisheries conflicts at the national level. Functions of the Fisheries Commission are provided by section 2 (2) of the Act. One of their functions is to hear and determine complaints from persons aggrieved in in fisheries matters. Section 9 (1) of the Act states that; \emph{the Commission may appoint committees it considers necessary for the effective}

\textsuperscript{11} Information for this section was taken largely from relevant provisions in the Fisheries Act 625 of 2002.
implementation of its functions. Section 10 (1) reads; there shall be appointed by the Commission from among its members a Fisheries Settlement Committee to hear and settle complaints from persons aggrieved in fisheries matters. Section 10 (3) states that: the Fisheries Settlement Committee may co-opt any specialist to assist it in the settlement of any issue before it. Section 10 (4) concludes that; the Fisheries Settlement Committee shall regulate its own procedures and shall in its deliberations act with fairness and in accordance with natural justice. It could be concluded from analysis of the Act that the Fisheries Settlement Committee is designed to address conflict issues more at the national level which involve the industrial and semi-industrial sectors who are the biggest players of the industry in terms of capital investment. Also, industrial and semi-industrial fisheries operators have more to do with the Fisheries Commission at the national level in terms of registration and licensing of vessels, as well as compliance and enforcement issues with the law. Canoe fisheries issues are handled more at the community level more so as they are not currently registered and licensed by the Commission at the national level. This argument is buttressed by section 78 (1-5) of the Act which state that; (1) there is established by this Act a Fisheries Appeals Board (2) A person affected or aggrieved by a decision of the Minister to (a) refuse to issue or renew a license under this Act; or (b) modify, cancel or suspend a license, may, within fourteen days of receipt of notification of that decision appeal first to the Fisheries Appeals Board for redress. (3) The Fisheries Appeals Board may confirm, reverse or vary the decision appealed against. (4) A person dissatisfied with the decision of the Appeals Board may seek such redress as that person considers appropriate from the courts. (5) The Fisheries Appeals Board shall regulate its proceedings and shall in its deliberations be guided by fairness and the rules of natural justice.
4.7.6 Challenges with the existing conflict management mechanisms
The following issues were identified as challenges with effective implementation of the existing conflict management strategies. Traditional fisheries authorities and members of the national arbitration committee have very important roles they play in managing conflicts in the fisheries at their levels but both institutions are not well resourced to work. Some chief fishermen do not have means of transport, office space and equipment like furniture, computer and stationery to work with. Some chief fishermen are also not formally educated and also do not have training in conflict management and resolution strategies so they may not be competent enough to mediate conflict cases even though they are the people who do it at the community level. In spite of the important roles they play, their roles and responsibilities are not recognized by law. Therefore, the execution powers of members of the arbitration committees tailor at a point where they can no longer act sufficiently to address and resolve fisheries conflict cases. The arbitration committees do not have the power to take certain actions against fishers who object to their rulings. Sometimes when cases are reported to the arbitration committees, members of the arbitration committees do not respond effectively in a timely manner which frustrates reporters. Sometimes committee members are not just willing to assist partly because they are not paid for what they do. They are not motivated to work also because they are not resourced with the basic facilities like the office equipment they need to work with. In instances where the committees are slow in acting, reporters may be asked by the committee to proceed to court which is not the best option for fishers partly because Ghana’s justice system does not effectively resolve fisheries disputes. Aggrieved people keep going back and forth to court until they become demoralized and finally give up. Even if the arbitration committee acts quickly in responding to cases, sometimes it is difficult for the committee to make a decision based on the presentations by conflicting parties. In rare circumstances, cases are dismissed by the arbitration committees on
the grounds that they are unable to arrive at a decision based on available evidence. In this case members of the arbitration committee get accused of being biased and are sometimes verbally or, in rare cases, physically assaulted. In conflict cases involving fishing vessels, the Fisheries Commission is able to track these vessels and apprehend them because these vessels are registered with the Commission and if they don’t comply with the sanctions their licenses may be withdrawn. However, in cases involving merchant vessels, the Fisheries Commission does not have the power to direct the merchant vessels to port. Therefore, it is difficult for the arbitration committees to resolve cases involving merchant vessels. In such circumstances, the Fisheries Commission has to call on the Ghana Ports and Harbors Authority for assistance to identify and direct the vessel to port or provide vessel track record as evidence. This is often a difficult procedure for the Fisheries Commission who finally gives up after all the frustrations.

4.8 CONCLUSION
The evidence shown in the previous sections of this chapter confirm that marine fisheries in Ghana are characterized with several conflicts, and in fact there are indications that there is the potential for more conflicts in the coming years if necessary actions are not instituted to manage the system. Overcapitalization in the fishing industry and the overexploitation of stocks, continuous decline in quantities of fish landed annually, scarcity of the resource leading to competition and conflicts among fishers are all reflections of management failure. The nature of the conflicts, as have been presented in this chapter, confirm that conflicts occur at different levels in the fisheries. Types of internal and external conflicts which occur in Ghana’s marine fisheries have been described using the typology of fisheries conflicts developed by Bennett et al. (2001). Types of marine fisheries conflicts, the parties involved in the conflicts and the specific conflict issues were summarized in Table 4.1. Existing interactions among fishers and government, occurrence and patterns of conflicts within the fisheries, governance and inter-
agency conflicts, existing conflict management and resolution mechanisms and their challenges were analyzed. It is concluded that human life and property are at stake in violent conflict cases and conflicts have the potential to cause further depletion of fish stocks leading to associated consequences. The complex nature of the conflicts requires the institution of more robust management mechanisms at all levels, considering the nature of the fisheries social-ecology. Types of conflicts in the fisheries, the nature and drivers of the conflicts and existing management mechanisms have been described in this chapter to provide the information base for the subsequent analysis of the issues and the assessment of strengths and weaknesses of existing conflict management and resolution mechanisms in chapter six. This will then lead to the contribution of knowledge required for improving the management of marine fisheries conflicts which is essential for the formulation of fisheries policy in Ghana. It is concluded from the typology of the conflicts that most of the conflicts are Type III conflicts which occur as a result of the relations between the fishery users suggesting that in the management of the conflicts, more effort should be directed at improving the relations between fishery users.
CHAPTER FIVE

5.0 CONFLICTS BETWEEN FISHERIES AND THE OIL AND GAS SECTOR

5.1 INTRODUCTION
The conflicts within Ghana’s marine fisheries have been extensively discussed in the previous chapter. In addition to the different types of conflict that occur within the fisheries, there are potential issues of conflicts between fisheries and other sectors (Smith and Vallega, 1991; Vallega, 1992; Smith and Vallega, 2002). These are classified as Type IV conflicts according to Bennett et al. (2001). However, this study showed that offshore oil and gas operations dominate in terms of impacts on marine fishing activities such as impact on the free passage of fishing vessels resulting in a loss of access to fishing grounds, damage to fishing vessels and gear, navigational hazards, competition for onshore facilities and potential adverse impacts on fishery resources, spawning grounds or nursery sites. These impacts translate into the occurrence of conflicts between the two sectors. Impacts of all other sectors on marine fisheries, and hence their conflicts with fisheries are minimal and less important in that respect. Based on that observation, fisheries and oil and gas conflicts justify a higher level of priority for research.

Challenges facing the marine fisheries sector in Ghana have been compounded by recent developments in the oil and gas sector and related matters, both on land and at sea. Oil and gas exploration and production activities are having impacts on the activities of fishers. How the exploitation of offshore oil and gas and its conflicts with fisheries is managed will be critical for the sustenance of marine fisheries and the benefits derived from the fisheries in Ghana.

Native fishing communities, particularly those along the west coast of the country, where oil and gas production activities are most concentrated, and their fishing activities now take place alongside oil and gas operations leading to competition for space in the marine environment and the creation of different types of conflicts between the two sectors. With the intensification of oil
and gas activities, conflicts between fishing and oil and gas production activities are bound to increase. In order to ensure the peaceful coexistence of both sectors there is the need to effectively manage existing conflicts, identify those that are likely to emerge and put systems in place to avoid conflicts or resolve them as and when they occur. This chapter identifies existing and potential fisheries and oil and gas conflicts, the drivers, causes and effects of the conflicts and their existing management mechanisms. This will provide the basis and set the stage for a detailed analysis and impacts of the conflicts and to propose more appropriate strategies for improving the management of the conflicts which will contribute additional knowledge required for fisheries and oil and gas sector policy formulation in Ghana.

5.2 OVERVIEW OF GHANA’S EMERGING OIL AND GAS INDUSTRY

5.2.1 Exploration, discovery and production of oil and gas in Ghana

Oil and gas exploration in Ghana is over 100 years old but these have intensified over the last decade. The West Africa Oil and Fuel Company (WAOFCO) started oil exploration in Ghana as far back as 1896. Only one of the five wells drilled by WAOFCO between 1896 and 1903 resulted in Ghana’s first oil discovery. Between 1909 and 1913, Societe Francaise de Petrole (SFP) also drilled wells in Ghana and found oil that produced some 7 barrels a day. Between 1923 and 1925 the African and Eastern Trade Corporation (AETC) joined and encountered oil and gas in the onshore Tano area. Thereafter, Gulf Oil Company also drilled wells in the Tano area from 1956 to 1957.

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12 Information presented here was largely obtained from the website of Ghana Oil Watch (http://ghanaoilwatch.org/index.php/ghana-oil-and-gas-news/1007-a-concise-history-of-oil-and-gas-exploration-in-ghana) in April, 2015 in an article titled: A Concise History of Oil and Gas Exploration in Ghana authored by Osei Bonsu Dickson, a Ghanaian Barrister and Solicitor. A smaller portion was obtained from the website of Tullow Oil Ghana Ltd (http://www.tullowoil.com/operations/west-north-africa/ghana) in April, 2015 and the rest from the Non-Technical Executive Summary of the Environmental Impact Statement of Tullow Oil Ghana Ltd Ghana Jubilee Field Phase 1 Development.
Between 1960 and 1967, Soviet and Romanian geo-scientists started prospecting for petroleum resources in the Volta Basin which culminated in a shift from onshore to offshore shallow water exploration. New companies came onboard after 1967, who continued with offshore drilling activities, leading to the maiden discovery of hydrocarbons in the Saltpond Basin in 1970 by Signal Amoco. Agripetco started the first offshore commercial hydrocarbon production in the Saltpond Basin in 1975, which to date produces about 600 barrels of oil a day.

Ghana's first petroleum law, the Provisional National Defense Committee Law 64 (PNDCL 64) was passed in 1983, with the establishment of the Ghana National Petroleum Corporation (GNPC). Between 1983 and 1989, GNPC entered into agreements with oil firms like Amoco to engage in further prospecting for oil and gas in Ghana. The GNPC subsequently drilled wells that established the viability of three fields in the Tano area. During the early 1990s, there were domestic attempts at appraising earlier oil and gas discoveries. The GNPC led many to undertake offshore exploration activities which resulted in the generation of data for future oil search.

In 2004, Ghana issued licences for offshore oil exploration and production to different international companies. In July 2007, Tullow Oil plc and Kosmos Energy discovered oil in commercial quantities in the Western Region of Ghana and called the area “Jubilee Field”. The Jubilee Field is approximately 110 km² and is found about 60km off the Ghanaian west coast. The Jubilee Field started producing oil in December 2010. Further oil discoveries have been made since 2007 but the Tweneboa Field seems to be a second major discovery. In May 2013, the Plan of Development for the field was approved by the Government of Ghana.
5.2.2 Legal and regulatory frameworks for oil and gas in Ghana

The existing laws, institutional and regulatory frameworks for oil and gas development and production activities in Ghana are outlined below. Currently, the management of oil and gas operations in Ghana are vested in the powers of the Ministry of Energy and Petroleum which has an oversight responsibility to formulate, implement, monitor and evaluate petroleum sector policies. A Petroleum Commission also exists with the responsibility to regulate and manage the use of petroleum resources and to coordinate their policies. In addition to the Ministry of Energy and Petroleum and the Petroleum Commission, there is also the Ghana National Petroleum Corporation which supervises the exploration, development, production and disposal of petroleum resources.

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Information presented under this section were quoted from and based on relevant sections of the laws and policy documents referred to under the section.
petroleum. The National Petroleum Authority is also in place to regulate, oversee and monitor activities in the petroleum downstream industry.


The Petroleum Exploration and Production Bill 2014 is meant to increase the fiscal terms presented in the Petroleum Exploration and Production Law 1984 and to introduce new fiscal provisions. The Bill introduces regulatory provisions covering regulations on infrastructure installation and operations, health, safety and environment and liability for pollution, and also touches on the institution of safety zones round oil and gas installations which will reduce the occurrence of conflict between fisheries and oil and gas activities at sea. However, there are no provisions to protect fishermen against social, economic and livelihood losses which occur as a result of petroleum activities. In addition to the laws, there are other oil and gas policy frameworks which include the National Energy Policy 2010, Local Content and Local Participation in Petroleum Activities Policy Framework 2010, and the Energy Sector Strategy and Development Plan.
5.3 POTENTIAL IMPACTS OF OIL AND GAS ACTIVITIES
The International Monetary Fund (IMF) estimates that the Jubilee Field will generate about US$1 billion revenue a year for the next twenty years (cited in Gyimah-Boadi and Prempeh, 2012) or a cumulative of US$20 billion over the period of 2012-30 (Gary, 2009). Asafu-Adjaye (2010) indicated that production from the Jubilee Field could increase the GDP growth rate by 3.5 percent per annum but oil production per se will not have a huge impact on the economy under a business-as-usual scenario. Asafu-Adjaye (2010) concludes that oil and gas production will increase household disposable income but will this will imply a faster growth in domestic prices. The Friedrich-Ebert-Stiftung in Ghana in collaboration with You-net conducted a quantitative survey across the ten (10) Regions of Ghana (Plänitz and Kuzu, 2015) and found out that, since oil and gas production started, prices have continued to increase for most basic commodities everywhere in Ghana. However, expectations of massive employment opportunities in the oil and gas sector has not been realized. In spite of the socio-economic benefits of the oil and gas sector, oil and gas exploration and production are also associated with adverse impacts as have been outlined below.

There is a general saying which is supported by Schubert (2006) that oil and gas discovery can be a blessing or a curse because of the positive and negative impacts that oil and gas exploration and production activities can bring. Empirical evidence shown by van der Ploeg (2011) suggests that either outcome is possible. Gyampo (undated) predicts that Ghana’s oil find could be a curse in the absence of good governance. Globally, there are good examples of cases where oil and gas find has become a blessing or a curse for producing countries like the case of Norway and the Niger Delta in Nigeria respectively (Kumah-Abiwu et al., 2015). The discovery of oil and gas could possibly multiply government revenue. If managed well, oil and gas revenue could bring significant earnings into a country (Okuthe, 2015). In spite of oil and gas benefits, exploration
and production involve several activities that can have adverse impact on the environment (Sakyi et al., 2012). Oil and gas production and related activities are known to affect the health of community members who reside close to production sites (INSPQ, 2015; Darkwah, Undated). Influx of oil and gas expatriates and other migrants to exploration and production areas cause health hazards through the introduction of new diseases (Oluduro and Durojaye, 2013). Explosions from oil and gas pipelines are also known to cause injuries and deaths in local communities. Oil and gas operations can also have significant effects on living marine resources including commercially important fish stocks (ITOPF, 2011). There is the need therefore, to ensure best practices in the development of oil and gas resources and reduce potential socio-economic, environmental and marine fisheries conflicts.

5.3.1 Socio-economic impacts of the oil and gas industry in Ghana
It is acknowledged that oil and gas activities can have both positive and negative social impacts but in terms of fisheries and oil and gas conflicts, focus on negative impacts which are drivers of the conflicts between the two sectors is critical. Currently, oil and gas production activities are concentrated in western Ghana with exploration activities in other parts of the country still in progress making coastal communities and people in the Western Region the most and directly affected by the negative impacts of oil and gas field operations. Ghana’s Western Region is going through massive economic transformation and change in terms of physical infrastructure development for the oil boom which is having significant social and environmental impacts, and impacts on fisheries and coastal communities. The oil and gas companies operate from the Takoradi metropolis, the political, administrative and commercial capital of the Western Region, and also a fishing hub in the Region. Old and abandoned industrial facilities and housing units in  

14 http://insideenergy.org/2017/05/25/back-to-back-oil-gas-explosions-rattle-colorado-communities/
the metropolis are being refurbished to accommodate the development of oil and gas. The airport and the harbour in Takoradi have never been as busy and congested as they are today because of patronage by oil and gas operators.

Findings from the quantitative survey conducted by Plänitz and Kuzu (2015) on oil and gas production and the transformation of livelihoods of communities in all 10 Regions of Ghana are summarized as follows. The study showed that the Sekondi-Takoradi metropolis in the Western Region of Ghana has recorded population rise since oil and gas production started in 2010. As a result of population rise, housing costs as well as the cost of living have also increased in recent times. There was 139.1% increase in the price of water in the Western Region between 2009 and 2013. Direct observation in coastal communities in the Western Region indicates that farmlands are currently being used for the siting of onshore oil and gas facilities leading to loss of farming opportunity. Also, direct observation in the Takoradi metropolis reveals that a lot of women engage in prostitution which has the potential to increase the occurrence of sexually transmitted diseases such as HIV/AIDS.

5.3.2 Potential environmental impacts of oil and gas production activities
To identify drivers of marine fisheries and offshore oil and gas conflicts, there is need to discuss the potential negative impacts of oil and gas operations on the marine and coastal environment. Oil and gas impacts on the environment depend upon the nature of the environment and the effectiveness of planning, pollution prevention, mitigation and control techniques (E&P Forum/UNEP, 1997). Before the extraction of oil and gas, seismic surveys are carried out to detect potential reserves deep below the ocean floor. Potential environmental impacts of seismic surveys include the destruction of benthic communities which are important in the marine food web. The exploration, development and production can result in discharge of wastes which can
have an adverse effect on the environment if not properly discharged and managed. Oil production and transportation could lead to oil spills that can disrupt animal and plant life.

5.3.3 Impacts of oil and gas production activities on fisheries
Adusah-Karkari (2015) explains that offshore oil and gas production activities impact on the livelihoods of coastal community dwellers. Fishermen are the most significantly affected by the development of offshore oil and gas operations (Cicin-Sain and Tiddens, 1989). According to Grant (1978), the extraction of hydrocarbons involves the building of installations and devices which impact on the free passage of fishing vessels resulting in a loss of access to fishing grounds. They pose a hazard to shipping, extraction debris can damage fishing vessels and their gear, and oil spill can damage fish stocks and their food. Miles and Geselbracht (1986) give a more comprehensive description of the impacts of oil and gas on fisheries by saying that, fishermen could experience loss of fishing opportunity, face increased navigational hazards, incur damage to fishing gear, face increased competition for onshore facilities, incur problems in the marketability of fishery products and face possible adverse impacts on fishery resources, spawning grounds or nursery sites.

Narrowing down to the Ghanaian context, Dowokpor (2015) documented that fishermen in the Western Region of Ghana are directly affected by the offshore oil and gas production activities. Fishers are not allowed to fish in or close to oil and gas exploration and production exclusive zones which leads to loss of fishing opportunity. This research identified that this is perhaps the most important issue of conflict between fisheries and the oil and gas sector at the production level. Dowokpor (2015) related the issue to the indirect impact that oil and gas production activities have on fish traders by saying that fishermen’s catch are negatively affected by oil and gas activities which, in turn, has a direct bearing on the quantities of fish that fish traders receive
from fishermen for sale leading to decreases in the income of fish traders. However, this conclusion requires in-depth scientific research. Apart from the negative impacts of oil and gas activities on fisheries, fishing communities have benefitted from corporate social responsibility of oil and gas companies such as community day care centres for children. According to Boohene and Peprah (2011), pollution from oil and gas activities in Ghana is inescapable. Oil and gas activities can cause chemical pollution of water bodies, air and noise, as well as plant pollution. Coconut trees and other crops along the coast of Ghana are likely to suffer from absorption of poisonous substances that will affect the process of photosynthesis. This poses health threats to people who consume coconut on a large scale.

5.4 CONFLICTS BETWEEN THE FISHERIES AND OIL AND GAS SECTORS

5.4.1 Conflicts between fisheries and oil and gas production activities
With the discovery and production of oil and gas and the intensification of more exploration activities in the marine waters of Ghana, oil and gas development issues regarding the impacts on the Ghanaian economy and environment have been discussed by sections of the Ghanaian public (Asafu-Adjaye 2010; Kumah-Abiwu et al., 2015; Plänitz and Kuzu, 2015). Marine fisheries and offshore oil and gas interactions at different levels and impacts have not been left out of the discussions (Friends of the Nation, 2013). Some of these discussions have centred on genuine concerns while others are based on speculations and perceptions of the public. In order to confirm the existence of conflicts between the two sectors, responses from conversations with stakeholders such as fishers and other fishing community members, operators in the oil and gas industry, fisheries managers and officials of the Environmental Protection Agency to certain critical questions as detailed below were analysed. Some of the questions include but not limited to the following. Are there really conflicts between fisheries and oil and gas production activities? What are the issues and the nature of the conflicts? Conversations with fishers,
fisheries authorities and oil and gas stakeholders revealed that different types of conflicts certainly occur between fishing and the oil and gas industry at different levels some of which have been described below.

5.4.2 Nature of the conflicts between fisheries and the oil and gas industry
Governance, management and inter-agency fisheries and oil and gas conflicts occur at the national level due to overlapping roles and responsibilities of fisheries and other ocean governance institutions. Roles and responsibilities of ocean governance institutions are sometimes not clearly defined by existing legal frameworks for ocean governance in Ghana (Tsamenyi, 2013). In addition to the inadequacies in the legal frameworks, this research found that there is also lack of coordination and communication among ocean governance institutions in the execution of their mandates. Fisheries and oil and gas conflicts also occur at the production and community level involving local fishermen, fishing communities and oil and gas production companies and their production activities. The siting and construction of oil and gas facilities at the coast impede the activities of local fishermen which creates conflicts between them and the oil companies. Underwater oil and gas pipelines have been laid from offshore oil production platforms all the way through fishing communities to oil and gas processing plants sited onshore which restricts free movement and other activities of local fishermen. Fishing activities take place alongside oil and gas operations which leads to traffic congestion at sea involving fishing vessels and oil tankers and supply vessels (Friends of the Nation, 2013). Fishers reported cases of accidents at sea between oil and gas supply vessels and fishing vessels causing damage to fishing gear and other equipment but could not be specific to state how many cases. Fishing activities are prohibited in certain areas of the sea reserved for oil and gas operations. Fishers disagree and refuse to cooperate with enforcement agencies to fish in such areas. Community people sometimes come into conflict with government regarding government
decisions which to fishers are in favour of oil and gas and have negative impacts for fisheries. Conflicts also arise when promises to the fisheries sector by government in support for oil and gas operations are not fulfilled or corporate social responsibilities of oil and gas companies to fishers are not delivered (Amin, 2011). Conflicts also occur because of fishers’ negative perceptions about the oil and gas industry and changes in the fisheries. Fishers blame oil and gas operations for the reduction in quantities of fish landed. For the fisherman in the Western Region, every fisheries misfortune is attributed to oil and gas development activities. Fishers have attributed the increase in number of dead whales that have been washed ashore and the quantum of aquatic weeds that are sent by waves to the shore in the Western Region in recent times to oil and gas. These perceptions create animosity with operators in the oil and gas industry and create conflict between fishers and oil and gas companies.

**DRIVERS OF CONFLICTS BETWEEN FISHERIES AND OIL AND GAS INDUSTRY**

There are a range of drivers behind the fisheries and oil and gas conflicts as outlined below.

### 5.5.1 Election campaigns and promises by political party officials

Presidential and parliamentary election campaigns and promises by political party officials are among the issues responsible for driving conflicts between the fisheries and oil and gas sectors in Ghana. Just a year before the 2008 presidential and parliamentary elections in Ghana, the country had just discovered oil. Typical of election campaigns in Ghana, political party officials took advantage of the discovery of oil and gas to conduct their campaigns and give promises to coastal communities, particularly in the Western Region. Some of the opposition political parties then, in their campaign in 2008, promised to allocate 10% of revenue that would accrue from the newly found oil towards the development of the Western Region if they were voted to power. The traditional authorities and people of the Western Region bought the idea and voted for an opposition party to win the elections. Oil and gas production started in 2010 just after a year that
the new government had assumed office in early 2009 but perceptions of the people were that such promises to the people of the Western Region had not been fulfilled. The notion that the people of the Western Region have not benefitted from the oil and gas find motivates the people of the Western Region to oppose the work of the oil and gas industry. Fishers in the Western Region have the same notion which creates tension and conflict between the fisheries and oil and gas sectors. Fishers are of the view that oil and gas production would impact negatively on their livelihoods so they must receive adequate compensation from oil and gas revenue.

5.5.2 High expectations from fishers after the oil and gas find
When the news broke that oil and gas had been discovered in commercial quantities in Ghana, many were those who thought were going to be employed by the oil and gas industry to be engaged in oil related jobs. Fishers in the Western Region were no exception. Many fishers thought they were going to have jobs with the oil and gas industry and were prepared to leave fishing for more lucrative jobs in the oil and gas industry to better their living conditions without even thinking about whether or not they had the requisite skills to be employed for oil related jobs. Other fishers also thought that their fishing businesses were going to receive a boost because of the oil find. In addition to the fact that political campaign promises by aspiring political parties were not fulfilled, fishers’ expectations of securing better jobs with oil companies were also not realized. Fishing businesses were also not seen to have improved due to oil and gas developments in the Western Region. These have also created tensions that drive conflicts between fishing industry operators and operators of the oil and gas industry.

5.5.3 Increase in death toll of marine mammals and other organisms
There is an emerging phenomenon that is currently occurring along the west coast of Ghana.
Dead whales keep washing ashore while at the same time there are large volumes of dead and decaying aquatic weeds that are also sent to the shore by sea waves. Many fishing communities
now find decomposing *Sargassum* on their seashores, which entangle their fishing nets and motor engines. Fishermen link this situation to the oil production (Ackah-Baidoo, 2013).

According to information gathered from the Environmental Non-Governmental Organization, Friends of the Nation from the Western Region in 2014, 21 dead whales were washed ashore between 2009 and 2013, and the death toll is expected to increase in the coming years. There were attempts by the Environmental Protection Agency and other government agencies to establish the causes of these occurrences but no definite reasons have been assigned. No one seems to know the exact cause but fishers have again blamed it on the impacts of oil and gas activities. Also, there were instances where foreign substances believed to be oil spill from oil and gas installations were sighted by fishers along the west coast. Fishers’ perception that oil and gas development activities are impacting negatively on their environment which has consequences on their fish catch drives conflicts between fisheries and oil and gas.

**5.5.4 Perceived contribution of fisheries and oil and gas to the economy of Ghana**

There is the general belief that oil and gas has more potential to transform Ghana’s economy than fisheries. This research, through conversations with stakeholders at different levels revealed that just as ordinary Ghanaian citizens see oil changing the fortunes of the country, Government of Ghana authorities also perceive that the oil and gas industry has more prospects to create significant impact on Ghana’s economy than fisheries and so they readily provide the enabling conditions for the oil and gas industry to thrive even if at the expense of the fishing industry. For instance, information gathered through this research showed that fishing activities are prohibited in areas of the sea demarcated for oil and gas exploration and production. Can certain areas of the sea as well be set aside purposely for fishing and oil and gas exploration activities not allowed in those areas? Fishers perceive that the oil and gas sector is considered as more important than the fisheries sector. This perception by fishers translates into fishers’ interactions
with oil and gas players. This is one of the issues that drive conflicts between fisheries and the oil and gas sector.

5.5.5 Other drivers of conflicts between fisheries and oil and gas sector
Land, rivers and other water bodies in the Western Region are being polluted with substances that coastal communities believe are coming from oil and gas production activities. Fishers in the Western Region have observed that sea turtles now spend more time on land than in the sea because the sea has been polluted with substances coming from offshore oil and gas operations. Farmlands belonging to fishing communities, wetlands and other critically important coastal habitats are being taken over for oil and gas related developments. There is increase in maritime traffic due to an increase in number of oil supply vessels which is causing accidents at sea involving oil tankers and fishing vessels. All of these developments have been attributed to the emerging oil and gas industry which is fuelling issues leading to conflicts between fisheries and oil and gas.

5.6 ANALYSES OF INTERACTIONS AND OCCURRENCE OF CONFLICTS BETWEEN FISHERIES AND OIL AND GAS SECTORS
Having adequate understanding of the conflicts between fisheries and the oil and gas sector requires the determination of whether or not interactions exist between the fisheries and oil and gas sectors and also between the oil and gas sector and government. Then it is important to determine whether or not existing spatial interactions lead to the occurrence of conflicts or if the issues go deeper (Smith and Vallega, 1991; Vallega, 1992; Smith and Vallega, 2002). It is also important to know whether the fisheries sector has conflicts with the oil and gas sector and not vice versa and also whether the oil and gas sector has conflict with government and vice versa. Table 5.1 below is an extension of Table 4.2 in chapter four which shows the results from the analysis of occurrence and patterns of conflicts between marine fisheries and the offshore oil and
gas sector at different levels. The results indicate that interactions actually exist between the two sectors. Conflicts were found to occur within the oil and gas sector. The oil and gas sector has conflicts with the fisheries sector. All the fisheries sectors have conflicts with the oil and gas sector regarding restriction of fishing in oil and gas exclusion zones, destruction of fishing gears and pollution. The oil and gas sector has conflicts with government, and government also has conflicts with the oil and gas sector regarding environmental impact assessment and enforcement of oil and gas production rules and regulations. These results conform to the observation by Sandole et al. (2009) that everything can be conflicting.
Table 5.1: Occurrence and patterns of internal and external marine fisheries interactions and conflicts

<table>
<thead>
<tr>
<th></th>
<th>Canoe</th>
<th>Semi-industrial</th>
<th>Industrial</th>
<th>Government</th>
<th>Oil and Gas</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Canoe</strong></td>
<td>Conflicts occur within the canoe fishery sector; e.g. competition for inputs such as pre-mix fuel, fishing space, fish, fish catch shares fishing gear and fishing methods, fish marketing and installation of chief fisherman.</td>
<td>Canoe sector has conflicts with semi-industrial sector; e.g. competition for fishing space, fish, fishing gear and fishing methods, and fish marketing.</td>
<td>Canoe sector has conflicts with semi-industrial sector; e.g. competition for fishing space, fish, fishing gear and fishing methods, and fish marketing.</td>
<td>Canoe sector has conflicts with Government; e.g. supply of fishing inputs, top-down management approach and enforcement of fishing rules and regulations.</td>
<td>Canoe sector has conflicts with the oil and gas sector; e.g. restriction of fishing in oil and gas exclusion zones, destruction of fishing gears and pollution.</td>
</tr>
<tr>
<td><strong>Semi-industrial</strong></td>
<td>Semi-industrial sector has conflict with the canoe sector; e.g. competition for fishing space, fish, fishing gear and fishing methods.</td>
<td>Conflicts occur within the semi-industrial sector; e.g. competition for fishing space, fish, fishing gear and fishing methods, and fish marketing.</td>
<td>Semi-industrial sector has conflicts with the industrial sector; e.g. competition for fishing space, fish, fishing gear and fishing methods.</td>
<td>Semi-industrial sector has conflicts with Government; e.g. supply of fishing inputs, vessel registration and licencing and enforcement of fishing regulations.</td>
<td>Semi-industrial sector has conflicts with the oil and gas sector; e.g. restriction of fishing in oil and gas exclusion zones, destruction of fishing gears and pollution.</td>
</tr>
<tr>
<td><strong>Industrial</strong></td>
<td>The industrial sector has conflicts with the canoe sector; e.g. competition for fishing space, fish, fishing gear and fishing methods.</td>
<td>Industrial sector has conflicts with the semi-industrial sector; e.g. competition for fishing space, fish, fishing gear and fishing methods.</td>
<td>Conflicts occur within the industrial sector; e.g. competition for fishing space and fish.</td>
<td>Industrial sector has conflicts with Government; e.g. supply of fishing inputs, top-down management, vessel registration and licencing, enforcement of fishing regulations.</td>
<td>Industrial sector has conflicts with the oil and gas sector; e.g. restriction of fishing in oil and gas exclusion zones, destruction of fishing gears and pollution.</td>
</tr>
<tr>
<td><strong>Government</strong></td>
<td>Government has conflicts with the canoe sector; e.g. enforcement of fishing rules and regulations.</td>
<td>Government sometimes has conflicts with the semi-industrial sector; e.g. over catch returns, vessel registration and licensing.</td>
<td>Government sometimes has conflicts with the industrial sector; e.g. over catch returns, vessel registration and licensing.</td>
<td>Ocean governance and management institutions come into conflict due to overlaps in roles and responsibilities and inadequacies in legal framework for ocean governance.</td>
<td>Government has conflicts with the oil and gas sector; e.g. environmental impact assessment and enforcement of oil and gas production rules and regulations.</td>
</tr>
<tr>
<td><strong>Oil and Gas</strong></td>
<td>Oil and gas sector has conflicts with the canoe sector.</td>
<td>Oil and gas sector has conflicts with the semi-industrial sector.</td>
<td>Oil and gas sector has conflicts with the industrial sector.</td>
<td>Oil and gas sector has conflicts with Government.</td>
<td>Conflicts also occur within the oil and gas sector.</td>
</tr>
</tbody>
</table>
Table 5.2 is an extension of Table 4.3 to include interactions between fisheries and oil and gas, and interactions between oil and gas sector and government. Table 5.2 shows the degree of interactions between fisheries and the oil and gas sector and degree of interactions between oil and gas sector and government on a scale of 1 – 3 (3 is the strongest). The numbers presented in Table 5.2 are derived based on the intensity of the positive or negative interactions that occur within the same fisheries sector or between fisheries sectors, between fisheries sectors and government, between the fisheries and oil and gas sectors, between the oil and gas sector and government, within the oil and gas sector, and within government agencies. The positive numbers indicate positive interactions where the interactions are mutually beneficial and lead to cooperation in fisheries while the negative numbers depict negative interactions which lead to conflicts. Table 5.2 shows that the oil and gas sector interacts negatively on the same degree with the canoe and semi-industrial sectors of the fisheries but has less negative interactions with the industrial sector. This directly translates into the level of conflict between the oil and gas sector and the 3 sectors of the fisheries. The level of interaction and hence the conflict between the oil and gas sector and the industrial sector is less because industrial fishers have more knowledge in maritime regulations and navigation rules than the canoe and the semi-industrial sector and therefore have less interference with oil and gas production activities. The oil and gas sector interacts positively with government because government is the regulator and the oil and gas companies would not want to have conflicts with government. This notwithstanding, there is sometimes conflict between the oil and gas sector and government as presented in the section on inter-agency conflicts. Government interacts positively with the oil and gas sector partly because the oil and gas sector is seen by government as very key in the generation of income for national development. Even though there is a positive interaction, there is sometimes conflict.
Table 5.2: Assessed interaction matrix of fisheries and oil and gas sectoral interactions and interactions with government.

<table>
<thead>
<tr>
<th></th>
<th>Canoe</th>
<th>Semi-industrial</th>
<th>Industrial</th>
<th>Government</th>
<th>Oil and Gas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canoe</td>
<td>-3</td>
<td>-2</td>
<td>-1</td>
<td>+1</td>
<td>-2</td>
</tr>
<tr>
<td>Semi-industrial</td>
<td>-2</td>
<td>-2</td>
<td>-2</td>
<td>+1</td>
<td>-2</td>
</tr>
<tr>
<td>Industrial</td>
<td>-1</td>
<td>-2</td>
<td>-1</td>
<td>+1</td>
<td>-1</td>
</tr>
<tr>
<td>Government</td>
<td>+1</td>
<td>+1</td>
<td>+1</td>
<td>+1</td>
<td>+2</td>
</tr>
<tr>
<td>Oil and Gas</td>
<td>-2</td>
<td>-2</td>
<td>-1</td>
<td>+2</td>
<td>+2</td>
</tr>
</tbody>
</table>

5.7 CONFLICT ISSUES BETWEEN FISHERIES AND OIL AND GAS SECTORS

In this section, existing and emerging conflicts issues between marine fisheries and the oil and gas sectors are identified and analysed. This then gives an understanding of the conflicts so as to assess the effectiveness of their management mechanisms.

5.7.1 Infringements of safety zone around the oil and gas production platform by fishers
Of all the issues that are responsible for the generation of conflicts between fisheries and oil and gas, the issue of fishers going very close to the offshore oil and gas production platform to fish is the most popular that generates a lot of controversies. Fishers are of the view that the offshore oil and gas production platform acts as a fish aggregating device which attracts fish in the sea because of the bright lights on the platform. This motivates fishers to fish very close to the platform to improve their catches. Some fishers reported that they are unable to catch any fish if they don’t fish close to the platform because all the fish are concentrated very close to the platform. The establishment of safety zones around offshore oil and gas facilities is addressed in the United Nations Convention on the Law of the Sea 1982 which permits operators of offshore
oil and gas installations to have a 500m radius exclusive zone around their facility for reasons of safety and to keep off intruders. The 500m radius exclusive zone should be clearly demarcated with reflective buoys to render them visible by other users of the ocean. The law requires all ships including fishing vessels to respect safety zones around offshore installations.

It was not possible to visit the platform in course of the research but information gathered through conversations with fishers who have had the experience of fishing near the oil and gas platform indicated that the safety exclusion zone is not clearly demarcated to alert fishers and other approaching marine vessels. According to the fishers, officers from the Ghana Navy conduct regular patrols around the platform to drive away fishing vessels that get close and that Navy patrols are supposed to serve as deterrent to prevent fishers from fishing close to the platform. Local fishers with their limited technology are not likely to locate their position in reference to the platform when there is no visible demarcation. Fishers therefore use their discretion to decide how far from the platform they can go. Some fishers go very close to the platform and fish and others are able to tie their canoes with strong ropes to the platform to avoid being drifted away by strong water currents. Some fishermen sometimes use explosive chemicals to blast shoals of fish near the platform before catching them. These practices pose danger to the lives of the fishers themselves as well as the oil and gas platform and its workers. There have been instances where some fishers have gone very close to fish near the platform and have been arrested by the Navy for prosecution. Fishers reported instances where the Navy have fired gun shots to drive off fishers. Also, there were instances where people on the platform have splashed hot water to drive off fishers who went close to the platform to fish.
5.7.2 **Destruction of fishing gears by oil tankers and supply vessels**  
The destruction of fishing gears by oil and gas tankers and supply vessels is another important issue that brings about conflict between fishing and oil and gas activities. Fishers complained about their fishing gears being destroyed by oil and gas tankers and supply vessels. When fishers comply with fishing and other maritime safety regulations and keep their distance from the oil and gas production platform to fish, their nets are sometimes run over and destroyed by oil tankers and supply vessels when the nets cross the paths of the moving vessels. When this happens, the fishers are not able to confront the supply vessels because the supply vessels move faster than the fishing vessels. Fishers have no option than to report the incident to the Fisheries Commission to work with other relevant authorities to track the vessel. If such cases are reported to the Fisheries Commission, the Commission liaises, on behalf of the fishing vessel, with the Ghana Maritime Authority that has a register of all supply and merchant vessels to track and identify the vessel and the owners and to notify them of the incident. The owners of the vessel are charged if found guilty and may be asked to pay for the damaged equipment or pay a compensation for the inconvenience caused.

5.7.3 **Restrictions on fishing activities due to oil and gas exploration activities**  
Before the installation of the oil and gas production platform, fishers operated freely in the open ocean including the area now being occupied by the platform. The open ocean used to be traditional fishing grounds which were exploited by fishers for their livelihoods especially as canoe fishers are not restricted in terms of fishing space like the industrial vessels. With the intensification and prospecting of oil and gas exploration activities, fishers are now not allowed to access their traditional fishing grounds in parts of the sea designated for oil and gas exploration. These areas are now protected and guarded by armed personnel who drive off fishers whenever fishers attempt to fish in such areas. In addition to the fact that fishers are
restricted to fish in areas reserved for oil and gas operations, fishing vessels now find themselves working alongside oil and gas tankers and supply vessels which creates a lot of traffic at sea affecting the manoeuvrability of fishing vessels. Increase in vessel traffic at sea and its impacts on fishing activities have been confirmed by reported cases of accidents at sea involving oil supply vessels and fishing vessels that have caused the damage to fishing vessels. Fishers see the restrictions placed on fishing due to the exclusion of fishers from areas of the sea reserved for oil and gas exploration and production and increased vessel traffic as a huge burden that threatens fishers’ livelihoods and this certainly creates tension and hatred between fishers and oil and gas operators. These are important conflict issues that require management attention.

5.7.4 Siting of onshore oil and gas facilities
There are also competition and conflict between fisheries and oil and gas operations onshore just as conflicts occur offshore. A common observation while travelling through the coastal belt of Ghana’s Western Region is the massive development of oil and gas infrastructure currently underway. Traditional leaders and family heads are busy selling or leasing their community and family lands to oil and gas operators for oil and gas development because the oil and gas operators offer huge sums of money in exchange for the lands. There is massive clearing of forests and huge excavations of the earth to make way for the building of oil and gas structures and to accommodate huge oil and gas equipment. Large-scale oil and gas facilities are being sited on the coast and in coastal communities which is causing fishers and other people to lose their fishing infrastructure and farm lands. Some fishers practice crop farming in the lean fishing season as supplementary livelihoods, a practice that reduces the pressure on exploited fish stocks. If these fishers lose their farmlands to oil and gas operators, opportunities for farming as an alternative livelihood for fishers will be lost. The result will be an increased pressure on already overexploited fish stocks. The clearing of forests and huge excavations of the earth for
the siting of oil and gas facilities also causes pollution in fishing communities and inland water bodies that are important for fish production and for domestic water supply. In addition, underwater oil and gas pipelines have been constructed from the offshore oil and gas platform to oil and gas plants onshore for processing. Fishers are required to keep off these facilities and installations to give way for the smooth operations of oil and gas operations at the expense of fishing. The result is an emerging development pattern shaped by the lack of adequate spatial policy and spatial plans, and ineffective institutions with authority to integrate across development decisions. These developments hinder the activities of local fishermen and threaten the sustainability of their fishing livelihoods. Fisheries are in conflict with the oil and gas industry due to the impacts that the siting of oil and gas facilities are having on fishing.

5.7.5 Gas flaring from oil and gas facilities into coastal fishing communities

Oil extraction involves the production of raw natural gas to the surface as well. If the extraction and production processes are not well managed where there is lack of pipelines, large amounts of gas are commonly flared as waste. Gas flaring is an issue that has heightened the tension which leads to conflict between residents in fishing communities along Ghana’s west coast and operators in the oil and gas industry. Residents of fishing communities in the Western Region reported incidence of gas flaring in their communities as one of the major issues of conflict between fisheries and oil and gas. The fishers indicated that one of the major changes that had occurred in their communities since the production of oil and gas started was the change in quality of the air they breathe. According to the fishers they could smell certain substances in the air which they believed were gases flared from the offshore oil and gas production platform. This notion by fishers is an issue of conflict which also require management attention.
5.8 GOVERNANCE, MANAGEMENT AND INTER-AGENCY CONFLICTS
The most important governance, management and inter-agency fisheries and oil and gas at the national level occurs between the Fisheries Commission and the Environmental Protection Agency regarding the issue of Fisheries Impact Assessment (FIA) versus Environmental Impact Assessment (EIA). The Environmental Protection Agency has a role to play in demanding EIAs from proponents of development projects that, in view of the Environmental Protection Agency, can bring potential adverse effects on the environment\textsuperscript{15}. The Fisheries Commission also requires proponents of development projects that, in view of the Commission, can cause negative impacts on fisheries, as specified in the Fisheries Act 625. Analysis of the legal instruments that give powers to both agencies to demand the two kinds of assessments clearly demonstrates that these are two distinct requirements from two different agencies which must be treated as such. It is acknowledged that some fisheries issues cannot be completely separated from environmental issues or vice versa. The two complement each other in a way but may be sometimes conflicting as in the case of conducting an EIA for offshore oil and gas operations as well as an FIA to examine the impacts of oil and gas activities on marine fisheries. The issue of two separate assessments (EIA and FIA) to be conducted for oil and gas and submitted to the Environmental Protection Agency and the Fisheries Commission for the issue of environmental and fisheries permit respectively has been an issue of conflict that has generated heated debates between the Fisheries Commission and the Environmental Protection Agency.

To better understand the issue and the nature of the conflict arising from it, it is important to analyse relevant sections of the Fisheries Act 625 and the Environmental Protection Agency Act 490 which empower the Fisheries Commission and the Environmental Protection Agency

\textsuperscript{15} Please refer to the Ghana Environmental Protection Agency Act 490 (1994) and Environmental Assessment Regulations 1999 (LI 1652).
respectively to this effect. Section 12 (1) of the Environmental Protection Agency Act 490 (1994) states that; the Environmental Protection Agency may require a person responsible for an undertaking which in the opinion of the Board of the EPA has adverse effect on the environment to submit an environmental impact assessment. This indicates that the Environmental Protection Agency requires an EIA for all proposed developments in order to issue environmental permits for the commencement of such proposed developments in line with the Environmental Assessment Regulations 1999 (LI 1652). Section 93 (1-3) of the Fisheries Act 625 (2002) provides as follows; (1) A person or government department or any other agency planning to conduct an activity other than fishing, which is likely to have a substantial impact on the fishery resources, shall inform the Fisheries Commission of the plans prior to the commencement of the planned activity with a view to the conservation and protection of the resources. (2) The Fisheries Commission may make or require reports and recommendations by those conducting the planned activity regarding the likely impact of the activity on the fishery resources of the Republic of Ghana and possible means of preventing or minimizing adverse impacts (3) The requirement under this section is in addition to any other requirement of the Environmental Protection Agency.

The requirements of section 93 of the Fisheries Act are intended to promote transparency and cross-sectorial integrated government decision-making to ensure sustainable resource management. Section 93 of the Act is also intended to avoid community and stakeholder dissatisfaction during the implementation phase of non-fisheries activities. EIA is the process by which the anticipated effects on the environment of a proposed development or project are measured. An FIA may be defined as a study designed to identify, interpret, predict and communicate information about the consequences of a proposed project on fishing, fisheries
resources and fish habitats. It is generally part of an EIA. An FIA aims to provide sufficient and accurate information to allow a complete and objective predictions and evaluation of the potential impacts of non-fisheries activities on fisheries resources and the socio-economic lives of fishers and communities. The requirement for FIA is in recognition of the fact that both marine and inland fisheries resources are susceptible to a wide array of human activities that are not related to fishing. These activities include the exploitation of oil and gas. The impacts may either be ecological, social or economic\(^\text{16}\).

Going by the provisions in the Fisheries Act 625 and the Environmental Protection Agency Act 490, clearly two different impact assessments (FIA and EIA) are required by the Fisheries Commission and the Environmental Protection Agency respectively. The Fisheries Act 625 has been in existence since 2002 but the issue of a separate FIA and an EIA did not become critical until recently when oil and gas exploration was intensified and production started in 2010. It was not a big issue for discussion until recently perhaps because no development has ever taken place in the offshore marine waters of Ghana that would have been expected to have the magnitude of impact on fisheries like that of the exploration and production of oil and gas, or perhaps because of the magnitude of investments associated with oil and gas production and its perceived impacts on the economy.

To fulfill the requirement by the Environmental Protection Agency to conduct an EIA for the issue of environmental permit to start production, an EIA was conducted for the Jubilee Field Phase 1 oil and gas project and submitted to the Environmental Protection Agency prior to the commencement of operations but the requirement to also prepare and submit an FIA to the

\(^{16}\) Information presented here was partly taken from unpublished work authored by Martin Tsamenyi in 2014 in his analysis of the Adequacy of Section 93 of the Ghana Fisheries Act 2002, Act 625 in terms of Fisheries Impact Assessment.
Fisheries Commission was not fulfilled. It could be assumed that the Jubilee Field Partners thought that aspects on impacts on fisheries were covered in the EIA that was submitted to the Environmental Protection Agency and therefore did not see the need to also submit a separate FIA to the Fisheries Commission or provision in the Fisheries Act 625 that requires the preparation and submission of a separate FIA to the Fisheries Commission must have been overlooked. The issue of a separate FIA for the Jubilee Field did not become critical until recently when fishers in particular and other residents in coastal communities started complaining about the impacts of oil and gas activities on their livelihoods. The Fisheries Commission has recently taken a step forward after all the agitations and has started engaging the oil and gas companies, fishers, relevant government agencies including the Environmental Protection Agency and other stakeholders in discussions about ways forward to resolving this conflict.

To have a good basis for their demand, the Fisheries Commission conducted a review of the Jubilee Field EIA to assess whether fisheries impacts were adequately captured in the EIA. The Fisheries Commission concluded from findings of the review that there is the need to conduct a thorough FIA for the Jubilee Field. Following are some of the concerns raised by the Fisheries Commission about weaknesses of the EIA as far as fisheries activities were concerned. The Fisheries Commission was of the view that offshore oil and gas production activities may affect the entire aquatic ecosystem including the socio-economic activities of fishers and fishing communities and therefore there is the need for an FIA that will address the entire spectrum of impacts. By the Fisheries Commission standards, the Jubilee Field EIA did not provide adequate fisheries baseline information in order to assess how baseline conditions will change and how much change would occur if the project was to be implemented. Some of the baseline conditions
specified were issues related to fish landings, fish biomass, fish ecology and threatened species including marine mammals and sea turtles. The Fisheries Commission also argued that the EIA did not demonstrate that fisheries stakeholders were adequately consulted on their views regarding the impacts of the project as well as their approval or disapproval of the project. The issue of gas flaring and emissions were also not adequately addressed. Finally, it was also mentioned that the EIA did not specifically disclose how fishermen and fishing activities would be protected because offshore petroleum activities adversely affect fishermen in many ways. Compensation relating to inconveniences, losses and damages caused to fishermen were not adequately addressed in the EIA.

Conflicts between the Fisheries Commission and the Environmental Protection Agency are not the only type of inter-agency conflicts that are external to fisheries. One other important government agency that also sometimes comes into conflict with the Fisheries Commission by the nature of its domain of operation is the Ghana Maritime Authority. The Ghana Maritime Authority is the government of Ghana agency with responsibility to monitor, regulate and coordinate activities in the maritime industry. Functions of the Authority include ensuring the safety of navigation and the protection of the marine environment\(^\text{17}\). Some of these functions clearly overlap with operations and functions of the Fisheries Commission that are a source of conflicts between the two agencies. The intensification of exploration and production activities of offshore oil and gas is an issue of conflict between the Fisheries Commission and the Ghana Maritime Authority. In performing its functions, The Ghana Maritime Authority requires fishers to keep away from oil and gas exploration and production sites but the Fisheries Commission argues that those areas are not demarcated in order that the become clearly visible to fishers.

\(^{17}\) The Ghana Maritime Authority Act 630 (2002)
Also, fishers do not have access to navigational charts provided by the Ghana Maritime Authority that will guide the movement of fishers at sea and again most local fishers are not well educated to be able to interpret navigational charts. The Fisheries Commission sees the provision of navigational charts and the education of fishers on their use as the responsibility of the Ghana Maritime Authority.

In attempts to find solutions to this challenge, the Fisheries Commission formed a platform with representatives from the Commission, oil and gas and other relevant stakeholders including the Ghana Maritime Authority to discuss fisheries and oil and gas interactions and find ways for the co-existence of both sectors. In one of the meetings of the platform, there were heated arguments between the Fisheries Commission and the Ghana Maritime Authority regarding the issue of navigational charts. The Ghana Maritime Authority insisted that navigational charts were already in existence to guide fishing activities at sea but representatives of fishing companies reiterated that even if such charts were available they were too old and needed to be updated to show where oil and gas exploration sites, installations and underwater pipelines are. Fishers argued that Ghana’s Petroleum Production and Exploration Bill requires underground oil and gas pipelines to be refurbished every quarter and expressed concerns on how that was going to impact on fishing activities at sea. They stressed the need for charts to be updated to avoid conflicts between fishers and oil and gas operators. The Fisheries Commission agreed with the issues raised by the fishers and added that fishers were not adequately consulted and educated before such underwater pipelines were laid. Moreover, trawling activities could cause damage to oil and gas pipelines but yet fishers did not know where the pipelines were. The Fisheries Commission demanded updated charts to be made available by the Ghana Maritime Authority and educate fishermen on how to use them. The Commission also suggested that the Ghana Maritime
Authority should closely monitor the operations of the oil and gas companies and demand them to demarcate all installations with illuminated buoys to prevent fishing vessels from running into them. The Ghana Maritime Authority wanted to know where the resources needed to carry out such activities were going to come from since for instance navigational charts were not produced for free. After the heated debate, the Commission suggested inter-agency collaboration and sustained dialogue to deliberate on ways forward for finding a harmonious solution to fisheries and oil and gas interactions.

**5.9 FISHERIES AND OIL AND GAS CONFLICT MANAGEMENT MECHANISMS**
Conflicts occurring between fisheries and oil and gas sectors are relatively new and still emerging as compared to conflicts that occur within the fisheries sector because fishing has been in existence for a long time, unlike the production of oil and gas which started only a few years back. As a result, the mechanisms for managing and resolving fisheries and oil and gas conflicts are not well structured and documented. Existing conflict management and resolution mechanisms for fisheries and oil and gas in Ghana are woefully inadequate and inadequately documented. Relevant government agencies, fisheries and oil and gas stakeholders are still in discussions about finding appropriate ways for managing fisheries and oil and gas conflicts. However, the following were identified as the current systems in place for managing and resolving fisheries and oil and gas conflicts. There is conflict management and resolution by the Fisheries Commission where the Fisheries Commission liaises with the Ghana Maritime Authority to resolve cases reported by fishers involving oil supply vessels, conflict management and resolution strategies by oil and gas companies which is a well-documented, formal and comprehensive fisheries and oil and gas conflicts management mechanism.
5.9.1 Conflict management and resolution by the Fisheries Commission
When a fishing vessel is involved in an accident with an oil tanker or an oil supply vessel at sea, or a fishing gear or other equipment is destroyed by an oil tanker or supply vessel at sea, the fishing vessel usually is unable to confront the tanker or supply vessel immediately after the incident to discuss and resolve issues because fishing vessels are smaller players in the maritime domain in terms of power relations than the oil supply vessels. By virtue of the fact that fishing vessels are less powerful than the oil supply vessels, usually the way out is for the fishers to report the incident to the Fisheries Commission for action to be taken. The Fisheries Commission has the power to control fishing vessels but not oil supply vessels and other merchant vessels. It is therefore difficult for the Fisheries Commission to track and pursue the oil supply vessel. Oil supply and merchant vessels are registered, controlled and tracked by the Ghana Maritime Authority. The Fisheries Commission reports the case to the Ghana Maritime Authority to take steps to identify the oil supply vessel and the operators. After the identification of the vessel, the operators are then contacted and notified about the incident. The operators are invited for a discussion on the issue and are charged if found guilty of the offence depending on available evidence. If the fishers are not able to produce any evidence or the incident was also not captured by the Vessel Monitoring Systems (VMS) of the Ghana Maritime Authority, then there will be no justification for charges to be made against the oil supply vessel. If found guilty of having committed the offence, the operators of the oil supply vessel may be asked to pay for the damaged equipment and/or pay a suitable compensation for the inconvenience caused to the fishing vessel.

5.9.2 Conflict management and resolution strategies by oil and gas companies
The most comprehensive fisheries and oil and gas conflicts management mechanisms in Ghana are those that have been presented by the oil and gas companies as requirements for the issue of
environmental permit by the Environmental Protection Agency. As part of the environmental permit application process for the Jubilee Field Phase 1 Development, a Public Consultation and Disclosure Plan (PCDP) was prepared as a tool for managing communications between the Jubilee project and stakeholders. In lieu of the development of the PCDP, public consultation meetings were organized to explain the objectives and nature of the project to the various stakeholders, including traditional and religious leaders, youth leaders, Members of Parliament, District Chief Executives and officials in the district administration, groups and local communities that may be affected by the project notably fishers and members of the general public. The goal of the PCDP is to improve participatory decision making among groups that can affect, or be affected by the development of the Jubilee project. It also aims to improve and facilitate decision making in relation to the project and its host country, and the fishing communities within its catchment area. One important specific objective of the PCDP was to develop and describe formal grievance submittal, management and resolution mechanisms\(^\text{18}\).

Fisheries and oil and gas conflicts in Ghana arise mostly due to the notion and the perceptions that fishers have about the oil and gas industry and their operations. It is therefore appropriate that Tullow Oil included grievance management and resolution mechanisms in the PCDP. The grievance management and resolution mechanisms, as described in the PCDP, are built around mechanisms that have existed in local communities for years which revolve around traditional leaders and family heads. Tullow Oil is of the view that though most of the grievances in local communities are mainly domestic disputes, it is likely that grievances concerning the Jubilee project could benefit from proven traditional dispute resolution mechanisms and believe that through the traditional procedure, all grievances that occur as a result of fisheries and oil and gas

\(^{18}\) Please refer to the Jubilee Field Phase 1 Development Public Consultation and Disclosure Plan for more information.
interactions can be addressed before they reach formal courts. The grievances redress process presented in the PCDP involves three distinct levels where settlement can be reached at each level. Where no amicable solution is found, the dispute can be taken to the next level until the grievance is finally resolved. The contesting party has the right to finally seek redress in the court of law. Details of the procedures and levels are described below.

At level one, grievances can be received verbally and in writing. Tullow Oil Community Liaison Officers (CLO) may receive verbal grievances during their visits to the communities. When possible, grievances are resolved in the presence of family members or other witnesses. Written grievances on Project Grievance Forms may be submitted in person or sent to the approved locations in the communities or to Tullow offices in Takoradi or Accra. As part of their daily work, CLO are to schedule regular visits to designated collection points to receive feedback and collect grievance forms. All grievances are recorded in duplicate on the Project Grievance Form and receipts are acknowledged in writing and entered into a grievance register. A copy of the form functions as acknowledgement of receipt of the grievance. The duplicate form will be provided to the person either at the time of the recording of the grievance (if verbal) or within 7 days of receipt of the written grievance. All grievances are classified according to categories and registered on the grievance database. The grievance database includes details of the name of the person, their contact details, address/village, category of grievance, and the status of the grievance.

Grievances are reviewed by the CLO to confirm that the grievance is project related. People are informed in writing if their grievances are project related. If the grievance is confirmed to be project related, the CLO will refer it to the Social Investment (SI) Manager who will then consult the appropriate internal department for investigation and feedback. Where necessary, Tullow
seeks advice and intervention of the local traditional authorities for resolving issues. This is done through consultative bodies at various levels including community leaders to periodically consider such grievances and provide a forum for hearing all sides and seeking consensus. This consultative body is made up of representatives of the Traditional Council, Community-Based Organizations, Non-Governmental Organizations and the District Assembly. Grievances that have legal dimensions are forwarded to the legal department of Tollow. The department has 21 calendar days to review and respond to the grievance, after which the CLO provide the person with a written response 30 calendar days of receipt of the grievance. In cases where people cannot read, a verbal response is provided. The contesting party is also kept informed if the grievance investigation is delayed. The responses generally include a settlement proposal for consideration and are coordinated through the on-site management team. The aggrieved persons’ response to the proposed resolution will also be recorded on the database. The Social Investment Manager visits the person within 30 days to verify whether the grievance is resolved. If it is resolved, it is then closed on the database. If not, it is carried forwards to Level 2.

Where cases cannot be resolved through the Level 1 process, they are referred to the Complaints and Grievances Committee (CGC) which is set up by Tullow in consultation with community representatives. This represents Level 2 of the grievance management mechanism. The CGC has the following roles and responsibilities:

i. Determine the way forward in resolving complaints considered to be reoccurring

ii. Manage all new complaints considered to be above the precedent and authority levels of CLO

iii. Review the resolution procedures adopted by the CLO to determine its merits and come out with alternative resolution
iv. Seek to resolve all outstanding unresolved complaints received over the year

v. Examine other alternatives to resolve complaints considered to be resolved of which the complainants refuse to sign the Terms of Resolution because of dissatisfaction with the resolution

vi. Ensure that decisions or recommendations taken/made in the resolution process conform to Tullow’s Complaints and Grievances standard operations procedures and explain deviations

vii. Refer all unsolved complaints that are above the precedent and authority level of the committee to the corporate affairs management for review

viii. Document Committee’s resolution procedures to serve as a guide to future resolutions

The CGC is composed of CLO, Communication Manager, Social Investment Manager, Representatives from Environment, Health and Safety, Legal and Human Resource Departments and 2 stakeholder representatives. The CGC meets according to demand for resolution of grievances. Any complaint (whether appealed or new) that goes before the CGC must be resolved within 2 weeks. In instances where complaints are not resolved within the stated sittings, the CGC records the reasons for its inability to do so. Aggrieved persons can seek independent arbitration in court if grievances are not resolved amicably at the level of the CGC. This is Level 3 of the grievance management mechanism. Efforts to gather information on the number of cases that have so far been resolved in court were not successful.

Fisheries and oil and gas conflicts are also managed through the provision of social amenities and other services as corporate social responsibility by oil and gas companies to fishers and fishing communities as a way of the oil and gas companies compensating the fishers for their impacts on fishing activities and communities. Information gathered and observations made in
fishing communities showed that some communities have benefitted from the payment of corporate social responsibility like the construction of bore holes to drill underground water to supply the communities with good drinking water. It was gathered also that, there were instances where community people had complained to the oil and gas companies about the poor quality of the air that they breathed and its impact on their health which they believed was as a result of gas flaring from the offshore oil and gas platform. The oil and gas companies responded by conducting health screening exercises to identify those affected for compensations to be paid to them. The oil and gas companies sometimes also organize meetings in fishing communities to meet with fishers to educate them on how to avoid engaging in issues that create conflicts between them and to assist them to tackle some of the problems faced by fishers and the fishing industry. Through such meetings some fishing communities have benefitted from the provision of improved fish smoking ovens provided by the oil and gas companies to women fish smokers to improve smoking efficiency. The oil and gas companies have done this as a way to manage their relationships with the communities to minimize the occurrence of conflicts.

5.9.3 Challenges with existing conflicts management mechanisms
In cases of conflicts between fishing vessels and oil supply vessels at sea, the fishing vessels normally report the incident to the Fisheries Commission. The Fisheries Commission in turn reports and follows up the case with the Ghana Maritime Authority to try and identify the oil supply vessel for settlement of the issue. This is usually not a straight forward and easy process. A greater part of the responsibility lies with the Fisheries Commission but information gathered indicated that the Commission may not act as quickly and expeditiously as expected to follow up on the matter with the Ghana Maritime Authority. Fishers therefore go back and forth the Commission until such a time that they become demoralized and finally give up. However, fishers gave a few examples of instances where fishing vessels have been involved in accidents
with oil supply vessels with their equipment destroyed and have been compensated following a similar process.

There are also a few challenges associated with the mechanisms of the oil and gas companies to manage fisheries and oil and gas conflicts. One major challenge is that sometimes the oil and gas companies are not as proactive as they should be in visiting the coastal communities to address issues of conflict. It is one thing having good grievance management mechanisms in place and another thing trying to implement the mechanisms. Discussions with fishers in fishing communities revealed that, the oil and gas companies have failed to live up to expectation in implementing their grievance management mechanisms. In addition to the failure on the part of the oil and gas companies to fully implement their grievance management mechanisms, there is also lack of enforcement on the part of Ghanaian management authorities at the national level to ensure that the oil and gas companies operationalize their grievance management mechanisms after receiving their operational licenses and permits.

5.10 CONCLUSION
Fishing existed long before the discovery and subsequent drilling of offshore oil and gas in Ghana. The fishing industry has supported the livelihoods of hundreds of thousands of coastal inhabitants and has significantly contributed to the economic growth of the country over the years. There is the justification therefore to safeguard the sustainability of the fishing industry in Ghana. It is concluded from the issues discussed in this chapter that offshore oil and gas production and the multiplication of exploration activities clearly pose significant threat to fishing in Ghana. The oil and gas industry also plays an equally important role towards the socio-economic development of the country but fisheries must not suffer at the expense of the operations of the oil and gas industry.
Competition for space and other resources at sea and on land and conflicts between fisheries and oil and gas are bound to occur and that cannot be underestimated. What is required is to put appropriate mechanisms in place to minimize the competition and conflicts and to resolve them as and when they occur. Operators in the oil and gas industry are seen as big players in the economy and may use that to protect their interests at the expense of the smaller players like fishing industry operators. It is the role of those in authority to ensure that competition and conflicts between big players like oil and gas and smaller ones like fisheries are properly managed to protect the vulnerable in society. The potential impacts of oil and gas exploration and production activities on fisheries, the nature, causes and management mechanisms for fisheries and oil and gas conflicts in Ghana and the consequences of the conflicts have been examined to set the stage for their in-depth analysis and discussion in the next chapter. The analysis provides an opportunity for critique on how fisheries and oil and gas conflicts are currently managed and to propose ways forward for improved management of the conflicts.
CHAPTER SIX

6.0 ANALYSIS AND DISCUSSION

6.1 INTRODUCTION
The global importance of marine fisheries especially in developing countries and in Ghana, the challenges which currently confront marine fisheries in the world and in Ghana, and the need to put systems in place to address the problem were highlighted in chapter one as the background, significance and justification for this research. In order to have a good knowledge about the nature of marine fisheries in Ghana, change in the fisheries and the current state of the fish resources, the fisheries sector in Ghana was reviewed and presented in chapter three. The review of the fisheries and the state of the fish resources provided a background to conflicts in the fisheries which were identified and discussed in chapter four. In order to have a sound knowledge of the nature of marine fisheries conflicts in Ghana, and to assess the effectiveness of existing conflict management mechanisms, theoretical perspectives of natural resource conflicts and conflicts in fisheries globally and in Ghana in particular were presented in chapter two. Conflicts between fisheries and oil and gas sectors were also identified and discussed in chapter five as a case study of conflicts between marine fisheries and other users of the marine environment. Conflicts and other issues of management concern in the fisheries were identified and presented as found in course of the research in the previous chapters. This chapter analyses and discusses the issues identified and presented in the previous chapters and their consequences. Doing so provides an opportunity for conclusions to be drawn, and appropriate recommendations for improved marine fisheries conflicts management and ocean governance in Ghana to be made as contribution of information and knowledge required for marine fisheries and ocean policy formulation in Ghana.
6.2 ADDRESSING THE PROBLEM OF OVERFISHING AND DECREASE IN CATCH
The decrease in fish catch due mainly to the problem of overfishing has been identified as the major underlying cause of conflicts that occur within the marine fisheries in Ghana. An important step forward towards managing conflicts within the fisheries will be to maximize efforts at tackling the underlying cause of the problem as suggested by Gritten et al. (2009). Finding ways to addressing the problem of overfishing and decrease in fish catch becomes ever more critical in this regard. It could be discussed therefore that, if there is enough fish in the sea available to be exploited by fishers, competition over fish resource which leads to the occurrence of conflicts among fishers at sea will be reduced. In the same way conflicts on land at the landing site as fish buyers compete to buy fish will be reduced. Consequently, if there is enough fish for everyone then competition and conflicts along the entire fish value chain will be reduced. There is therefore the need to put systems and measures in place that will ensure a positive change in the fisheries and the rebuilding of fish stocks. Such systems and measures should be designed according to international best practices and global experience without forgetting the nature of the Ghanaian marine fisheries social-ecological system. Local context matters in this regard as best and workable practices elsewhere might not work in Ghana. The following are possible scenarios to consider in finding solutions to the problem of overfishing, dwindling fish stocks and the occurrence of conflicts in the fisheries. These considerations are proposed based on findings from the research.

6.2.1 Moving from open access canoe fisheries to restricted/managed access
The open access nature of fisheries has been identified as one of the most common reasons for fisheries management failure (Gordon, 1954). Findings from the research showed that, one of the major causes of the problem of overfishing in Ghana is fishing vessel/fisher overcapacity. The canoe fishery, which contributes to the bulk of the fish landed on the shores of Ghana, operates
on an open access basis where entry to the fishery is free for all Ghanaian citizens who are interested to exploit the resource either as fishers or businessmen. Unlike semi-industrial and industrial fisheries, measures for regulating access to canoe fisheries are inadequate or almost non-existent. Over the past years, canoe fishermen have operated freely without fishing licenses or any other forms of entry control. Also, it has been a government policy to protect the livelihoods of canoe fishermen as a way of reducing poverty in rural coastal communities and to enhance fish production to cater for the protein needs of the citizenry\textsuperscript{19}. In view of that, not very much attention has been paid by fisheries authorities to ways of restricting entry to the fishery in order to safeguard and protect the resource for generations to come. These have created the enabling environment for high increases in number of canoes and fishers alike creating enormous amount of pressure on fish stocks and resulting in overfishing.

Danilo et al. (2016) note that marine fishing grounds in The Philippines have become increasingly less productive and many are in danger of depletion, generally due to the open-access nature of Philippine fisheries, which leads to the unintended consequence of overfishing. Moving the fisheries from open access to restricted/managed access is a critical step forward towards saving Ghana’s marine ecosystems from becoming unproductive, and addressing the problem of overfishing, decreases in fish catch, competition and conflicts within fisheries. This should be a medium- to long-term intervention by government. To begin with, there is an urgent need for an updated canoe census to be conducted to determine the total number of canoes operating in Ghana’s marine waters, canoe types, fishing gears, identities of canoe owners and number of people employed by all canoes as a measure of fishing effort. There is also the need for an updated fisheries stock assessment to be conducted to know how much fish is currently

\textsuperscript{19} This information was provided by an experienced government of Ghana senior fisheries officer in a conversation.
available in Ghana’s marine fishery waters and to access the maximum number of canoes (type of canoe, gears used and number of fishermen) that available fish stocks can sustain as recommended by Pomeroy (2012). It is recommended that this exercise should be informed by the appropriate scientific method. According to the Ghana Marine Fisheries Management Plan 2015-2019 official document, the current number of canoes operating in Ghana’s marine waters is more than what the fishery can sustain indicating the need for a reduction in canoe numbers. If the number of existing canoes is proven by a scientific means to be within the range that can exploit stocks without any problems, then all existing canoes should be licensed based on a specified criteria and conditions. It should be a rule that canoes which do not meet the criteria and specified conditions for registration will not be registered. After licensing of all existing canoes, no more canoes should be allowed access to fish by refusing new applications for canoe fishing licenses until such a time that fish stock levels have been found by scientific research to have significantly improved. If the number of existing canoes is found to be more than what the fishery can sustain, then appropriate systems should be put in place to strategically get some of canoes out of the fishery as a way of managing excess capacity. How could that be achieved? Some suggestions have been provided below.

Efforts to reduce canoe numbers should also be directed towards the point of manufacture. Despite concerns about fishing fleet overcapacity, more canoes are still being built. The construction of canoes is a common observation to be made on visits to many landing sites across the coast of Ghana. Trees are felled from the forests, roughly carved in the shape of a canoe and transported to fish landing sites to be re-shaped and made sea-worthy for fishing. The Fisheries Commission has a responsibility to control the building of fishing vessels in Ghana but it appears as if that responsibility has been relegated to the background. One possible way to
control this is for the Fisheries Commission to check and stop all currently ongoing boat
construction activities without building permits at the landing sites and put a ban on those
without permits to discontinue with that activity and that should be constantly monitored.
Alternatively, the Fisheries Commission can collaborate with the Forestry Commission of Ghana
to check and stop the felling of trees that are meant to be used for the construction of canoes
right in the forests or through the forest products check points on Ghana’s highways. If this is
checked from source and the Fisheries Commission does well to regulate and monitor what goes
on at the landing sites, it will help to control the number of canoes operating in Ghana’s waters.
To achieve this intended objective, other categories of fishing vessels should also be controlled
through registration and licensing procedures for reasons of equity and fairness to all operators of
the different fisheries sectors.

6.2.2 Reducing and controlling fishing effort
According to Salayo et al. (2006), most conflicts arise from excessive fishing efforts due to
increasing population and economic motivations. High increases in fishing effort were identified
as a major contributing factor to overfishing in Ghana. Reducing and controlling fishing effort is
as important as moving the fisheries from open access to restricted/managed access if the
problem of overfishing is to be curtailed. This should be a medium- to long-term intervention by
government. Currently there are so many fishers and fishing vessels operating in the industry
which is putting too much pressure on fish stocks. Clearly the number of fishers and fishing
vessels need to be reduced. There has never been a time in the history of Ghana when fishers
have been forced and pressured to leave fishing for other jobs because of fisher/fishing vessel
overcapacity. Serious challenges will be encountered if that is going to be tried for the first time.
Conversations with fishers confirm that, should that become a proposal from government fishers
are not willing to accept it. Fishers simply do not see any reason why they should be stopped
from fishing. Considering the investments that people have made in the industry and the fact that fishers livelihoods are at risk, fishers are simply not ready to quit fishing. What will therefore be the most appropriate ways to achieve this objective should management authorities decide to implement this idea?

Before that decision is made, certain critical questions need to be asked some of which are as follows; what are people going to do when they are asked to leave the fishery? Who should leave the fishery and who should continue to fish? What will happen to the fishing vessels that will become redundant? Are the owners of such vessels going to be compensated? If people are going to be compensated how exactly is that going to be achieved? Reducing numbers of fishers and numbers of vessels are similar but these are two different things that require different approaches and actions from government. Getting people out of the fishery is as important as the fate of the vessels. How could these be achieved? There are two approaches to the issue. First, all existing boats and their fishermen need to be registered and licensed based on certain defined criteria like the sea worthiness of the boats and there should be no more entry to the fishery. Boats that do not meet such criteria should be disqualified from obtaining fishing licenses and therefore will not be permitted to fish. Secondly, there should be an intervention program that will ask people to voluntarily ground their vessels with certain rewards or to identify certain vessels to be forced to leave the fishery. Before vessel owners agree to voluntarily release their vessels or are forced to release them for a reward, they should be educated and sensitized enough for them to be convinced to do so. It should be pointed out, however, that the success or failure of such an intervention program will depend on a large extent to the willingness of government to effect such a change. Government may not be willing to take up this challenge because of the fear of losing political votes during subsequent general presidential and parliamentary elections. Certain
harsh decisions, backed by the necessary political will, will have to be taken by government to get some boats out of the fishery even if political votes will be lost in the interest of saving the fisheries from complete collapse.

In further attempts at reducing the number of fishing vessels, it will be worth considering the following options. In the fishing industry in Ghana, there are people who own more than just one fishing vessel and there are others who own just one. It will be appropriate to make a rule that disallows fishers to own more than one vessel. This means that those who own more than one boat will have to let go the rest. How does this happen? There should be a form of compensation for those that are going to lose vessels through a vessel buy-back system of a sort (World Bank, 2004). In the same way, single boat owners could also be encouraged to surrender their boats for compensation through the same system. This will certainly depend on the ability of government to provide the funds required to promote such a venture, considering the number of vessels that are currently operating in the system and also Government of Ghana budgetary constraints.

On the issue of who should be forced to leave the fishery and who should be permitted to continue to fish, the following approach could be used. There are very successful fishers who have been able to invest proceeds from their fishing business in other income generating activities but are still engaged in fishing. Such people are well-known in the communities where they live and could easily be identified by their community people. Such people are one group who could be targeted when it comes to identifying people who should be forced to leave the fishery so that other people who do not have such business opportunities could still be allowed to fish. Another way to do this is to target people from the bigger coastal towns where there are likely to be other livelihood options as compared to the smaller and very remote communities who do not have such options. Identification of people to leave the fishery could also be on the
basis of how long people have been fishing or poverty status of community households. Those who have been fishing for very long could be asked to leave on the assumption that they have benefitted a lot already from fishing so that other people who have not been in the business for so long could also have the opportunity to make gains from the industry. Lastly, getting people out of the fishing business should exclude very poor and vulnerable households who without fishing would find it very difficult to cope. It should be noted however that transparency and fairness in this policy decision-making is key in this process.

Fishing effort is not only determined in terms of numbers of fishers or number of boats. It also depends on the frequency of fishing trips, numbers and types of fishing gears used as well as the methods employed in fishing. These should also be checked and controlled if overfishing and decline in fish catch is to be managed and resolved. Conversations with fishers and direct observation from fish landing sites as well as canoe census data all indicate that fishing gears used have dramatically increased in length over the years while their mesh sizes have decreased. Fishing gears have therefore become very efficient in catching both adult and juvenile fish which do not get the opportunity to spawn before being caught. Unorthodox fishing methods like light fishing and fishing with chemicals and explosives have greatly enhanced fish catching efficiencies which has contributed to overfishing and habitat destruction. Mesh size regulations and the law on illegal fishing methods should be strictly enforced as a way of decreasing fishing effort to increase fish catch.

6.2.3 Providing alternative, diversified or supplementary livelihoods to fishers
Moving the fisheries from open access to restricted access and reducing fishing effort can go a long way towards restoring the fisheries, but of course not without certain social costs and implications. If the fishery is to move from open access to restricted access and/or if fishing
effort is to be reduced, the implication is that some fishers will have to lose their jobs. Since people will still have to work to cater for themselves, one possible way out to get around with this challenge is for people to engage in alternative, diversified or supplementary livelihoods; doing something that is completely different from fishing or undertaking other fish-related livelihoods along the fish value chain. This should be implemented in the short- to medium-term by government. Brugere et al. (2008) note that it is still unclear how diversification strategies affect fishing activities and, ultimately, pressure on fisheries resources. Martin et al. (2013) concluded that alternative livelihoods in the rural context are unlikely to cause fishers to leave the fishery, but rather can be a supplementary activity. Again, there is no doubt that this will be a very difficult task to accomplish for a number of reasons. Fishers may not be willing to quit fishing for other completely different jobs or other jobs along the fish value chain. Fishing is a tradition and way of life in many Ghanaian coastal communities. For most people, fishing is the only thing they can do. They are not equipped with other skill sets to enable them engage in other activities for their livelihoods even if they are prepared to quit fishing. Are other jobs available for them to do assuming that they have the required skills to perform such functions looking at the already high unemployment rates in the country? Are there enough resources to expand the jobs market? On the other hand, if fishers are willing to stop fishing for diversified livelihoods along the fish value chain like fish processing and marketing, are the existing fish processing and marketing channels enough, willing and capable of absorbing all fishers who will lose their jobs? Displaced fishers may also displace women processors which will create more problems. Do fishers possess the requisite skills to be able to work in fish processing and marketing facilities? What are the other diversified livelihood options along fish value chains available to be exploited considering the fact that fish landed nowadays are not enough to
support such livelihoods? These are some of the questions which need to be asked if alternative or diversified livelihoods are considered as options for solving the problem of overfishing and decrease in fish catch. If government in collaboration with other fisheries stakeholders can find answers to some of these questions it will be a huge step towards solutions to the problem.

Adjei and Ajei (2016) note that successive governments of Ghana with their development partners have since the 1990s, pursued rural diversification and restructuring policies and programmes underpinned by livelihood sustainability. They are of the view that developing mechanisms for diversifying livelihoods is necessary for a viable and sustainable rural economy.

The role of government can certainly not be overlooked in this process. Government has a critical part to play to ensure successful execution of an alternative or diversified livelihoods program for fishers. If people will be forced or motivated to quit fishing, this is an action that must come from government as a policy because it is highly unlikely or almost impossible that fishers themselves will voluntarily stop fishing because they want to save fish stocks from collapsing. The bulk of the task therefore rests on the shoulders of government. National policies should give fisheries the needed attention in this regard. Livelihood diversification strategies must be incorporate into local and possibly national poverty alleviation policies on small-scale fisheries as supported by. This will enhance fisheries management and improve the wellbeing of fishers (Asiedu et al., 2013). For this to be achieved, they recommend that there should be investments in infrastructure and there should be collective action from all stakeholders in a coordinated manner.

As a starting point, government must first work to sensitize and educate fishers to understand and appreciate the problem at hand and the need for alternative or diversified livelihoods. After
fishers are made aware and educated, government should then roll out programs to train fishers to acquire specialized skills for other livelihood options that would be unanimously identified, accepted and agreed upon as feasible and equally lucrative as fishing for fishers. There should be improvements in the Ghanaian job market related to the livelihood options identified so people trained will not become idle or people should be assisted to set up small businesses related to the skills acquired through the training by way of government providing necessary infrastructure and coming up with ways for people to obtain some seed money through arrangements with local and international donor agencies, development banks and other financial institutions (micro finance, etc.). Such government interventions should be effectively monitored and evaluated from time to time to ensure impact and learning. If such programs are well thought through and implemented, it will go a long way to save the fisheries from total collapse.

6.2.4 Improving inland fish aquaculture as a diversified livelihood
In promoting diversified livelihoods for fishers as a way of reducing the pressure on marine fish stocks, inland fish aquaculture is perhaps the best way to go since both aquaculture and capture fisheries are all concerned with the production of fish. Aquaculture expansion should be implemented in the short-term. Extensive mariculture should not be an option at this stage in Ghana’s development as it is too expensive an enterprise. Mariculture has never been practiced before in the country but could be tried on pilot basis through research. It is however acknowledged through expert opinion that Ghana’s marine waters are not conducive for mariculture due to high energy waves and the absence of coves. Lagoon aquaculture may also be encouraged. Aquaculture can reduce the pressure on fish stocks, especially in the face of increasing world population and to support local communities that heavily rely on fishing (Bledar, 2007). Aquaculture is now one of the fastest developing source of animal protein due to the decline of wild fish stocks in Ghana (Ashitey and Flake, 2010; Al-Harbi and Uddin, 2005).
According to FAO (2016), Government of Ghana has placed aquaculture as one of the top priorities in the country’s development agenda.

Inland fish aquaculture in Ghana has the potential to increase fish supply to support the protein needs of the people and also create jobs. Ghana is endowed with fresh water bodies and soils with high water-holding capacity which provides prospects for aquaculture development. The enabling environment in Ghana is conducive for aquaculture production more so as Ghana’s current fisheries policy promotes the enhancement of aquaculture. The national expectation is that aquaculture would contribute significantly to closing the gap between fish demand and supply.

In attempts at saving marine fisheries from collapsing fishers could be encouraged to invest in aquaculture as a business. Fishers would always want to remain “fish hunters” and not fish farmers perhaps because aquaculture is relatively new to them and more capital and labour intensive. Others also see aquaculture as a risky venture and time consuming. But with the current trends in marine fish production, if fishers are educated on the potential benefits of aquaculture, they are likely to be convinced to engage in aquaculture as a business. Again, it requires a lot of planning and effort on the part of government to ensure that aquaculture becomes socially acceptable by fishers. To achieve this objective, government should set up livelihoods empowerment programs in aquaculture particularly for fishers with the overall objective of moving fishers from engaging in marine capture fisheries to aquaculture. There is the need to get private sector investment into aquaculture to create employment. Government should map out special areas as high priority aquaculture zones and strengthen training institutions to train fishers for employment at the different levels of the aquaculture business value chain to set up and manage fish farms in these areas. There should be initial assistance
from government in terms of the provision of technical know-how and equipment. Government should also liaise between prospective fish farmers and development banks and other financial institutions to provide financial support. The Fisheries Commission should also strengthen its extension arm to provide adequate extension services in aquaculture after the establishment of the fish farms and continually monitor and evaluate the program.

6.2.5 Improving fisheries governance through institutional strengthening

Aquaculture could be an alternative to addressing the problem of decreasing fish catches and consequently reduce fisheries conflicts but there is clearly the need to move beyond improving aquaculture to include governance of the fisheries. Aquaculture can certainly contribute to increase in fish supply but cannot be a substitute for a well-managed capture fishery. Weak and ineffective fisheries governance was identified as a major cause of overfishing and decline in fish catch in Ghana. Fisheries throughout the world are facing a crisis, and the root cause of this crisis is poor governance (Grafton et al., 2007; World Bank, 2004). Basic fisheries governance structures (policies and institutions) should be in place in order to ensure the sustainable use of fisheries resources and the ecosystems that support them. According to the Code of Conduct for Responsible Fisheries, the criteria for sustainable fisheries governance are as follows; avoid or correct excess fishing capacity, take into account the interest of fishers, protect the biodiversity of aquatic habitats and ecosystems, and allow depleted stocks to recover, assess and correct adverse environmental impacts on the resources from human activities and minimize pollution, waste, discards, catch by lost or abandoned gear, and catch of non-target species, both fish and non-fish species.

To overcome the problem of overfishing and fish catch decline, governance in fisheries in Ghana at different levels must be improved bearing in mind the principles of sustainable fisheries
governance as outlined above. This recommendation should be implemented in the short-term. Improving governance must first start with strengthening existing fisheries management institutions at national, regional, district and community levels. Strengthening fisheries institutions come in different forms. The Fisheries Commission is not adequately resourced in terms of infrastructure, equipment and human capacity. Moreover, it was gathered through conversations with government fisheries authorities that annual budgetary allocations to support programs and activities of the Fisheries Commission are woefully inadequate. These put the Commission in a rather disadvantaged position to be able to effectively perform its roles in governance of the fisheries. These have contributed in creating the impression among fishers in particular that the Commission is gradually failing to live up to expectation in the performance of its functions. There is the need to change that perception to restore the trust and confidence that fishers had in the Commission. The Commission must be strengthened in these respects if good governance in fisheries is to be achieved in order to reverse the decreasing trends in fish production currently encountered in the country and reduce conflicts in fisheries.

Improving governance in fisheries not only involve government. One critical area that must be looked at carefully is the institution of the chief fisherman at the community level. During visits to fishing communities and conversations with fishers, the impression was created that fisheries will be more effectively managed if the institution of the chief fisherman is strengthened, recognized and empowered by law to be able to make and enforce community fisheries bye-laws. The argument put forward by fishers is that fisheries were well managed in the olden days when chief fishermen were at the helm of fisheries management affairs. Chief fishermen commanded authority in their respective fishing communities and earned a great deal of respect among fishers. In one way, this is true because fishers are more likely to listen to and obey
instructions from their own people in authority than people in authority they perceive as not being part of their community. Going by this argument, therefore, the institution of the chief fisherman should be strengthened and given the necessary powers to effectively perform their functions.

Improving governance requires the need for better structures of communication. It also means that different stakeholders as far as fishing is concerned must have the chance to participate in fisheries management decision-making. Fisheries stakeholders at all levels including fishers and women especially who also play very important roles in fisheries must be adequately consulted in all aspects before the formulation of any policy that affects the fishing industry and there should be continuous and sustained dialogue among all stakeholders in the fishery. For instance, fishers tend to obey fisheries law and regulations if they were part of the process that culminated in the passing of the law and regulations. If they were not consulted before the making of the law, they tend not to see the reason to comply with them. Fisheries authorities’ relationships with other stakeholders must also be based on trust if good governance of the system is to be achieved. De Vos and Van Tatenhove (2011) note that an effective fisheries governance arrangement is not only a matter of building institutions but also a matter of building trust relations between government and industry. Authorities must therefore be transparent in all their work with stakeholders particularly fishers and must be accountable to them because there is no trust without transparency and accountability. Marcus (2006) confirms that trust is central to conflict resolution. This will ensure improved governance in the fisheries sector in Ghana which will in turn contribute to solving the overfishing problem and reduce the prevalence of fisheries conflicts.
6.2.6 Compliance and effective enforcement of the fisheries law and regulations

Findings from the research showed that another major factor that has contributed to the current crisis in the marine fisheries in Ghana is the non-compliance and ineffective enforcement of fisheries law and regulations on the part of fishers and fisheries authorities respectively. Compliance and enforcement operations should be prioritized by government in the short-term.

Fishers have continued to fish with little or no compliance with fisheries law and regulations partly also because fisheries authorities have not adequately enforced the fisheries law and regulations. It was noticed that the Fisheries Commission lacks the needed equipment and human resource capacity to effectively enforce the law both on land and at sea. Looking at the number and size of fish landing sites for artisanal and semi-industrial vessels across the coast, it could safely be concluded that a high degree of manpower is required to properly monitor and control fishing activities across all the landing sites. Moreover, the Monitoring, Control and Surveillance Division of the Fisheries Commission is only present at Tema and Sekondi fishing harbor whose fisheries enforcement activities are mostly targeted at industrial vessels. The Fisheries Enforcement Unit (FEU) lacks the right number of personnel to comb the Tema and Sekondi fishing harbor let alone to extend operations further to the smaller landing sites in other coastal towns and villages. There is an inadequacy in terms of the number of personnel required by the Fisheries Commission to carry out its enforcement mandate to ensure that fishers go about their day to day fishing business in a manner that are not harmful to the conservation of fish stocks.

A lot of the illegal fishing activities occurring on land take place at the smaller landing sites but those rather are the places that do not have fisheries enforcement officers. Fisheries enforcement activities at the major fishing harbors alone will not yield desired outcomes if they are not linked with enforcement operations also at the smaller landing sites. There is the need to increase the number of personnel of the FEU and also increase their technological capability to be able to
extend their operations to the smaller fishing communities. For enforcement to have the necessary impact in fishing communities, existing district fisheries directorates must also be equipped with adequate personnel, infrastructure and other logistics to become fully functional in their zones of operations. Direct observations and interactions with some members of staff at the district fisheries offices in the regions revealed that there is inadequate infrastructure which leaves fisheries staff working in poor conditions. Offices were in deplorable state, some without office furniture and other office equipment. Members of staff of the Fisheries Commission at the district level, in such conditions, are not likely to be motivated to give off their best at work. It was also noticed during such visits that existing district fisheries offices were simply not enough to oversee fishing activities in all the communities under their jurisdiction. Therefore, in addition to strengthening and equipping the existing offices, more offices should be built in other districts that currently do not have any to serve their districts. After strengthening and equipping the district offices, more enforcement personnel could be deployed in the districts to carry out their operations from the district offices under the supervision of the district Director of Fisheries. To a large extent, the actual presence of enforcement personnel in the districts and communities will deter fishers from engaging in illegal fishing activities.

In discussing fisheries enforcement activities at the district and community levels, again the institution of the chief fisherman becomes critical. From the ongoing discussions, it is evident that the Fisheries Commission doesn’t have the capacity to successfully regulate what goes on in the widely-dispersed fishing communities. It is concluded, therefore, that the delegation of fisheries management functions (enforcement in this case) to the local level through the institution of the chief fisherman could work more than what the Fisheries Commission at the national level, being under-staffed and under-funded can provide. Chief fishermen should be
empowered by law to make fisheries enforcement decisions and enforce them in the fishing communities under their respective jurisdictions. In doing so, it should be ensured that efforts by the chief fisherman must not conflict with efforts by the Fisheries Commission.

In addition to enforcement actions on land at the beaches, efforts should also be directed towards ensuring compliance with the law and regulations at sea so as not to engage in selective enforcement. Activities of all categories of vessels must be monitored to ensure compliance as artisanal fishers are more likely to comply with the law if they know that industrial vessels are also being monitored to do the same. The Fisheries Commission should therefore be equipped with modern surveillance and communication tools as well as fisheries patrol vessels to be able to monitor the activities of fishing vessels at sea and MCS staff should be adequately trained on the use of such equipment. It is also important that such equipment is regularly serviced and maintained to ensure their long-term use. It must be acknowledged that fisheries enforcement operations are expensive to be undertaken by developing countries like Ghana and hence more effort should be directed at voluntary compliance with the law and regulations which can be achieved through rigorous and sustained sensitization and education of fishers through the various approved communication channels. If fishers are willing to comply with the law without being forced to do so, that will save Ghana the time, effort, money and other resources to engage in fisheries enforcement activities and this will also lead to improved fisheries management. Earnhart and Glicksman (2015) describe two different approaches to the enforcement of regulatory law; the coercive approach which emphasizes the deterrence of non-compliance through inflexibly imposed sanctions, and the cooperative approach which emphasizes the inducement of compliance through flexibility and assistance, and show that a more cooperative relationship induces better environmental management. Gezelius (2007) identifies three
mechanisms whereby enforcement may generate compliance; deterrence, rational communication and enforcement’s symbolic meaning. To improve compliance performance in the fisheries, there is the need to identify the potential factors of non-compliance and the extent of their influence on non-compliance. Also to ensure effectiveness of compliance strategies, it is vital to increase industry participation in the decision making process to enhance mutual trust and legitimacy attributed to management authorities (Bose and Crees-Morris, 2009; Al-Subhi et al., 2013).

6.2.7 Establishing Marine Protected Areas and closed fishing seasons
Other approaches proposed that are rather considered as long-term measures to addressing the problem of overfishing and decline in fish catch and conflicts are the establishment and implementation of Marine Protected Areas (MPAs) and closed fishing seasons. According to Jones (2006), MPAs are recognized as an ecosystem-based management tool for improving fisheries, protecting biodiversity and ecological functions, and protecting coastal zones from climate-change related impacts. MPAs are normally created to promote protection of marine biodiversity, but it is still unclear the degree to which no-take MPAs might contribute towards or undermine fisheries management objectives. Gell and Roberts (2002) reported that, fishery benefits for reserves include increases in spawning stock size, and reproductive output of exploited species. In 2013, a team of Ghana government officials, fishers and representatives from local NGOs working in fisheries and environment in Ghana (including myself) participated in a learning and exchange tour to Senegal purposely to study MPAs initiatives that are contributing to enhancing fisheries management and development with the hope of implementing
such an initiative in Ghana to enhance the rebuilding of declining fish stocks. It can be concluded from observations in Senegal that the successful establishment and implementation of MPAs in Ghana can go a long way to enhance fish production. MPAs provide safe havens for fish to spawn and grow to maturity before being harvested if there is spill over to other areas.

Conscious and concerted effort will have to go into the planning for the establishment and implementation as the concept of MPAs in Ghana as it is new to fishers and other community people. The social and financial consequences of creating and managing MPAs cannot be ignored. Hilborn (2007) cautions that, the objective of preserving marine ecosystems is broadly in conflict with all other objectives. Creation of MPAs can best be described as a conflict between preservation versus utilization. FAO (2005b) reports that when considering the economic, social and ethical implications of establishing MPAs, fishing communities generally resist regulatory measures to exclude fishing from their usual fishing grounds. Closing parts of the coastal marine environment adversely affects coastal populations by restricting or prohibiting access to local fisheries (Sanchirico, 2000). Governments are increasingly recognizing the need to develop policy frameworks that address the wide-ranging effects that establishing MPAs have on marine activities (Bess and Rallapudi, 2007). Certain questions need to be asked which include; does Ghana possess the technical expertise and the financial resources to successfully establish and manage MPAs? Where would be the best areas of the sea or coast to be set aside as MPAs? Are fishers and other marine and coastal resource users in Ghana going to embrace the concept of MPAs in order to avoid potential conflicts?

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20 For more information please refer to the Report on Study Tour on Fisheries Co-management to Senegal in 2013 published by the Integrated Coastal and Fisheries Governance Project (ICFG) for Ghana. Coastal Resources Center, Graduate School of Oceanography, University of Rhode Island, USA.
Obviously, there is lack of local human resource capacity to manage MPAs in Ghana as there are currently no MPAs in the country which means that people will have to be trained by MPA experts possibly from outside Ghana and recruited for such jobs. Current unemployment conditions in Ghana will suggest that there is enough idle capacity that could be recruited and trained to manage MPAs in the country (World Bank, 2004). After the training and recruitment, funds must be made available to provide the necessary infrastructure and other logistics to work with as well as paying for the salaries of foreign MPA experts and other employees. This is further going to stretch the already thin budget allocated for fisheries management in Ghana. MPAs should be established based on the best scientific evidence and local ecological knowledge.

There should therefore be a thorough scientific and social survey that will ensure that the best suited places at the coast and in the sea, are selected as MPAs. The conflicts that will emerge between managers of MPAs, fishers and other coastal and marine resources users must be effectively managed. Such conflicts are perceived to be similar to those which will emerge when fishers are asked to stop fishing because there is the need to save fish stocks from complete collapse. Consequently, there is the need to sensitize and educate people in a manner that they will eventually accept such an idea and where necessary appropriate compensations paid to communities or individuals who are likely to lose their traditional fishing grounds due to the establishment of MPAs.

Aside MPAs which may be in the form of permanent or seasonal area closures, closed fishing seasons may also be implemented as a means of ensuring the recovering of fish stocks. With closed seasons, periods are set aside where fishers are not allowed to fish during such times but may fish outside those seasons with the aim of decreasing the pressure on fish stocks. There
could be a total ban on fishing where no fishing at all is allowed or a partial ban where fishers are not allowed to fish with certain fishing gears and methods or are not allowed to catch certain species of fish during the closed season depending on the objectives for closure. Colwell and Axelrod (2017) cautioned that resource use restrictions such as the implementation of closed fishing seasons often disproportionately impact the most vulnerable stakeholders. The decision to have closed seasons should be informed by the available scientific evidence and in agreement with fishers to minimize potential conflicts. Lessons could be drawn from seasonal and spatial closures in China as described by Cao et al. (2016) in order to minimize associated conflicts. With the exception of certain traditional management practices where certain lagoons are closed in certain periods of the year, there are no records of any successful implementation of closed fishing seasons in Ghana. This means that a significant amount of work needs to be done to get fishers to accept the concept and comply with such bans since this is going to be implemented for the first time. However, managers can draw on the experiences from traditional implementation of closed lagoons to successfully implement closed seasons in the sea and other coastal areas despite the challenges that will be encountered. It must also be emphasized that the successful establishment and management of MPAs and closed seasons must be backed by appropriate legislative instruments and the necessary political will.

6.2.8 Addressing potential impacts of climate change on fisheries
According to Lam et al., (2012), West Africa has been identified as one of the most vulnerable regions to climate change. Adverse changes in marine resources under climate change may pose significant threats to the livelihoods and well-being of the communities and countries that depend on fisheries for food and income such as Ghana. Despite these threats, the potential impact of climate change on fisheries and its subsequent impact on human well-being in West
Africa are not well known. Lam *et al.*, (2012) assessed the potential impacts of climate change on fisheries and their effects on the economics, food and nutritional security in West Africa and showed that climate change may lead to substantial reduction in marine fish production and decline in fish protein supply in this region by the 2050s. They projected a 21% drop in annual landed value, 50% decline in fisheries-related jobs and a total annual loss of US$311 million in the whole economy of West Africa. They concluded that these changes are expected to increase the vulnerability of the region through economics and food security of West Africa to climate change.

Allison *et al.* (2005) note that the impacts of and responses to climate change have significant implications on the fisheries sector and the lives of poor people. This is a good justification for Ghana to consider the impacts of climate change as a response to addressing the problem of overfishing and decrease in fish catch and their associated consequences. Ghana’s response to climate change presents opportunities for the fisheries sector to improve its efficiency, sustainability and support for climate compatible wealth creation (Tarner *et al.*, 2014). Climate change initiatives must be undertaken as a long-term intervention. Ministry of Environment, Science and Technology (2011) states that climate change-related initiatives in Ghana are increasing, and the government is committed to mainstreaming climate change responses into multi-scale and multi-sector planning and policy processes. It is recommended as a matter of policy that potential impacts of climate change on fisheries stay high on the agenda of climate change initiatives in Ghana.

### 6.3 MANAGING CONFLICT ISSUES WITHIN THE FISHERIES

There remains an urgent need for information as to how conflicts can be managed because when conflicts are well-managed sustainable fishing will be achieved (Murshed-e-Jahana *et al.*, 2009).
Managing existing conflict issues within the fisheries is as important as addressing the causes of the conflicts which is overfishing and the subsequent decline in quantities of fish landed. In order to ensure the co-existence of fisheries sectors, there is the need to find suitable ways to prevent the occurrence of conflicts and to manage or resolve them as and when they arise. If the very issues that are responsible for driving conflicts within the fisheries such as the decline in fish production, open access nature of canoe fisheries, increases in numbers of fishers and fishing vessels, lack of effective enforcement of fisheries law and regulations as well as poor governance of the fisheries are adequately addressed by the appropriate institutions, Ghana will already be on her way to more effectively manage existing conflicts within the marine fisheries. There is more to be done in ensuring the effective management of conflict within the fisheries. Additional approaches to managing the conflicts are presented below.

6.3.1 Ensuring the co-existence of fisheries sectors

All the marine fisheries sectors in Ghana were found to be important. Artisanal fisheries produce bulk of the marine fish catch particularly the small pelagics, support the livelihoods of many in shorefront communities and provide a cheaper source of animal protein for Ghanaians. Coastal fish resources are mostly exploited by the canoe sector. Semi-industrial vessels mostly fish further offshore because they are more equipped with more powerful engines than canoes to do so, exploiting both pelagic and demersal species which otherwise couldn’t have been effectively exploited by canoe fishers. Industrial trawlers are much more comfortable fishing vessels with much more powerful engines that enable them to fish in much more deeper waters exploiting mostly high quality demersal fish with more advanced fishing technologies. Tuna vessels target very far offshore fast swimming large pelagics (tuna and other tuna-like species) which cannot be efficiently exploited by canoes, semi-industrial vessels or industrial trawlers due to their lack of equipment, technology, capacity and expertise to do so. Together all four sectors play
different roles in ensuring that Ghana exploits her marine fish resources to the optimum. Ghana generates revenue and foreign exchange earnings from the fish licensing fees paid by semi-industrial vessels, industrial trawlers and tuna vessels and fish exports from their catch. It is therefore in the best interest of the nation to put systems in place to safeguard the co-existence of all fisheries sectors. Ideally, none of the fisheries sectors should suffer at the expense of others.

Destruction of fishing gear and equipment, intrusion of fishing zones, signaling and navigation, illegal methods of fishing, resource competition, and compliance and enforcement of fishing rules and regulations were identified as some of the major conflict issues in the fisheries. These issues certainly need to be effectively managed in order to minimize or eliminate conflicts among fisheries sectors. These issues and how to go about them while engaging in fishing have been specified in the fisheries law in one form or the other. Is it because fishers and other players in the industry are ignorant of the law or are conversant with the law but simply are not willing to comply with it? Interactions with fishers confirm that fishers’ knowledge of the rules of engagement in fishing is superficial. Education of fishers on the fisheries law and regulations and the ecological justification of the law are critical to managing the issues of conflicts in the fisheries. The Fisheries Commission should have it on their agenda and make it a priority to constitute a team comprising of experts with requisite knowledge in the fisheries and the law governing fisheries in Ghana and provide them with the resources to engage in regular education programs in all coastal districts and fishing communities across the coast. It is suggested that such programs should take place in the districts and the communities to bring fisheries authorities in physical contact with fishers. This will determine the importance that fishers will attach to such a program. One observation made was that fisheries authorities have lost touch with fishers because their presence is hardly felt in fishing communities. If fishers see education
programs organized in their communities by the Fisheries Commission, it will go a long way to renew their trust in the Commission and will let them know that the Commission is willing to collaborate with fishers to find solutions to the current crisis in fisheries.

The team of experts together with representatives from the Fisheries Commission itself should be assembled first to think through the nature of the problem in fisheries and prepare relevant materials to be presented to fishers in the districts and communities based on the nature of the problem. Such education materials should be in the form of audio-visuals or in graphical representations in ways that are very simple to be understood by the local people preferably in languages they understand considering the educational background of fishers and their ethnic diversity. More emphasis should be drawn on aspects of the fisheries law that highlight the issues raised which generate conflicts within the fisheries and the penalties associated with the offences which are related to them to serve as a deterrent to fishers. It is when the fishers know and understand the reasoning behind the rules of engagement that they will appreciate and comply with such regulations to reduce the occurrence of conflicts in the fisheries.

To tackle the issues which give rise to conflicts between fisheries sectors, there should be effective enforcement of the law and the promotion of voluntary compliance with the law to ensure that fishers also do the right thing after they have been educated on the law. Intrusion of fishing zones, signaling and navigation, illegal methods of fishing could be checked when there is effective enforcement of the law. Illegal activities could be checked by installing and maintaining a Vessel Monitoring System (VMS) to monitor the activities of fishing vessels at sea and also equipping the Fisheries Enforcement Unit to conduct aerial and sea patrols to ensure that fishers do the right thing. Fishers are more likely to obey the rules once they know that they are being watched. Also, all vessels including canoes and semi-industrial vessels should be
equipped with the necessary devices to be able to locate their position and warn off intruders or quickly notify the authorities with their communication gadgets to be tracked. Illegal methods of fishing such as light fishing also give rise to conflicts among fisheries sectors. There is always conflict between those who engage in illegal fishing practices and those who do not. Effective enforcement of the ban on light fishing and other fisheries malpractices will tend to reduce the occurrence of conflicts.

Many canoe fishers in particular have little or no knowledge about navigation rules at sea as found out from this research. Many of the fishers do not have any formal training in sea navigation but are somehow skilled to ferry canoes to sea utilizing their local experiences acquired through several years of fishing. Local knowledge is good but it should be supplemented by some kind of formal education and training to bring fishers up to speed with current rules of engagement at sea. Apart from the education that will be given to fishers in the communities on the fisheries law and regulations, local fishers should also be made to undergo practical sea faring training and issued with certificates before they are allowed to go to sea. Government can collaborate with the Regional Maritime University in Ghana which has a long-standing record of providing practical training to local fishermen and other fishers alike to offer short professional courses on maritime regulation and enforcement to fishers where responsibilities of fishers as far as signaling and navigation at sea are concerned. If this is achieved, there will be lower incidence of destruction of fishing gear and equipment involving different sectors of the fisheries and conflicts are more likely to be reduced.

In order for different fisheries sectors to co-exist, there should be constant and sustained dialogue among representatives of the various sectors. All sectors of the fisheries have their individual associations which meet regularly to discuss issues pertaining to their respective sectors but
hardly meet together as a group to think about issues affecting all of them as one group and present grievances to Government as a unified force. If these groups meet regularly and dialogue on ways forward for resolving existing conflicts among their members and deliberate on possible steps to be taken for preventing the occurrence of conflicts, it will provide an opportunity for better management of the conflicts in particular and contribute to improved governance of the fisheries in general.

6.3.2 Improving the management of pre-mix fuel to reduce conflicts within canoe fisheries
The research undertaken confirms that pre-mix fuel conflicts are probably the highest ranked conflict in the marine fisheries in Ghana. Issues of conflict with pre-mix fuel only concern the canoe sector since canoes are the only fishing vessels that utilize the commodity. The management of the commodity in terms of its supply, distribution and sale is associated with conflicts at different levels. The background to the pre-mix fuel conflict issue stems from the fact that the product is highly subsidized by government and also managed to a large extent by government appointees. Issues with pre-mix fuel are highly politicized as a result of the extent that political campaigns are conducted based on the supply of pre-mix fuel to fishing communities. The provision of pre-mix fuel at subsidized costs to canoe fishers is a government intervention to assist fishers to reduce their input costs. Ideally, it is targeted at assisting all categories of canoe fishers without bias but unfortunately, this research found that the management of the fuel is associated with a lot of challenges both at the national and community levels.

To minimize the occurrence of pre-mix fuel conflicts within the canoe fishery sector, government should ensure the regular supply of the fuel to all designated landing sites by fulfilling its obligation to pay all distribution companies on time and also put appropriate checks
in place to ensure that fuel consignments arrive at their designated landing sites and people must be held accountable for that. If the fuel is always available at the landing site, it will reduce the chances of competition and conflicts. Also, middlemen have to be eliminated from the distribution and sale process and ensure that fishers are able to buy the fuel straight from the Landing Beach Committees at the exact subsidized price. Activities of the Landing Beach Committees must be closely monitored by fisheries authorities and all persons found engaging in any illegalities be given the appropriate sanctions. Getting middlemen out of the process mean that there should be a system of identification of all fishers or at least canoe owners or their representatives at the landing sites who would only be allowed to buy the fuel upon the presentations of their identities to the pump attendant who physically sells the fuel. This must be closely linked with the canoe/fisher registration exercise so that only canoes/fishers that are registered will have access to the fuel. These proposals must be undertaken in the short-term.

It is very important to get politics out of the pre-mix fuel business if the issue of conflicts within fisheries is to be minimized or eliminated. It is the responsibility of government to see to the well-being of all its citizens and not only a section of them who bear the same political affiliation as the political party in government. The same must apply in fisheries. There should be transparent and equitable supply and distribution of pre-mix fuel to all canoe fishers regardless of their political affiliation. If politics are avoided in the pre-mix fuel distribution process, it will be a huge step forward towards the management of conflict issues within the canoe fishery sector. The best way to get politics out of the process is to remove the subsidy on the product to limit the role of government and allow private sector oil companies to fully engage in the business of supplying and selling pre-mix fuel to fishers just like the way other fuel products are sold to the general public.
Pauly et al. (2002) identified subsidies of fisheries as a remote cause of vessel overcapacity and overfishing, while Hilborn (2007) describes that as a political process gone wrong. Schuhbauer et al. (2017) note that capacity-enhancing subsidies are known to exacerbate overfishing and propose that taxpayers' money should be used to support sustainable fishing practices and in turn ocean conservation, and not to foster the degradation of marine ecosystems as a result of capacity-enhancing subsidies. They argue that reducing capacity-enhancing subsidies will promote global fisheries sustainability.

The level of subsidy on pre-mix fuel should be reduced over time from the current 50% until there is completely no subsidy at all on the fuel. Tanner et al. (2014) support the removal of the subsidy on pre-mix fuel to canoe fishermen in Ghana and describe that as a potential ‘triple win’ outcome, but caution that in practice this is highly problematic. There are examples from countries like Senegal where pre-mix fuel subsidies have been successfully reduced from about 40% to as low as 4% over time.21 According to Deme and Bah (2012), in Senegal, an export subsidy was instituted by law in 1980 as a trade measure aimed at facilitating penetration of external markets by national products. The granting of export subsidies was part of a general policy of encouraging exports to international markets. Initially set at 10% of Freight on Board value, the subsidy was raised to 15% in 1983. The rate was then raised to 25% with the subsidy being extended to all fish sector products. This policy was cancelled in 1994 in view of emerging possibilities of recovery of the marine fishing industry. Also in the Gambia, there is no subsidy on fuel for fishing and related operations within the fishing industry. Fuel prices are similar to the commercial pump price.

21 This information was obtained through verbal communication with Senegalese government fisheries officials during the study tour on fisheries co-management to Senegal in 2013.
Getting politics out of the pre-mix fuel business could also mean that the National Premix Committee should comprise representations from different fisheries stakeholders who are not politically inclined and perhaps elected with a fixed term instead of government appointing members to the committee. Mechanisms that will eliminate politics should be adopted to ensure that members of the Landing Beach Committees at the community level do not engage in politics in the performance of their duties. Fishers must participate in the process of deciding who should be on their Landing Beach Committees. If some of these actions are implemented, pre-mix fuel would be better managed to reduce the incidence of conflicts within the canoe fishery sector.

**6.3.3 Improving landing beach infrastructure and management**

Fisheries conflicts on land, as identified, could be avoided or significantly reduced if there were much better fish landing beach facilities and an improved management of the facilities and other issues which give rise to conflicts both at the landing beach and in fishing communities at large. Many fish landing beaches in Ghana were found to lack the appropriate infrastructure for berthing, vessel repairs, fish storage, offloading and transporting as well as good facilities for fish marketing. The modernization and expansion of landing sites and the creation of others that are capable of accommodating existing fishing vessels and supporting the work of fishers will solve some of the issues of conflict and also add some dignity to the fishing profession. If such facilities are built and entrusted in the care of capable management authorities, there will be improvements in the working conditions of fishers which can also reduce the level of conflicts at the landing beaches. This must be considered as a medium- to long-term measure.

Improved management of landing beach facilities and other activities at the landing beaches is as important as the creation of those facilities to reduce conflicts. If the landing sites are built with ice plants that have constant supply of electricity to produce enough ice to meet the demands of
all fishers and with better management of the facility, conflicts that arise due to struggles by fishers to acquire ice for their fishing operations will be reduced. This definitely is an issue that requires action from central government authorities. If improved management mechanisms are also put in place to ensure the regulation and control of fish pricing and marketing which is a major conflict issue at the landing sites, conflicts will also be reduced.

Having the ultimate responsibility of managing fisheries, government regional fisheries authorities could collaborate with and supervise the chief fisherman and the chief fishmonger to set out modalities for fish pricing and sale based on the seasonal dynamics of the fisheries. If the issue of fish pricing and marketing at the landing beach is resolved, conflicts will definitely be reduced. Regional and district fisheries authorities have a crucial role to play in ensuring better management of facilities and fishing activities at the landing sites to reduce conflicts. They should be equipped with the necessary capacity, tools and other logistics to effectively carry out their work and their presence must be felt at the landing sites. They must be seen working together with fishers at the landing sites and not only working from their offices and must also be seen to be addressing issues of concern to fishers as well as liaising between fishers at the community level and government at the national level. Fisheries authorities have largely lost touch with fishers which has affected the trust that fishers had in fisheries managers. This trust needs to be restored and one way to achieve that is when the fisheries managers have regular and physical presence with fishers in their communities. The recognition of the position of chief fisherman also needs to be strengthened.

6.3.4 Strengthening the institution of chief fishermen
One of the important findings from the research was that fisheries conflicts are managed at the local level by chief fishermen and their council of elders depending on the kind of conflict. In
resolving conflicts at the level of the chief fisherman, the chief fisherman and his elders rely on their wisdom and traditional knowledge because they don’t have any specialized formal training in conflict management and resolution strategies. To achieve more effective conflict management at the level of the chief fisherman, it will be good to, first of all and in the short-term, formally recognize the institution of the chief fisherman as a mechanism for managing and resolving fisheries conflicts at the community level. If such recognition is given, then the institution of the chief fisherman as a whole must be strengthened to more effectively handle conflict cases at the local level.

All chief fishermen and their elders must be given formal basic training in conflict management and resolution strategies and must be empowered by law to act as arbitration committees with powers to sanction and impose fines based on well established guidelines. If fishers are aware that chief fishermen and their elders have received training in conflict management and have been empowered by law to act as mediators in fisheries conflict cases, it will serve as a deterrent to fishers not to engage in activities that will lead to the creation of conflicts which may eventually create problems for them. And if chief fishermen and their elders are trained to act as mediators in fisheries conflict cases and are required to make judgments based on laid down procedures and prescribed guidelines, a high level of transparency and fairness will be assured in the process.

6.3.5 Creating and strengthening fisheries arbitration committees
Many conflicts are resolved through arbitration (Gray et al., 2007; Grewal and Darlow, 2007).

The creation of more functional fisheries arbitration committees and the strengthening of existing ones including those of the chief fishermen to manage fisheries conflict cases at different levels will help to achieve good governance of marine fisheries in Ghana. Government must ensure to
carry this out in the short-term. Existing arbitration committees were found to lack visibility because many of them are not fully functional. The arbitration committee that operates from the Greater Accra Regional fisheries directorate at the Tema fishing harbor appears to be more functional may be because they are regarded as the national arbitration committee and by virtue of where they operate from; managing conflicts at the national level and at the busiest fishing port in Ghana. The non-existence of functional fisheries arbitration committees at different levels could account for the high incidence of conflicts confronting the fisheries sector in Ghana.

The Fisheries Commission must see and make it a priority and lead the process to work with fishers to form fisheries arbitration committees at all levels to more effectively manage conflicts in fisheries. Arbitration committees should also be motivated and equipped with the necessary capacity and logistics to perform their duties. Such committees must be recognized by law with clearly defined roles and responsibilities and must be given formal training in conflict management strategies as well to put them in a better position to manage the conflicts. The committees must be empowered and act with the idea of using mediation to solve fisheries conflict issues. Wright et al. (2000) demonstrate that processes built around the idea of using mediation to solve fisheries issues as practiced by Fisheries Western Australia show considerable promise as an alternative to top-down rules as a way of resolving disputes over fishery resources. They recommend that mediation is an efficient and effective way to address management issues in fisheries and should be continued and extended where appropriate, and it is good to have an experienced mediator as part of the team which assesses fisheries conflict cases. In the case of Ghana, chief fishermen should be well trained to act as experienced mediators in fisheries conflict cases. The committees must also be equipped with good report writing skills to be able to document arbitration proceedings that must also reach the Director of Fisheries in Accra.
regularly. If such proceedings are documented and shared, it provides the opportunity for learning and information to feed fisheries policy decision making at the national level.

This research showed that members of the national arbitration committee work voluntarily without getting paid or compensated in any way for their time. They also do not have a convenient meeting place with basic working logistics. Moreover, the committee is not recognized by law and therefore there is an extent to which they can act. For example, if they instruct a party at fault in a conflict to pay a fine or compensation to the other party in the conflict and that is not fulfilled, their power ends there and there is nothing more they can do. Sometimes they invite parties involved in conflicts to sit in arbitration proceedings and some never show up because they know the arbitration committee doesn’t have the power to impose any sanctions on them. These issues must be taken into account when setting up new and strengthening existing arbitration committees. There must be appropriate mechanisms to compensate members of the committees either through the fisheries development fund or through other means and hold them accountable for their work. Members of the committee should be provided with office space with the basic logistics and their establishment and function should be backed by law. These will offer meaningful contributions to fisheries conflicts management.

6.3.6 Establishment of environmental/fisheries courts
According to Bedner (2008), one reform strategy to improve judicial performance has been to establish special courts, and this has been demonstrated in Indonesia. Improved performance depends on the conditions under which special courts evolve and the form they are given. Creation of special courts tends to reinforce political independence of the courts. The relatively small-scale of most special courts makes judges more aware of the decisions of their colleagues
while the relatively limited jurisdiction of special courts also makes it easier to obtain legal expertise. Ghana can learn from this experience.

This research has shown that when fisheries conflict cases are not resolved informally between the parties involved, at the level of the chief fisherman or through mediation by arbitration committees, they finally end up in the courts. Conversations with members of the national fisheries arbitration committee indicated that the courts sometimes fail to resolve some of the fisheries conflict cases which end up in court and such cases are referred back to the chief fisherman or the arbitration committee for settlement in as much as the chief fisherman and arbitration committees are not recognized by law. Some of the reasons attributed to that were that court officials and other members along the prosecution chain are most of the time not well versed in fisheries issues as well as the fisheries law and regulations. Fisheries conflict cases are not treated by the courts as important as other non-fisheries cases in court or parties involved in the conflicts normally fail to produce concrete evidence based on which the courts can make decisions on cases presented before them.

It was not surprising that courts were sometimes not able to resolve conflict because fisheries cases are likely to end up in the general courts which deal with general issues and not specialized courts with officials that could effectively handle matters broadly related to the environment in general and fisheries in particular. Moreover, there are only a few Ghanaian lawyers in the system with specialization in fisheries or environmental law. For fisheries cases to be more effectively handled in court, Ghana needs to set up specialized courts in the medium- to long-term to deal with environment and fisheries cases, with court and other officials along the prosecution chain equipped with knowledge in fisheries and environmental issues, the fisheries law and regulations and their duties and responsibilities along the fisheries prosecution chain.
Some of the agencies involved in the fisheries prosecution chain such as the Monitoring, Control and Surveillance Division of the Fisheries Commission, the Attorney-General’s Department, the Judicial Services Department, Ghana Navy, the Marine Police Unit of the Ghana Police Service and the Environmental Protection Agency sometimes are found wanting when it comes to their roles and responsibilities along the prosecution chain and therefore must be reminded of them through refresher courses. Government could also collaborate with Universities to incorporate environmental and fisheries issues in their curricula and encourage people to read environmental and fisheries law. If there are many lawyers in the system who have adequate knowledge of basic principles in fisheries management and the laws governing fisheries and ocean management in Ghana as well as other international best practices in the fisheries sector, fisheries conflict issues could be more effectively addressed in court.

6.4 MANAGING CONFLICTS BETWEEN FISHERIES AND OIL AND GAS SECTORS
One of the most difficult marine policy issues is how to resolve conflicts between different user groups (Burger and Leonard, 2000). Fisheries and oil and gas sectors are all important to the economy of Ghana which justifies the need for both sectors to be safeguarded to ensure their sustainability for generations to come. Fishing in Ghana existed long before oil and gas production commenced. The fisheries sector has continued to thrive over the years despite the current challenges it faces. Oil and gas activities have recently become an additional challenge in the Ghanaian fishing industry. Conversations with fisheries stakeholders indicate that the future of the marine fishing industry remains uncertain with the expansion of oil and gas operations. With the intensification of oil and gas operations, there is likely to be more conflicts between the two sectors in the near future and that should not be underestimated. The oil and gas sector is perceived as a bigger player than the fisheries sector in terms of their socio-economic contributions. There were indications that the survival of the oil and gas sector was given more
attention and priority by management authorities than was given to fisheries. The collapse of the fishing industry in Ghana due to oil and gas will be a complete disaster that could undermine the overall security of the country. In view of this, it must be considered as a matter of urgency to put appropriate systems rightly to manage the impacts of oil and gas on fisheries and reduce conflicts which will ensure that the fishing industry does not suffer at the expense of oil and gas. The following measures will be necessary for the management of conflicts between marine fisheries and offshore oil and gas which is critical for the co-existence of both sectors.

**6.4.1 Strengthening the legal and regulatory systems for fisheries and oil and gas**

Global experience shows that successful management initiatives require strong legislative backing. In other words, management initiatives fail partly because of policy and legislative vacuum. This research has shown that there are inadequacies in the legal and regulatory frameworks for fishing and oil and gas activities in Ghana. In order to more effectively manage conflicts between fisheries and oil and gas, the current legal frameworks that govern both sectors in particular and the whole of Ghana’s marine waters in general must be strengthened to more effectively manage issues of conflicts between fisheries and the oil and gas sectors. This must be carried out in the short-term. The Fisheries Act 625 was enacted close to a decade before the production of oil and gas started and the Fisheries Regulations LI 1968 was promulgated in 2010, the same year that oil and gas production started in Ghana. In view of that, it is likely current conflict issues between fisheries and oil and gas were not fully anticipated in order that relevant provisions would be made in the fisheries law and regulations to more effectively manage conflict issues between fisheries and oil and gas. New fisheries legislation is needed which will clearly require oil and gas operators to conduct Fisheries Impact Assessments before the start of any oil and gas exploratory activities, and that must be strictly enforced. Similarly, the current framework governing the oil and gas sector in Ghana (PNDCL 64) was enacted more
than two decades before actual production of oil and gas started. It is also likely therefore that the PNDCL 64 did not make adequate provisions to effectively address fisheries and oil and gas conflict issues. The Fisheries Act 625 must have incorporated some oil and gas issues, the PNDCL 64 must have also incorporated some fisheries issues but since there were not that much interactions between the two sectors at the time because oil and gas production had not actually commenced at that time, there are likely to be inadequacies in both laws as far as marine fisheries and offshore oil and gas interactions and conflicts are concerned. Both laws therefore need to be reviewed by legal experts and appropriately amended to include provisions that will effectively address, in particular, emerging conflict issues between the two sectors. Other legal frameworks for ocean governance in Ghana must likewise be reviewed and amended to manage conflict issues at sea.

Information gathered at the time of writing indicated that proposals had been made by fisheries and oil and gas stakeholders, which was supported by Ghanaian Civil Society Organizations, and presented to the Parliament of Ghana to review and amend the current fisheries and oil and gas laws respectively. It would be good if such proposals adequately addressed fisheries and oil and gas conflict issues. It is one thing submitting a proposal to parliament and another actually getting the law passed. In Ghana, this process can take several months or years to conclude which often causes unwanted delays in the implementation process. It would be good therefore if a special parliamentary committee is put together to fast-track the process to ensure that new fisheries and oil and gas laws are in place to regulate the operations of both sectors in general and improve the management of conflicts between fisheries and oil and gas sectors.
6.4.2 Continuous monitoring of oil and gas activities
Results from this research show that the effects of oil and gas operations on fisheries, fishing communities and the environment as a whole is one major factor that drives conflicts between fisheries and oil and gas sectors. Continuous monitoring of oil and gas operations by the regulatory agencies to ensure compliance with the regulations in order to minimize impacts of oil and gas operation on fisheries, fishing communities and the environment will enhance the management of conflicts between the two sectors. This must be an ongoing process. The Environmental Protection Agency which issues environmental permits, and has the responsibility of regulating and managing projects like oil and gas exploration and production that can have adverse impacts on the environment, should be equipped with the necessary human resource capacity and the required logistics to effectively monitor activities of the oil and gas companies both at sea and on land. Before the commencement of operations, an Environmental and Social Impact Assessment (ESIA) report was submitted by Tullow Oil Ghana Ltd to the Environmental Protection Agency, detailing perceived adverse impacts of their operations on the environment and other activities such as fishing, and how to mitigate such impacts before they were issued with an environmental permit to commence operations. The Environmental Protection Agency should constantly refer to the Tullow ESIA report and remind the oil companies of their commitment and obligations towards ensuring environmental sustainability and their co-existence with fish and fisheries. Environmental management plans and annual environmental reports of the oil and gas companies should be continually reviewed by the Environmental Protection Agency to take into account emerging issues and to ensure that the oil companies fulfill their duty to comply with the guidelines set out in the ESIA report.

The Ghana Maritime Authority also has a role to play to monitor and regulate the activities of oil tankers and oil supply vessels at sea to ensure that they do not engage in malpractices that will
lead to conflicts between oil and gas and fishing vessels. The Ghana Maritime Authority must provide assistance to the Fisheries Commission and therefore fishers through their Vessel Monitoring and Tracking System to identify oil and gas vessels that are reported to have been involved in accidents at sea with fishing vessels and ensure that fishers are paid the necessary compensation if the oil and gas vessels are guilty of such offences. In both cases, the role of fisheries authorities is as important as the roles played by the Environmental Protection Agency or the Ghana Maritime Authority. Fisheries authorities should therefore collaborate closely with the Environmental Protection Agency and the Ghana Maritime Authority to ensure that, respectively, oil and gas companies carry out their operations in ways that do not conflict with fisheries interests and also engage in best safety and navigation rules at sea that will not jeopardize fishing activities and create conflicts.

6.4.3 Clear demarcation of exclusive zones and underwater gas pipelines
This research has shown that when it comes to conflicts between fisheries and oil and gas sectors, a very important issue as far as local fishers and other fishing community members are concerned is the exclusion of fishers from areas of the sea and land that are meant for oil and gas activities. Exclusion of fishers from fishing close to the offshore oil and gas platform and underwater oil and gas pipeline areas merits special discussion in this regard. Fishers make the argument that bright lights on the oil and gas platform attract fish in surrounding waters close to the rig therefore the most efficient way through which they can enhance their catch is fishing close to the platform. The oil and gas platform operators ask fishers to keep a distance of about 1 mile from the platform. Looking at the danger that fishing close to the platform presents to fishers and to the rig and to the safety of its workers, it is a fair argument on the part of the operators and for the benefit of society for fishers to keep their distance from the rig. It is also in
the interest of all for fishers to keep away from underwater gas pipeline areas of the sea and the coast considering the dangers involved.

The question therefore arises as to how are fishers supposed to determine their distances from the platform and also to know where underwater oil and gas pipelines are to avoid fishing close to such areas? Industrial fishers may be able to determine their distances from the platform because of the technology they use and also know where the gas pipelines are located as they have navigation maps which indicate exactly where the pipelines are. Local fishers with their limited technology and educational background may not be able to determine their distances from the platform or be able to read and interpret navigation maps that show where underwater pipelines are. The best way out therefore is for the platform, underwater gas pipelines, all other oil and gas installations and areas of the sea reserved for oil and gas operations to be clearly demarcated with illuminated buoys that are visible to fishers both during the day and at night. This is an activity that must happen in the short-term looking at the dangers involved.

Information gathered from fishers indicated that neither the exclusive zone round the offshore oil and gas platform nor underwater gas pipeline areas are demarcated. Fishers also don’t have access to maps which show where these installations are. The Ghana Maritime Authority, the Environmental Protection Agency and oil and gas authorities and regulators should, as a matter of urgency, insist that all onshore and offshore oil and gas facilities are clearly demarcated based on international best practices and relevant local legislation. If that is accomplished, then fishers will have no excuse to operate close to these installations. Fisheries authorities who represent the interest of fishers also have a role to play in all that to effectively collaborate with all relevant agencies to ensure that these are done in a proper manner to minimize the conflicts that fishers experience with the oil and gas industry. Fisheries authorities should also liaise with the Ghana
Maritime Authority in particular and the other agencies to make seascape maps available to all fishers and educate them on the use and interpretation of the maps to help them to locate where oil and gas facilities are and avoid them.

**6.4.4 Increased levels of sensitization and education of fishers and community members**

Notions and perceptions of fishers and community members was identified as one of the drivers of fisheries and oil and gas conflicts. Currently, every negative occurrence along the coast and in fishing communities is linked to oil and gas operations. This increases the level of tension between dwellers in coastal communities and oil and gas operators which drives conflicts between the two groups. Incidence of conflicts between fisheries and oil and gas could be reduced if fishers and other community members living close to oil and gas production areas were more sensitized and educated on oil and gas production activities, potential impacts on fisheries and the environment.

To get that perception out of the minds of fishers and other coastal inhabitants in order to reduce the conflicts, government should team up with the oil and gas companies to regularly conduct sensitization and education programs for community people to better understand that, oil and gas activities are conducted such that they will ensure fisheries and environmental sustainability and that the oil and gas companies are fully committed to that course. This should be an ongoing process that must commence in the short-term. It is recommended that such sensitization and education programs are organized right in the coastal communities for fisher to have a sense of ownership of such programs and also for them to have the feeling that government and oil and gas operators recognize the plight of fishers and are regularly present with them in the communities to dialogue with them. Such occasions should also be seen as an opportunity to dialogue with fishers to share and discuss concerns pertaining to fisheries and oil and gas issues.
The perceptions that fishers have are sometimes due to their ignorance of the facts and therefore sensitizing and educating them on the facts can go a long way to change that perception and reduce conflicts. Regular engagements among government officials, oil and gas operators and fishers through such sensitization and education programs will present good will and build trust among authorities and fishers which will finally reduce conflicts. Fishers are expected to keep away from oil and gas installations at sea but some do not know where these installations are or exactly why they are asked to do so even if they knew where the installations were. It would also be good if fishers were made aware and educated on the reasons why they are asked to keep off oil and gas exclusion zones and also to educate fishers to be able to know basic interpretations of maps showing areas of the sea where there are oil and gas installations or areas that are reserved for oil and gas activities if such maps were made available. If continuous awareness and education of fishers are taken seriously, it will go a long way to reduce the incidence of conflicts between fisheries and oil and gas sectors.

6.4.5 Proper land-use and seascape planning in coastal communities
Results from the research indicate that because of the intensification of oil and gas production and exploration activities in Ghana, land-use planning along the coast is an important issue that needs urgent attention by management authorities. It was noticed during field visits that oil and gas companies are procuring lands in coastal communities for the siting of facilities for the production, processing and storage of oil and gas. It was also detected that estate developers are developing lands for the construction of residential facilities to accommodate the rapidly expanding population in the Western Region due to oil and gas production and a changing economy in the Western Region. These are lands which otherwise would have been used by local coastal community people including fishers to grow crops and raise livestock to feed people during the lean fishing seasons when fishers don’t fish. Growing of crops and the rearing of
animals are supplementary livelihood activities for fishers that have the potential to reduce the pressure on fish stocks and contribute towards the rebuilding of stocks. This means that oil and gas operators are in a race with fishers to acquire land which is a major conflict issue between fisheries and oil and gas. A similar situation occurs offshore where oil and gas operations are in intense competition over space with fishing. These developments are happening in an uncoordinated manner which has to be properly controlled. The major challenge is to properly manage the ongoing development in the Western Region and to provide mechanisms for meaningful conflict management.

This finding supports the urgent need for proper land-use and marine spatial planning particularly in the Western Region. This must be done in the short- to medium-term. Major development proposals and land-use decisions, which are often highly politicized, are made in Accra without the knowledge of government agencies in the districts, or consideration of long-term cumulative impacts. Moreover, it was discovered that coastal districts do not have proper land-use plans to inform decision making on development processes. It is proposed that there should be a review of the land tenure and land acquisition systems to more effectively control the development process where people (in most cases traditional chiefs and family heads) cannot just decide to give out their family lands without conforming to arrangements set out in district spatial development plans. Also, the governance system should be improved to integrate the District Assemblies in land-use and development proposal decision-making since the District Assemblies are those on the ground in coastal communities where development projects actually take place. Such decisions should effectively be made in the context of poverty reduction to safeguard and protect the interests of vulnerable local inhabitants including fishers who have only a few livelihood options. The District Assemblies particularly the District Planners must be
well resourced to enable them develop appropriate district land-use and spatial development plans that can control the current development process. Such plans should be strictly followed and implemented accordingly over the long-term irrespective of which political party is in government. Similarly, proper marine spatial planning using modern technology should be carried out as a means of ensuring that oil and gas operations are conducted in ways which do not conflict with fisheries interests. Such planning processes should be within confines of the law and should be developed such that they will not conflict with overall district development plans. Conflicts will be reduced if such plans are in place and the systems work well to ensure that oil and gas development does not take place at the expense of fisheries and the socio-economic well-being of fishing communities in Ghana.

6.4.6 Payment of corporate social responsibility to fishers and fishing communities

Analysis of the Public Consultation and Disclosure Plan of the Jubilee Oil Field shows that Tullow Oil Ghana Limited recognizes their corporate social responsibility to communities affected by the operations of oil and gas as a way of resolving conflicts. This is a good initiative because if the oil and gas companies fulfill that obligation and once the fishing communities realize that they are benefitting from the oil and gas companies through the provision of social amenities and infrastructure as well as the payment of compensation to people directly affected by oil and gas activities, they may tend to change the negative perceptions that they have about the oil and gas companies that drive conflicts. But payment related to corporate social responsibility should be managed carefully to achieve its intended objectives. The way to go is for Tullow to have a Unit within its management structure that addresses matters relating to the payment of corporate social responsibility and fishing communities must be high on the agenda of the Unit. The Fisheries Commission should collaborate with the Environmental Protection Agency, the body that issues environmental permits, to conduct regular checks and make sure
that oil and gas companies have such Units in place, and are fulfilling their obligation to affected fishing communities. These must be inspected perhaps before the yearly renewal of environmental permits by the Environmental Protection Agency.

Decisions on areas to be considered for the payment of corporate social responsibility to fishing communities must be made by the established Unit in consultations with the affected communities. Tullow should work closely with traditional fisheries management authorities in the fishing communities to first discuss and unanimously agree on community development priorities with their larger communities before presentation to the oil and gas companies for support. In that way, there will be assurance that community people have what they want and not things that are imposed on them by oil and gas companies who are seen as outsiders in the communities. Also, the Ministry of Fisheries and Aquaculture Development has been working with fishing communities long before oil and gas production started and therefore also have good knowledge of development issues in fishing communities, some of those issues of which have been earmarked in their work plans to be implemented but hardly get implemented due to financial constraints. The oil and gas companies should therefore also consult with the Ministry of Fisheries and Aquaculture Development to identify priority areas for corporate social responsibility activities in fishing communities and collaborate to ensure effective implementation of those activities.

One important activity that the oil companies could support apart from the provision of social amenities and rural area infrastructure is the identification and support of alternative livelihood actions particularly now that fish production is on a continuous decline. Alternative livelihoods should be tailored to the needs of the people concerned and fulfil the same range of functions characteristic of the original activity (Wright et al., 2015). Alternative livelihood interventions
have been on the working agenda of the Fisheries Ministry due to the problem of fish catch declines so that presents an opportunity for the Ministry to collaborate with the oil and gas companies to assist in the training of fishers in alternative livelihood activities and probably provide some seed money to people to start up other businesses. Mahmood and Ansary (2013) conclude that provision of technical training is a prerequisite for encouraging alternative livelihood. Corporate social responsibility payments by oil and gas companies to fishing communities could also help to reduce conflicts between fisheries and oil and gas but may also cause conflicts.

6.5 MANAGING GOVERNANCE AND INTER-AGENCY FISHERIES CONFLICTS
Some proposals have been put forward, analyzed and discussed regarding ways forward for managing and resolving conflicts within fisheries sectors and conflicts between fisheries and oil and gas. Governance and inter-agency conflicts also have to be better managed in addition to the management of conflicts within fisheries sectors and conflicts between fisheries and oil and gas in order to achieve greater impact for sustainability of Ghana’s marine fisheries. Identification of the drivers, nature and types of governance and inter-agency fisheries conflicts should be complemented with a thorough analysis and discussion of the conflicts including how they are currently being managed and to propose more effective management mechanisms based on a sound understanding of the causes of the conflicts. Doing so will present a more comprehensive package of the knowledge and information required for improved management of conflicts within marine fisheries and conflicts between marine fisheries and offshore oil and gas in Ghana which is essential for marine fisheries policy formulation. Based on research findings, the suggestions below are proposed as ways forward for managing governance and inter-agency fisheries conflicts in Ghana.
6.5.1 Strengthening inter-agency collaboration and communication

Communication is key in resolving and managing conflicts (Murshed-e-Jahana et al., 2009).

Based on the nature of governance and inter-agency fisheries conflicts, it is clear that one important way to improve the management of the issues of governance and inter-agency fisheries conflicts is through the strengthening of collaboration and communication among all agencies involved in fisheries, coastal and marine governance and management. Research findings show that lack of effective collaboration and communication among government agencies is a major governance challenge in Ghana. Government agencies usually perform their functions with little or no interactions with others or with little or no knowledge at all about what others are doing. Some level of collaboration and communication exists among ocean governance agencies but that need to be strengthened for improved management of issues of conflicts. There is the need to learn about what others are doing, work more closely together and to identify opportunities for collaboration to complement one another’s effort because all the agencies are working to achieve a common national interest.

Analysis of existing legal frameworks for ocean governance in Ghana shows that these legal instruments mention collaboration and communication with other relevant agencies in carrying out their mandate but the nature of the collaboration or the consequences for not collaborating are not clear. The agencies therefore use their discretion on how to collaborate with other agencies or not to collaborate at all and will not be held liable for their inactions. Moving forward, some of these issues have to be stated clearly in the laws which govern the operations of the different government agencies in order to compel the agencies to collaborate with others and also to make sure that the agencies actually develop Memorandum of Understandings (MoUs). These should indicate specific areas for collaboration and communication and if possible sanctions to be applied for failing to collaborate. Such MoUs need to be strictly monitored and
enforced by the Monitoring and Evaluation Units of the agencies to make sure that they become functional. If such systems are in place, the agencies will be compelled to collaborate for mutual benefit. If collaboration and communication is strengthened, it will contribute towards the management of governance and inter-agency fisheries conflicts. Improved collaboration and communication must be implemented in the short-term.

Also, there is the need for a more effective communication among different agencies. It is only when there is communication that people will know what others are doing and to explore opportunities for collaboration. Lack of effective communication was identified to be a major underlying cause of governance and inter-agency fisheries conflicts. If the agencies do well to more effectively communicate among themselves, inter-agency conflicts will be reduced. Also, the agencies must not plan and work in isolation. Planning must occur with consultations and active involvement of all other relevant agencies in order to achieve intended results and also to reduce the occurrence of conflicts. The communications sections of the different agencies should have communications with other agencies very high on their agenda and must be seen to be actively working. If the agencies improve on cooperation and communication, inter-agency conflicts will be significantly reduced.

6.5.2 Harmonization of legal frameworks for fisheries and ocean governance
Research findings support the fact that one important thing that must be done in order to reduce the occurrence of governance and inter-agency fisheries conflicts is a thorough review, analysis and harmonization of the existing legal and regulatory frameworks for fisheries, coastal and ocean governance. One of the drivers of governance and inter-agency conflicts is the inadequacies in the legal and regulatory frameworks for fisheries, coastal and ocean governance in Ghana. Sometimes roles and responsibilities are not clearly defined in the laws which may
lead to the duplication of functions and conflicts as a result. Also, in the process of drafting the laws that govern the operations of the agencies other relevant agencies are not adequately consulted to provide inputs from their perspectives which will feed into and shape how things are done in particular agencies in relation to others. It is certainly a long process for laws to be amended in Ghana but it is recommended that a thorough review, analysis and harmonization of ocean governance laws is carried out by legal experts and amended accordingly so that the laws will become accommodating of one another. The laws must complement themselves and not rather conflict with themselves. It is recommended to government to take this up in the short-term.

The question is which government agency should initiate the discussions on harmonization of the laws and regulatory frameworks since there are many agencies involved in ocean governance in Ghana? In the context of this discussion, this initiative is a way of ensuring that there are good systems in place at governance level to reduce fisheries conflicts and therefore it should be a responsibility of the Fisheries Commission to champion that course. The Fisheries Commission must first recognize the importance of managing conflict issues in fisheries and the need to tackle the challenge from all angles including addressing inadequacies in legal and regulatory frameworks. The Commission must initiate the process by engaging the services of competent legal and ocean governance practitioners to conduct a thorough analysis of some selected legal instruments for fisheries, coastal and ocean governance aimed specifically at identifying issues of governance and inter-agency conflicts and recommend ways forward for dealing with such issues. When this is accomplished then the Commission must start engaging the other agencies in a continuous dialogue to discuss the findings of the review and analysis of the laws and think about the best possible ways which will be acceptable by all to resolve those issues. If the
inadequacies in the legal and regulatory frameworks are resolved through this process where there is participation by all relevant agencies in the decision making, agencies are more likely to conduct their operations in ways to enhance efficiency and reduce the occurrence of conflicts that arise from multiple uses of the ocean.

6.5.3 Managing conflict between Fisheries Impact Assessment (FIA) and Environmental Impact Assessment (EIA) for offshore oil and gas exploration and production

Conflict between the Fisheries Commission and the Environmental Protection Agency regarding the issue of Fisheries Impact Assessment and Environmental Impact Assessment for the Jubilee Field oil and gas project is the most important conflict issue identified between the two government agencies. This is a special issue to be discussed by an inter-agency conflict discussion process. The Fisheries Commission argues that the Fisheries Act requires a separate Fisheries Impact Assessment from the Jubilee Field partners in addition to their Environmental Impact Assessment because the Environmental and Social Impact Assessment did not adequately address potential impacts of their operations on fish and fisheries. This is an issue of conflict between fisheries and oil and gas which needs to be fully resolved to serve as a precedent.

To start with this discussion, it is important to, first of all and in the short-term, examine the legal basis for the requirement of both assessments by the Fisheries Commission and the Environmental Protection Agency because it is only when the legal basis is clear that sound arguments could be made in efforts to resolve the conflict. It is important to examine in detail section 93 of the Fisheries Act, which requires a Fisheries Impact Assessment for the Jubilee Field operations and in fact for all projects that can have significant adverse impacts on fish resources, fisheries and other aquatic life and their environment. Section 93 of the Fisheries Act needs to be critically analyzed to determine whether the Fisheries Commission can legitimately
demand a Fisheries Impact Assessment from undertakers of non-fishing activities such as oil and gas production.

Sub-section 1 of section 93 of the Fisheries Act, as it stands, shows that undertakers of projects other than fishing are free to inform the Fisheries Commission on their planned activity and potential impact on fisheries any time they wish. It does not say what will happen if the proponent of the planned activity does not inform the Commission. It is better if the Commission rather takes the initiative to demand that information from the proponent of the planned activity and relate that requirement to the grant of any approval or authorization. Sub-section 2 somehow specifies the requirement of a Fisheries Impact Assessment by the Commission but it is non-restrictive as it stands. The Commission may find it difficult to make a case and demand reports from those proposing the planned activity. Sub-section 3 clearly complements the requirements under the Environmental Protection Agency law which indicates that the Environmental Protection Agency and the Fisheries Commission must collaborate on the issue of impact assessment. Section 93 of the Fisheries Act also does not clearly specify how exactly a Fisheries Impact Assessment should be conducted. There is clearly the need for an assessment of the Fisheries Act in order to address the inter-agency conflicts that arise from it.

The provisions of the Environmental Protection Agency Act which requires an Environmental Impact Assessment and the Fisheries Act which requires a Fisheries Impact Assessment complement themselves. Therefore, it is important that Fisheries Impact Assessments are conducted for all projects which have the potential of causing significant impact on fish and other aquatic resources. The issue worth discussing is whether the Fisheries Impact Assessment should be part of the Environmental Impact Assessment or should be conducted as a separate assessment? It could be both provided that a detailed Fisheries Impact Assessment is carried out
in both cases. So, a Fisheries Impact Assessment could be part of an Environmental Impact Assessment which could be thoroughly assessed by a technical team at the Fisheries Commission. However, there is a good reason to think that it is more appropriate to conduct a separate Fisheries Impact Assessment in order that the quality will not be compromised and also to avoid all conflicting issues.

It is concluded from this discussion that, a comprehensive separate Fisheries Impact Assessment which looks at the broad range of impacts in addition to an Environmental Impact Assessment is recommended to resolve the conflict. The Fisheries Impact Assessment must address concerns raised by the Fisheries Commission in their analysis of the Jubilee Field Environmental Impact Assessment. If a detailed Fisheries Impact Assessment is prepared by the Jubilee Field partners and submitted to the Fisheries Commission for review and consideration, the Commission will have the opportunity to scrutinize issues and insist that all concerns are addressed and followed as presented. This will help resolve the conflict between the Fisheries Commission and the Environmental Protection Agency.

Investigations revealed that the Jubilee Field partners submitted an Environmental Impact Assessment and were issued with an environmental permit to start production over five years. In the beginning, a separate Fisheries Impact Assessment did not become so much of an issue until after fishers started complaining to the Fisheries Commission. The Jubilee partners may now not be under any form of pressure to conduct a separate Fisheries Impact Assessment for the Fisheries Commission. More work therefore needs to be done by the Fisheries Commission to actually get the Jubilee partners to do the Fisheries Impact Assessment. The Ministry of Fisheries and Aquaculture Development therefore needs to work things out with other relevant agencies and higher government authorities if possible should it become difficult to get the oil companies
to conduct a separate Fisheries Impact Assessment. But there is a lesson that the Fisheries Commission or the country as a whole can learn from this to inform how things are done in future.

The lesson learned is for the Fisheries Commission to develop an effective framework for Fisheries Impact Assessments and there must be some incentives for project proponents to conduct Fisheries Impact Assessments. One important incentive is to make a provision for some form of approval from the Fisheries Commission contingent on the Fisheries Impact Assessment. The Fisheries Commission should also develop guidelines regarding the conduct of Fisheries Impact Assessments in collaboration with relevant institutions and such guidelines should provide clarity and direction on what is expected by the Commission. Also, the Fisheries Commission should form an independent committee to develop guidelines for Fisheries Impact Assessments. Until such time that some form of approval from the Fisheries Commission and appropriate guidelines become available, the Fisheries Commission, the Environmental Protection Agency, the Ghana Maritime Authority and the Petroleum Commission must closely collaborate and work together to ensure that fisheries and oil and gas issues are appropriately addressed and impacts on fisheries are minimized. If such arrangements are put in place inter-agency conflicts between the fisheries and the oil and gas sectors are likely to be reduced.

6.5.4 Addressing conflict between the Fisheries Commission and the Ghana Maritime Authority
The Ghana Maritime Authority is the Government of Ghana agency established by law to supervise marine functions. Fishing is one of the activities that take place in the maritime domain and therefore the Ghana Maritime Authority has a role to play to also regulate and monitor activities related to fishing particularly in the marine and coastal environment even though the Fisheries Commission and the Ministry have oversight responsibility for managing fisheries. It is
therefore not surprising that conflict sometimes occurs between these two agencies. The Fisheries Commission expects the Ghana Maritime Authority to co-ordinate activities in the maritime industry in such a way that fishing does not suffer at the expense of other industries like oil and gas in particular. Information from fishers indicated that conflicts within fisheries sectors are escalating while at the same time fishers are now in conflict with oil and gas. A lot of complaints particularly about the oil and gas industry get to the Fisheries Commission from fishers every now and then concerning the challenges fishers are having at sea since the production of oil and gas started. The Fisheries Commission in their response to such complaints shift part of the blame to the Ghana Maritime Authority for not being proactive to ensure that oil and gas and other maritime activities are not conducted in ways to safeguard and protect fishers.

A case in point is the fact that the Ghana Maritime Authority requires fishers to stay away from oil and gas installations and production sites including underwater gas pipeline areas close to the coast. If fishers are required to keep off oil and gas oil and gas installations and exploration sites, these areas must be visible or at least be fitted with signs to warn off approaching fishing vessels. Such signs are not in place and the question that the Fisheries Commission is asking the Ghana Maritime Authority is that how are local fishermen with their limited technology supposed to know exactly where the oil and gas pipelines and other installations are so that they can keep off? It is very dangerous for fishers to be trawling and fishing close to oil and gas pipelines as that may cause explosions which could lead to loss of life and property. In fact, some local fishers may not even be aware of the dangers involved in going close to oil and gas facilities. The Ghana Maritime Authority is also supposed to monitor the activities of merchant vessels including oil and gas supply vessels and foreign fishing vessels to ensure free flow of maritime traffic to reduce accidents at sea involving fishing vessels and check illegal fishing.
To resolve the conflict therefore, the two agencies must effectively collaborate and work together with the oil and gas companies to demarcate all the oil and gas installations and provide signs to warn of approaching fishing vessels. This should be in the short-term. Operations of offshore oil and gas fall more under the domain of the Ghana Maritime Authority that is the best agency to demand this from the oil and gas companies. However, it is in the interest of the fisheries also, so the Fisheries Commission should be proactive and initiate the process. Another option is to procure maritime updated navigational charts for fishers to enable them locate the positions of oil and gas pipelines and other installations. Interactions with the Ghana Maritime Authority indicated that such charts already exist but have not been made available to fishers and to have the charts updated and made available to fishers was going to cost a lot of money which the Ghana Maritime Authority probably could not afford. Again, the Fisheries Commission must work with the Ghana Maritime Authority to produce the charts for distribution to fishers. Both agencies can work with central government to find the funds or collaborate with the oil and gas companies to allocate some money for that activity as part of their corporate social responsibility.

Even if the charts were provided to fishers will they be able to interpret and use them effectively? That will certainly require education of all local fishers which will also not be an easy task looking at the number of fishers involved and the resources which will be required to carry out such an activity. That will have to take place in the fishing communities. The Fisheries Commission will again have to work with the Ghana Maritime Authority to constitute a technical team with requisite knowledge in Geographic Information Systems which will lead this education campaign in fishing communities with the support of the traditional fisheries.
authorities. The fishers should also be educated on the reasons why they are asked to stay away from oil and gas installations during such education campaigns.

6.5.5 Addressing conflict between the Fisheries Commission and the Directorate of Fisheries

The Fisheries Commission and the Directorate of Fisheries are different arms of the Ministry of Fisheries and Aquaculture Development, who play different but complementary roles in the management of fisheries. While the Commission’s role has more to do with co-ordination of fisheries policies, that of the Directorate is more concerned with the day-to-day operations and implementation of management activities in relation to the policy directives of the Commission and the Ministry. This makes it clear that members of the Commission should not be actively involved with normal work of the Directorate unless of course that prevailing circumstances allow them to intervene. They can also offer advice as and when needed.

Conversations with members of staff and direct observations at the offices of the Directorate showed that at a point, the Chairman of the Fisheries Commission was virtually running the affairs of the Directorate on a daily basis from an office at the Directorate. That resulted in conflict between the Commission and the Directorate as members of the Directorate felt they were gradually losing their management powers to the Commission. Members of the Directorate could hardly make any management decisions on their own without intervention and prior approval from the Chairman of the Commission. That actually derailed the performance and efficiency of the Directorate because things almost had to come to a halt when the Chairman of the Commission was out of office.

To manage this conflict, members of the Commission must first be made to understand and respect what is in the law by the appointment authority, recognize and appreciate that they don’t
play active roles in the normal work of the Directorate and that the Director of Fisheries has an oversight responsibility of the affairs of the Directorate. This should be in the short-term. The law exists but it must be acknowledged that sometimes not all public officials know what is stated in the law partly because they simply do not read, or even if they read they cannot simply interpret exactly what the law says and therefore sometimes carry out their functions in ways that do not conform to the law. This therefore means that public officials of the Commission and officials from other arms of the Fisheries Ministry should all be educated on the law and be encouraged to work within confines of the law.

There should also be effective supervision by higher level officials at all levels within the management structure because it is believed that the Chairman of the Fisheries Commission was not adequately supervised by higher level officials of the Ministry, and officials of the Directorate of Fisheries did little to challenge the position of the Chairman of the Commission. This is a common practice in Ghana especially within government agencies where lower level officials cannot challenge any management decisions made by their seniors. An atmosphere should be created in fisheries agencies where junior level officials are free to offer constructive criticisms about proposed policies and the seniors are also able to take alternative ideas in good faith which are all needed to improve management decision making and overall performance of the fisheries sector. There are definitely a lot of lessons to be learned here to manage conflicts of this kind both within fisheries and other government agencies.

6.5.6 Addressing local industrial and semi-industrial vessel registration and licensing conflicts

For very good reasons, all fishing vessels operating in Ghana’s marine waters need to be registered and issued with fishing licenses that allow them to exploit the country’s fish resources. Fishing vessels need to be registered so as to know the total number and types of vessels in
operation in Ghana, the identities of the vessels, as well as their owners, members of crew, etc. for the purposes of planning. Aside registration, fishing vessels also need to be issued with fishing licenses in order for the vessels to have the right to fish for particular fish species in the countries waters using particular fishing gears and methods and for fisheries authorities to effectively regulate, monitor and control exploitation rates and all other activities related to fishing. If vessels are registered and licensed to fish, then the vessel owners are those that are held responsible and accountable for all activities conducted by the vessels. The country also generates revenue from the registration and licensing of fishing vessels and payment of penalties by vessels for engaging in any illegal activity. In Ghana, such revenues are supposed to be paid into a Fisheries Development Fund. Registration and licensing of fishing vessels therefore come with many benefits to Fisheries Commission and therefore Ghana. Considering the benefits derived from the registration and licensing of fishing vessels, it would have been expected that procedures involved in vessel registration and licensing in Ghana would be smooth in order to facilitate the process. A fisher would have to go through a very tedious process to successfully have a vessel registered and licensed, having to deal with many agencies with different requirements. The process can only be described as very complex and cumbersome which is characterized by many agencies with conflicting objectives. Procedures involved in the registration and licensing of fishing vessels need to be reviewed to reduce inter-agency conflicts.

Registration and licensing procedures for local industrial and semi-industrial fishing vessels are slightly different but similar with the same agencies involved. In the case of a local industrial vessel one needs to first, register a company at the Registrar General’s Department. There is no problem with that because that is a Government of Ghana requirement by law and industrial fishing must be seen as a commercial activity which requires the setting up of a company to steer
the affairs of the business. Moreover, the Registrar General’s Department does not come into
collision with Ministry of Fisheries and Aquaculture Development, the Fisheries Commission, the
Ghana Maritime Authority, the Ministry responsible for Transport, or any of the other agencies
in the process because the Registrar General’s Department does not interact with any of these
agencies in the process. The Registrar General’s Department also doesn’t have to issue any
approvals based on recommendations from the other agencies. On the other hand, Ministry of
Fisheries and Aquaculture Development and the Fisheries Commission have to issue their
approvals based on recommendations from the Ghana Maritime Authority and the Ministry
responsible for Transport. That is where conflict comes in. The Ministry of Fisheries and
Aquaculture Development and the Fisheries Commission in their interest may want to support
applications but the Ghana Maritime Authority or the Ministry responsible for Transport can
decide not to give their approvals based on their specific sector interests and there will be
conflicts between Ministry of Fisheries and Aquaculture Development or the Fisheries
Commission and the Ghana Maritime Authority or the Ministry responsible for Transport. The
registration and licensing of semi-industrial vessels also occur in a similar fashion where there
are also interactions among the agencies involved in the registration and licensing procedures.

In finding ways forward for reducing such inter-agency conflicts, the following measures are
proposed in the short-term. It is certainly acknowledged that the registration and licensing
process is lengthy and need to be shortened in any ways possible. The process could actually be
shortened to reduce conflicts if all applications stayed with the Fisheries Commission throughout
the processing period and don’t have to go from one agency to the next. Of course, the roles
played by the other agencies are also important and so they must still contribute to the process.
The whole process could be undertaken by the Fishing License Evaluation Committee of the
Commission, with technical representations from the other agencies in meetings of the Committee who will have to report back decisions made in such meetings to their respective agencies. It must also be ensured that there is transparency and accountability in such an arrangement to achieve intended results. That will fast-track the processing of applications and ensures efficiency in the system to reduce the occurrence of conflicts. The challenge to the establishment and smooth implementation of such an arrangement among the agencies which is to be coordinated by the Fisheries Commission may be that some of the agencies may not agree to it because it may be interpreted as the Fisheries Commission taking over and performing the responsibilities of the other agencies. But that is a challenge which could be overcome with effective collaboration among the agencies, more education and communication on the justification for such an arrangement.

6.6 CONCLUSION
This chapter has provided a detailed analysis and discussion of a wide range of issues pertaining in the marine fisheries sector in Ghana that are responsible for conflicts within the fisheries and conflicts between the fisheries and the oil and gas sector and what could be done to manage the conflicts. This enables conclusions to be drawn and appropriate policy recommendations to be made for consideration by people in authority that will lead to improved marine fisheries conflicts management and ocean governance in Ghana. The next chapter concludes the analysis and discussion on the issues and the research undertaken, its contribution to knowledge and recommendations for marine fisheries and ocean policy formulation in Ghana. The chapter then ends with recommendations for further research.
CHAPTER SEVEN

7.0 CONCLUSIONS AND RECOMMENDATIONS

7.1 INTRODUCTION
Ghana’s marine fisheries sector is characterized by different kinds of conflicts, both within the fisheries and between the fisheries and offshore oil and gas. Analysis of the fisheries sector and the oil and gas industry described why the fisheries are prone to conflicts. The nature, the causes and the consequences of the conflicts were analyzed and discussed in previous chapters. Conclusions from the analysis and discussion of the issues as well as conclusion on the thesis including a review of the research undertaken, its significance and contribution to knowledge, suggestions for improved management of marine fisheries conflicts in Ghana and recommendations for marine fisheries policy formulation and further research are summarized in this chapter.

7.2 CONCLUSIONS ON THE ISSUES

7.2.1 Recognizing the consequences of existing and emerging fisheries conflicts
One important conclusion drawn from the analysis and discussion of the issues identified by this research is that, to effectively manage the issues and the conflicts arising from them, there is the need for management authorities to recognize the consequences of the existing and emerging conflicts. It appears that it is only when that recognition is given that the challenge will be addressed. Realizing the consequences of neglecting or failing to address the issues is equally important. Knowing the problem and attaching the importance it deserves should be the first step towards addressing them.

This research concludes that addressing the problem of overfishing, which is a critical fisheries management issue in Ghana, can help to reduce conflicts within the fisheries. Suggestions on the ways forward to tackle the problem of overfishing in Ghana based on the identified reasons that
have contributed to overfishing have been provided in chapter six. It is concluded that, this objective could be achieved if the willingness on the part of all stakeholders, including government, to do so exists. However, the proposals also require the necessary human, financial and other logistical resources. Ghana as a developing country is faced with many challenges in managing different sectors of the economy with her available resources to the extent that fisheries management may not be on the priority list of issues that need immediate attention by government. Even if fisheries management were on the priority list of government issues that need urgent attention, investing the energy and resources to manage conflict issues in fisheries may not rank high on the agenda.

Analysis of fisheries policy documents suggests that issues related to the development of aquaculture, improving fish value chains and the provision of alternative livelihoods for fishers as a way of reducing fishing pressure on fish stocks are currently given much more attention than other fisheries sector issues. Sometimes this does not recognize that these interventions are in themselves associated with issues of conflicts in one way or another. There has to be the recognition, particularly on the part of government, that development in fisheries and fishers’ wellbeing cannot occur when there are conflicts and therefore conflicts in fisheries must be given the necessary attention. Management of conflicts in fisheries could be improved if that clear understanding exists. After that recognition is given, policy formulation and the fisheries management process should treat fisheries conflict issues as important and relevant as all the other issues in the fisheries.

Recognizing the implications of failing to address fisheries conflicts is therefore the first step that should be taken towards managing the conflicts. After that recognition is given, appropriate programs and other forms of interventions should be designed and the needed resources should
be provided for the actual implementation of those programs. Pilot programs and other forms of interventions that could be rolled out, and how exactly they could be implemented to achieve the desired results have already been suggested and described in chapter six. Addressing conflict issues in fisheries must also be situated within the broader governance framework of the fisheries and therefore the right structures and systems for improved governance, which were found to be currently lacking, must also be in place. Stakeholders at different levels of the governance structure must be strengthened and supported in appropriate ways to effectively perform their roles and responsibilities to ensure that programs and interventions which may be rolled out to address conflict issues in fisheries yield intended outcomes. There should also be the integration of efforts at different levels that are geared towards common objectives.

7.2.2 Managing Ghana’s small-scale fisheries, data and information gathering
Managing Ghana’s marine fisheries in general and conflicts in the fisheries in particular requires managing all sectors of the fisheries; small-scale, semi-industrial, industrial and tuna. Semi-industrial, industrial and tuna vessels could be more easily managed than canoes because they operate from only a few selected landing sites. Apart from their offshore activities, more of their activities can be managed and controlled from the fishing ports. They are registered and licensed to use specific gears targeting fewer species and also occur in smaller numbers compared to the small-scale sector. Diaz-Uribe et al. (2007) state that biological, technological, and social complexity of small-scale fisheries systems has been a hard subject to tackle. The characteristics of Ghana’s small-scale fisheries as described earlier in the thesis make them very difficult to manage. Many canoes and crew members alike, operating from many fishing communities using a variety of fishing gears and targeting different fish species participate in Ghana’s small-scale marine fisheries. It is very difficult therefore to monitor and control their activities from the ports as well as their offshore operations. Governing such a complex system and managing all
conflicts associated with it is by no means a straightforward task. Many options including reducing the number of boats, fishers and fishing gears, the creation of alternative livelihoods, establishment of closed fishing seasons and Marine Protected Areas have been suggested as some of the required solutions to the problem of overfishing and decline in catches which are the main underlying causes of conflicts in fisheries. It is important to add that such mechanisms must be correctly diagnosed, well planned and implemented with a great deal of caution. Any mechanisms which will be put in place to manage such a system and to implement some of the mechanisms proposed to manage conflicts in particular must take into account the historical, economic and political perspectives associated with the fisheries not forgetting also the science (particularly the biology) of the fisheries to protect their sustainability.

In historical terms, it must be recognized that small-scale fishing has been the major activity in coastal fishing communities for centuries. Most people in these communities do not know anything apart from fishing. Fishing is not only a means of livelihood but also a heritage, tradition and culture of the people. Day-to-day lives are centered round fishing in the communities. Implementing any mechanisms which have the potential to upset the culture, tradition and the make-up of the people is not likely to succeed. Similarly, in economic terms, fishing is the most predominant economic activity which generates income to people in their lives and in fact in most cases, the people are only equipped with skills to fish. Asking people to change from fishing to other economic activities or asking them to stay away from fishing for a particular period or not to fish at all in traditional fishing grounds will definitely encounter resistance from fishers if such an approach is not well structured and appropriate.

Also, fisheries governance in Ghana was found to have become political at different levels. Different stakeholders with different objectives are involved in the governance of the fisheries.
Politicians at the top level think about what they can do in the fisheries to continue to remain in government. Fishing rules and regulations are not strictly enforced or even if enforced at all enforcement becomes selective where certain groups get off the hook because they have the backing of influential politicians. Ghana’s marine fisheries can be described as data and information poor. There is inadequate data on catch and effort statistics to inform policy decision-making in the fisheries. Moreover, information gathered from government fisheries officials indicate that, there is inadequate information available on the biology and ecology of exploited species to help determine the actual status of stocks. It is concluded that, there is the need to make management decisions that are informed by good, adequate and accurate data.

According to information gathered from fisheries stakeholders at different levels, one of the constraints to adequate information and good data gathering is inadequate human and financial resources including the needed logistics. One needed logistic that most people talked about was a fisheries research vessel. The general impression gathered was that there is the need for Ghana to have a research vessel because it is believed that there is a lot of data and information that could be collected if the Fisheries Commission owned and operated a research vessel. Further analysis of the information gathered indicated that many people are of the view that there is very little that can be done to collect data without the use of a research vessel. This is partly true but that needs to be given further thought. Research vessel is important but it must be recognized that such an initiative has associated acquisition and maintenance costs. Where will the funds to buy and to maintain the research vessel come from? Further interrogations on the matter suggested that a research vessel is to be acquired under the currently ongoing World Bank-supported West Africa Regional Fisheries Program for Ghana. If the West Africa Regional Fisheries Program plans to procure a research vessel, why has it taken project management that long to do so and if
so how will be vessel be sustained after the end of the project. If the project acquires a vessel for Ghana during the project’s lifetime that will be good but obviously, that must be approached with caution to ensure sustainability. And even if there is money from the project to maintain it for a specified period, systems must be in place to ensure the maintenance of the vessel beyond the closure of the West Africa Regional Fisheries Program. Possibly, the vessel could be maintained with funds accruing from the Fisheries Development Fund. In case the West Africa Regional Fisheries Program does not provide a research vessel for Ghana but the Fisheries Commission still considers it useful to have one, Government of Ghana can support in ways possible to procure one either from government funding or through funds provided by the international donor community and the vessel could be maintained with funds from the Fisheries Development Fund.

The conclusion is that Ghana cannot afford to wait for a research vessel before collecting data and information to manage the fisheries. The fisheries may be data poor but they still have to be managed. In order to prevent the worst possible scenario of species collapse from happening, the system should be managed using the information and data available and it should be managed based on the principles of precautionary management. It was noticed that some useful data and information already exist but are scattered in the system. The Fisheries Commission can engage in a program to work with all relevant stakeholders to pull together useful data and information that can be stored in a data repository to inform science-based fisheries policy decision-making. This is something that can certainly be done without too many cost implications. Once the recognition is given that, it requires good data and information to manage the fisheries and associated conflicts and this is a useful starting point in the absence of a research vessel that is
something that will not be too difficult to do. This can be done until such a time that a research vessel becomes available for more data collection.

7.2.3 Improving marine fisheries and offshore oil and gas interactions
It was concluded from the analysis of the issues and interactions between Ghana’s marine fisheries and offshore oil and gas that, the oil and gas industry in Ghana poses a significant threat to marine fisheries in the country. The oil and gas sector in Ghana was found to be important in different ways but there is the need for improved planning by government and other stakeholders to minimize the impacts of oil and gas on fisheries and reduce conflicts. The marine fisheries in Ghana are predominantly small-scale which directly supports a large number of people at the community level and the bulk of total fish catch is landed by the small-scale sector. If the fishing industry is allowed to collapse due to oil and gas operations, there will be an increase in poverty particularly in Ghanaian coastal communities, and food and nutrition security in the country at large is also threatened. Fisheries and oil and gas sectors in Ghana have specific roles they play in contributing towards the development of the nation as described earlier. In that regard, there is the need for government to ensure the co-existence of both sectors. Fishing is the most affected industry by the operations of offshore oil and gas Cicin-Sain and Tiddens (1989) therefore this subject matter must be given a particular attention by management authorities in the country.

Comparative analysis of the fisheries and the oil and gas sectors indicates that the oil and gas industry is perceived as a bigger player in contributing towards the economy of the nation and so it has an advantage over the fishing industry in terms of the level of protection that is accorded by government. For both sectors to exist alongside one another and for Ghana to continue to derive the needed benefits from them, government must attach the needed importance and attention to the different contributions by both sectors and have a comprehensive management
plan for ensuring the co-existence of both sectors. The relevant national government agencies must consult with all other relevant fisheries and oil and gas stakeholders at different levels, particularly fishers at the community level who are affected by the operations of offshore oil and gas and effectively implement the plan, so that co-existence of both sectors will be enhanced.

7.2.4 Need for collaborative management of Ghana’s marine fisheries resources
Due to the complex nature of the fisheries as identified and described, it could be concluded that for a more effective management there is the need to think outside the standard toolbox for managing fisheries. It is ultimately the responsibility of the Fisheries Commission to more effectively manage the system but it must be acknowledged that the Fisheries Commission cannot do it alone. It is concluded from the research findings that management of fisheries in Ghana has mostly been top-down over the years with little or no stakeholder participation in decision making. Lane and Stephenson (2000) note that fisheries management has mostly been top-down but it is known that top-down centralized approaches have not been effective for small-scale fisheries management (Mills et al. 2012), and in fact this has been proven in Ghana looking at the persistent challenges in the fisheries.

It could be concluded from the information and knowledge generated by this research and also from past experiences that, collaborative management with active participation of stakeholders at different levels should be encouraged. Governments have turned to co-management as a means of responding to a management crisis (Pomeroy and Berkes, 1997). Bennett et al. (2001) concludes that a high degree of cooperation between government and local actors is a needed for successful conflict management in tropical fisheries. Quantitative analysis conducted by Pomeroy et al. (2007) in selected coastal communities in Indonesia, The Philippines, Thailand and Vietnam with and without co-management indicated that co-management leads to reduced
resource conflict levels. They concluded that fisheries co-management and collaboration among fishers can possibly serve to reduce resource conflict and in fact co-management arrangements in fisheries have been found to show potential for conflict management (Mills et al. 2012).

Collaborative management can be in different forms involving relevant ocean governance agencies but that involving the fish resource users and their management institutions at the community level (community-based management) must be given a priority. Sen and Raakjaer-Nielsen (1996) define fisheries co-management as an arrangement where responsibility for resource management is shared between the government and user groups. Charles (1992) indicated that co-management is a compromise management method which is based on shared responsibility and shared decision making between fishers and government. Jentoft ((2000) describes co-management as the democratic participation of user-groups in regulatory decision making, which is expected to improve legitimacy of fisheries management schemes and result in a higher degree of fishers’ compliance. However, it must be emphasized that co-management does not change the fundamental fact that regulatory systems impose restrictions on users (Jentoft et al., 1998). Raja Abdullah et al. (1998) highlight information costs, collective fisheries decision-making costs and collective operational costs as the transaction costs under a fisheries co-management system.

It is suggested that government must recognize the importance of engaging stakeholders in promoting community-based fisheries management in Ghana. This can significantly increase voluntary compliance rates of fisheries law and regulations by resource users (Mills et al., 2012). It is recommended that such arrangements must be built around chief fishermen and chief fishmongers because fishers are more likely to co-operate with their local authorities in management arrangements than with government fisheries authorities. It is also important to
encourage continuous dialogue which will ensure opinions of all stakeholders matter in the process. The successful implementation of such co-management systems will depend on the existing Ghanaian fisheries legal system and therefore the co-management systems must be supported by the appropriate legislative backing. Also co-management systems should be guided by Elinor Ostrom’s design principles - well-defined boundaries, congruence between appropriation and provision rules and local conditions, collective-choice arrangements, monitoring, graduated sanctions, conflict resolution mechanisms, minimum recognition of rights and nested enterprises - as Cox et al. (2010) found that the principles are well supported empirically.

**7.2.5 Need for urgent change in fisheries governance/management in Ghana**

Another important conclusion drawn from the analysis and discussion of the issues and the conflicts is that the central challenge is the issue of weak and ineffective governance and management of Ghana’s marine fisheries and ocean systems. This calls for an urgent change in the way the system is currently being managed. Fisheries stakeholders cannot continue to engage in business as usual. There is obviously an urgent need for reforms. New, more workable and practical solutions aimed towards revamping the fisheries sector need to be established immediately. The last two decades have seen international donor funded projects in fisheries in Ghana. Such projects are often characterized by many scientific studies, meetings, workshops, conferences and study tours organized with some pilot intervention programs implemented but the problems in fisheries still persist. The projects do not seem to resolve key fisheries management issues. In moving forward to implementing new and innovative governance systems there is the need to learn from past experiences and build on the positive outcomes of previous projects and avoid past mistakes. Projects need to be sustained by governments even after their life time because it is only when there is sustainability that long-term benefits could be achieved.
Results from this research conclude that for expected change in the fisheries to occur, a greater part of the responsibility rests on the shoulders of the Fisheries Commission. A significant reform needs to occur in fisheries in Ghana with some drastic decisions made by the Fisheries Commission in the process. The Fisheries Commission should be seen to be championing that course. Several proposals have been made regarding the changes which need to happen. The Fisheries Commission should be the lead institution to effect that change as it is empowered by law to make management decisions which are of the best interest to the sector and must act accordingly in that capacity to cause a positive change. It was found out that recent developments in the sector demonstrate that the Commission has not lived up to the governance expectations of the fisheries sector and this has dented the image of the Commission in the eyes of many stakeholders, particularly fishers at the community level. It is appreciated that the Commission has its own challenges but that withstanding there is a lot it can still do despite the challenges to address the problems currently pertaining to the fishing industry in Ghana. The Commission must stand up to the challenge and work to improve governance of the sector in all aspects of the fisheries in order to protect its image and save the industry from a total collapse.

7.2.6 Bridging the communication gap between research institutions and industry
Fisheries science agenda is determined by the regulatory policy agenda which is established by government. Kerr et al. (2006) indicate that regulatory systems depend on scientific evidence to support policy decisions. One thing that was found to be lacking in the fisheries in Ghana as far as the utilization of the information and knowledge generated through scientific research is concerned is the effective communication between fisheries research institutions and the fishing industry. There is a wide communication gap between fisheries research institutions and the fishing industry in Ghana. Fisheries research institutions are mandated to carry out research that will be useful for fisheries management decision-making. On the other hand, fisheries authorities
must also engage in evidence-based management decision-making, utilizing the research findings from the research institutions. Research and management institutions of state must work together and not in isolation, engage in cooperative research with fishermen to achieve country specific development goals. Hartley and Robertson (2006) found that through cooperative research, fishermen and scientists are more informed about science and fishing respectively, and fishermen are more likely to believe the science to be credible. Also fishermen specifically, and scientists too, become more active in management after participating in cooperative research. There is the Water Research Institute of the Council for Scientific and Industrial Research, Regional Maritime University, Department of Marine and Fisheries Science of the University of Ghana, Department of Fisheries and Aquatic Sciences of the University of Cape Coast, Department of Fisheries and Watershed Management of the Kwame Nkrumah University of Science and Technology, Department of Fisheries and Water Resources of the University of Energy and Natural Resources, Department of Fisheries and Aquatic Resources Management of the University for Development Studies and other research institutions all of Ghana, but the fishing industry in Ghana still faces a lot of management challenges. Research conducted by these institutions in cooperation with fishermen and fisheries managers could contribute immensely towards solving some of these management challenges including the effective management of conflicts in the fisheries. In view of this discussion, it is recommended that the Fisheries Commission should strengthen existing collaboration and communication with these research institutions and fishermen to conduct research in fisheries management and fisheries conflicts that will be of direct benefit to industry. This can help find answers to some of the issues that generate conflicts in the fisheries. It must be emphasized that lack of financial and logistical support impedes research operations of institutions in the country. The Fisheries
Commission in collaborative research efforts with research institutions can fund research activities with the objective of managing conflicts in fisheries through the Fisheries Development Fund if there is the political will to do so.

7.2.7 Need for a comprehensive ocean governance framework for Ghana

The preamble of the United Nations Convention on the Law of the Sea states that the problems of ocean space are closely interrelated and need to be considered as a whole. Traditional coastal management is limited to solving within-sector issues and is incapable of resolving multi-sectoral use interactions, resulting in conflicts (Lorenzen et al., 2010; Norse, 2010). As demand for various types of marine resource use increases, there is the need by governments to formulate policies to guide the use of marine resources (Bess and Rallapudi, 2007). Flaherty and Karnjanakesorn (1993) recommend a more integrated approach to the management of coastal resources. Similarly, there is the need for Ghana to develop a comprehensive ocean governance framework that will coordinate, regulate and manage all ocean-related economic activities such as fishing and oil and gas drilling in a manner to reduce conflicts. This research has shown that, presently, there is no holistic national framework for ocean governance in Ghana. Currently, maritime regulation and enforcement activities in the country were found to be carried out on a sector by sector basis with little or no coordination and communication among ocean sectors which provides fertile grounds for the generation of conflicts.

In designing a comprehensive ocean governance framework for Ghana, experiences could be drawn from international best practices such as the famous Integrated Coastal Management program in Xiamen, China (Chua T-E., 2008) which is purposely designed for effective and inclusive coastal governance to reduce conflicts among ocean sectors. A comprehensive ocean governance framework for Ghana that is similar to the Xiamen model could be developed and
effectively implemented. An Inter-Ministerial or an Inter-Agency Ocean Commission in Ghana could be established to regulate and coordinate affairs relating to governance of the ocean and the use of marine and coastal resources in a manner that will reduce conflicts among different ocean stakeholders. The establishment of such a Commission, roles and responsibilities should have an appropriate legislative backing and the Commission must have a Secretariat that is not housed within any of the Ministries involved where the Commission can meet regularly because there is the potential for the Secretariat to function as a single Ministry if it is housed within a particular Ministry. Funding for the operations of the Commission and the running of the Secretariat must come from the annual budgetary allocation by the state which could also be supported by internally generated funds by the Ministries and their Agencies. Considering local context, implementing marine spatial plans in Ghana as comprehensive and functional as that of Xiamen will be difficult but at least there are opportunities for that to be initiated on pilot basis in the short-term and scaled up in the medium to long-term. The main fishing harbours in Tema and Takoradi could be separated from the main shipping harbours to reduce conflicts between marine fisheries and shipping. Aquaculture activities could be allowed only in specific and suitable areas along the coast and so for tourism and industrial development activities. This initiative must have the appropriate legislative backing and the actual implementation must be strictly enforced. There should be an Integrated Enforcement Unit of the Ocean Commission similar to the Fisheries Enforcement Unit of the Fisheries Commission which must be given the power and the resources to function. Conflicts among ocean sectors will be reduced if such arrangements are put in place.

7.2.8 Eliminating politics from the fisheries in Ghana
This research concludes that managing conflicts in the marine fisheries in Ghana also requires managing issues of politics in the fisheries because politics has been identified as one of the
drivers of conflicts in the fisheries. The fisheries sector in Ghana was found to be among the sectors that are highly associated with politics if not the most highly politicized sector in the country perhaps because of the revenue that is generated by the sector and also the number of people that depend directly or indirectly on the sector. The fisheries sector is characterized by politics at different levels. Fisheries governance issues have become a political campaign tool for political parties during presidential and parliamentary election years. Political parties give all sorts of promises to fishers and fishing communities in order to win their votes but they are unable to fulfill those promises when they are in government. During political campaigns, some politicians promise to reduce fuel and other fishing input prices drastically and make them available at all times while others also promise to provide fishers and fishing communities with well-developed fisheries infrastructure. Failing to deliver on those huge promises leads to conflict between fishers and fishing communities and government. One government sets up a Ministry for Fisheries to oversee the fisheries sector and the Ministry is dissolved and merged with the Ministry of Food and Agriculture by another government for political reasons. Again, another government decouples fisheries from the Ministry of Food and Agriculture, and so on. This causes governance instability in the fisheries sector. There is also the issue of selective enforcement of fisheries law and regulations. Fishers commit all forms of fisheries offences and are left off the hook because of their political affiliation. Pre-mix fuel and other fishing input issues in the fisheries are highly politicized. Fishers and fishing communities who are sympathizers of the political party in government often have more access to pre-mix fuel and other fishing inputs. Local government administrators sometimes influence the fair and equitable distribution of fishing inputs at the community level. Politics create different forms of conflicts
in the fisheries which must be addressed if improved management of conflicts in the fisheries is to be achieved.

7.3 CONCLUSION ON THE RESEARCH AND CONTRIBUTION TO KNOWLEDGE

7.3.1 Conclusion on the research
This research thesis was dedicated to identifying conflict issues in the marine fisheries sector in Ghana, the types, drivers and the causes of the conflicts and their existing management mechanisms using appropriate methods as described in chapter one. This research confirms that the relative importance of marine fisheries compared to other sectors of the Ghanaian economy can certainly not be underestimated. This justifies the need to protect marine fisheries ecosystems and exploited fish stocks to secure the continuous existence of the fishing industry so that the industry can continue to support the lives of coastal inhabitants, provide the protein and other nutritional needs of Ghanaians and generate income for the nation. The fisheries sector in Ghana is confronted with many challenges which, together, are a potential threat to the sustainability of fishing in the country. The confronting issues and the threat they pose to the fishing industry need to be very well managed if the sector is to continue to provide the needed benefits. Relevant information and knowledge generated by participatory research that actively involve fisheries stakeholders cannot be overlooked if the issues are to be effectively managed to achieve intended results.

A number of research works have been carried out on the biological, ecological and socio-economic aspects of marine fisheries in Ghana but one important area that has not been given the needed attention for research is conflicts with the exploitation, governance and management of the fisheries. The consequences of conflicts at different levels in the fisheries and the implications of not managing them were described in chapter one which justify the urgent need
for improved management of the conflicts. The reasons why conflicts prevail in worldwide fisheries in general, and in the marine fisheries in Ghana in particular, and the existing and potential consequences of the conflicts have been determined. The existing management mechanisms for the conflicts in marine fisheries in Ghana have also been assessed and critiqued. These steps were undertaken to have a systematic understanding of the conflicts and how they are currently being managed in order to find more appropriate ways for managing the conflicts for resource and environmental sustainability.

Results from the research confirmed the prevalence of different types of conflicts within the fisheries, and between the fisheries and other sectors, the most important of all being conflicts between the fisheries and the offshore oil and gas sector. Some of the conflict issues identified seemed trivial but they are important issues of fisheries development concern. Types of conflicts identified include spatial, gear, resource competition, governance and inter-agency conflicts. Conflicts mostly occur as a result of relations between fishery users, Type III conflicts according to Bennett et al. (2001). One conclusion drawn from this finding is that in managing conflicts within the fisheries, more efforts should be directed at improving the relations between fishery users. This implies managing the interactions between fishery users. If the interactions between fishery users are well managed for fishery users to peacefully co-exist, conflicts within the fisheries will be reduced. Managing the interactions and the relations between fishery users also means strengthening fisheries governance and management systems for effective enforcement and compliance with the fisheries law and regulations. Awareness and education of fishers, canoe fishers in particular, on the ecological justification for the fisheries law and regulations have been found to be key to achieving effective enforcement and increased levels of compliance with the fisheries law and regulations in order to reduce the occurrence of conflicts.
The results also showed that decline in fish landings mainly due to overfishing and the scarcity of fish is the underlying cause of the conflicts within the fisheries. To manage the conflicts within the fisheries, therefore, the underlying cause of the conflicts, the decline in fish production, must be appropriately addressed. If there is enough fish for fishers to catch, there will be less competition in fishing and hence less incidence of conflicts within the fisheries. Destruction and damage of fishing gear and other fishing equipment ranked high among the conflict issues identified within the fisheries that arise from competition in fishing, indicating that more attention should focus on reducing the incidence of destruction and damage to fishing gear and equipment. The highest degree of interactions and conflicts occur within the canoe sector because of its open access nature, the number of canoes and crew members. Moving the canoe fisheries from open access to restricted/managed access will help to address the problem of overfishing, decreases in fish catch, competition and conflicts within fisheries. The management of pre-mix fuel, which was found to be the most important conflict issue within the canoe fishery sector, needs to be addressed. This is directly linked to the existing number of canoes and therefore, moving the canoe fisheries from open access to managed access will contribute positively towards reducing pre-mix fuel conflicts. Pre-mix fuel management issues in particular and the fisheries management issues in general must be devoid of politics. This research has also shown that management decision-making especially for the canoe fisheries must be data-driven which underpins the essence of collaboration between fisheries research institutions and government as well as industry.

The research focused on conflicts between the fisheries and the oil and gas sector because conflicts between fisheries and other ocean sectors were found to be minimal or non-existent from the perspectives of fishers. Conflicts between fisheries and the oil and gas sector were
found to occur mostly as a result of the negative impacts of oil and gas operations on fishing. Managing conflicts between fisheries and oil and gas sectors must, therefore, also focus on addressing the impacts. Restriction of fishers from fishing near oil and gas installations and exclusive zones was found to be the most important issue between fisheries and the oil and gas industry which demands more management attention than all other issues. Environmental Impact Assessment versus Fisheries Impact Assessment was identified as the most important inter-agency conflict issue between the fisheries and the oil and gas sector which calls for the conduct of a separate Fisheries Impact Assessment by oil and gas undertakers in addition to the conduct of Environmental Impact Assessments. Fisheries and ocean governance legal frameworks need to be harmonized to avoid inter-agency conflicts followed by the creation of a holistic ocean governance framework that adequately addresses all maritime activities in Ghana. This research contributes to the information and knowledge gaps in marine fisheries management that is needed for the formulation of fisheries policy and advice in Ghana.

7.3.2 Contribution of this research thesis
A number of research activities in different aspects of marine fisheries in Ghana have been undertaken and documented but none of them give conflicts in marine fisheries the needed attention this issue requires. This research thesis has focused on the types and causes of the conflicts, consequences of conflicts in the fisheries, identifying issues of marine fisheries conflicts, and provides knowledge on the issues of conflicts within the fisheries. Conflicts between marine fisheries and offshore oil and gas, and governance and inter-agency conflicts concerning marine fisheries and oil and gas operations are also investigated. Existing fisheries management and policy documents in Ghana emphasize the management of some of the issues related to conflicts in the fisheries, but none of them clearly identifies the types and causes of conflicts in the fisheries and exactly how they should be managed based on knowledge of the
issues and causes of the conflicts. This research has fully focused on the consequences of marine fisheries conflicts, identification and analysis of existing and emerging issues of conflicts both within the fisheries and between the fisheries and the oil and gas sector, the types and causes of the conflicts and their existing management mechanisms.

The reasons why marine fisheries are prone to conflicts have been identified. The reasons why the fisheries are prone to conflicts are because most of the fishers are not formally educated and adequately trained in basic maritime operations. Many of the fishers particularly small-scale fishers don’t understand and appreciate the justification for the fisheries law and regulations that guide the operations of the industry. The occurrence of conflicts in the fisheries impede socio-economic development and threaten food security in Ghana. When the conflicts are not managed adequately, it may lead to increased levels of resource competition and resource degradation, destruction of property and loss of human life. A typology of the conflicts was developed based on the conflict issues identified and analyzed as a means of knowing the nature and causes of the conflicts, how they are currently being managed and how to better manage them.

A decrease in fish production and the scarcity of fish was identified as the major underlying cause of conflicts which need to be addressed by management. Innovative ways to address this problem have been proposed contributing to knowledge of the current gaps in marine fisheries management in Ghana. It was suggested to change canoe fisheries from open access to managed access and it was shown exactly how to do that. It was suggested that there is an urgent need for an updated canoe census and an updated fisheries stock assessment to determine fish exploitation rates, fishing effort and sustainability of stocks. This will then determine the number of canoes that can fish sustainably and reduce canoe numbers if required. Innovative ways to reduce canoe
numbers and other vessel types as well as the number of fishers as a way of reducing fishing effort have been provided in chapter six.

Lack of effective governance of fisheries was identified as an important factor responsible for the decline in fish catch and the occurrence of conflicts in fisheries. Innovative ways to strengthen fisheries institutions to improve fisheries governance, compliance and enforcement of the fisheries law and regulations have also been put forward. After analyzing conflict issues within the fisheries sector and conflicts between the fisheries and the oil and gas sectors, their existing management mechanisms and management challenges were clarified. Innovative ways to improve management of the conflicts were proposed particularly for the production, distribution and sale of pre-mix fuel. Government has its role to play to ensure the regular supply of the fuel, and middlemen should be excluded from the distribution process to ensure order in the system and to get politics out of the pre-mix fuel business. To manage some of the issues of conflict especially on land, existing fish landing sites should be modernized with expansion and new ones created and better managed to accommodate fishing vessels and support the work of fishers. The research also proposed that chief fishermen should be formally recognized by law and must be given formal basic training in conflict management and resolution strategies with powers to sanction and impose fines on fishers found to have committed fisheries offences. Fisheries arbitration committees must be well resourced to effectively function in the management and resolution of conflicts. Finally, environmental courts should be established with training of members along the prosecution chain to handle fisheries conflict cases.

What also became evident through the research was that legal and regulatory systems for managing fisheries and oil and gas operations should be strengthened to more effectively manage issues of conflicts between fisheries and the oil and gas sectors. The activities of oil and gas
operators must be continuously monitored by the regulatory agencies to ensure compliance with the regulations. Oil and gas platforms, underwater gas pipelines, and all other oil and gas installations and areas of the sea reserved for oil and gas operations must be clearly demarcated with illuminated buoys that are visible to fishers both during the day and at night. Proper land-use and seascape planning and the payment of corporate social responsibility by oil and gas companies to fishers will also contribute to managing fisheries and oil and gas conflicts. Communication and collaboration among Government of Ghana agencies need to improve, and the legal frameworks that guide the operations of the agencies must be harmonized to reduce inter-agency conflicts. The research also proposed guidelines for establishing a comprehensive ocean governance and policy framework for Ghana. Innovative ways for these suggested approaches for managing conflicts within marine fisheries, conflicts between fisheries and oil and gas, and inter-agency conflicts have been established in chapter six as contribution to existing knowledge for fisheries management in Ghana.

7.4 RECOMMENDATIONS

7.4.1 Policy recommendations
The purpose in conducting this research was to contribute to information and knowledge required for marine fisheries policy formulation and advice. Symes and Hoefnagel (2010) note that any effective policy incorporates the knowledge generated by a well-founded research. Scientific evidence is needed to support marine fisheries policy making and management in Ghana. The study has extensively analyzed conflicts in marine fisheries in Ghana and their management which is critical to the sustainability and economic feasibility of marine fisheries in the country. Recommendations for marine fisheries policy making have consequently been developed using the research findings and summarized as follows:
1. The Fisheries Commission needs to be well resourced to effectively implement fisheries policies particularly concerning compliance and enforcement of the fisheries law and regulations as lack of effective enforcement and compliance with the fisheries law and regulations is a major issue that creates conflicts in fisheries.

2. Government must make it a priority to implement measures to rebuild the fisheries and prevent the collapse of species by controlling the number of vessels, fishers, gears, and protect the degradation of fish habitats by establishing Marine Protected Areas and closed fishing seasons as availability of fish serves to reduce the occurrence of conflicts.

3. Open access canoe fishery is a major factor that has contributed to the problem of overfishing, decreases in fish catch, competition and conflicts within fisheries. Government should endeavor to register and license all canoes and move the fisheries from open access to restricted access.

4. Distribution and sale of pre-mix fuel is associated with conflicts within the canoe fishery which is caused by government subsidy on the commodity. It is recommended that subsidy on pre-mix fuel should be reduced over time from the current 50% until there is completely no subsidy on the fuel.

5. Government must encourage the participation of private oil companies in the pre-mix fuel business so as to ensure efficiency in the distribution and sale process. If private oil companies become actively involved and subsidy is gradually removed, management of the fuel will become less political and conflicts will be reduced.

6. Fisheries conflicts on land occur at the fish landing sites because of inadequate infrastructure and facilities. The modernization and expansion of fish landing sites to
be able to fully support fishing activities and reduce conflicts at the landing sites should be high on the agenda of government.

7. As a matter of policy, chief fishermen must be given formal recognition within the fisheries law with powers to enforce fishing regulations, sanction and impose fines on law offenders, and they must be given formal basic training in conflict management strategies to resolve conflicts more effectively.

8. Government must make it a policy for every fish landing site to have a functional fisheries arbitration committee which is chaired by the chief fisherman to manage fisheries conflict cases at their levels. This will help to achieve good governance of the fisheries.

9. Women play important roles in fisheries such as fish processing and marketing and the financing of fishing trips, yet they are less engaged in fisheries management decision-making. Women can play a critical role in fisheries compliance and enforcement in Ghana. Fisheries policy should critically examine the role of women and develop their capacities for fisheries enforcement in order to reduce associated conflicts.

10. The Ministry of Fisheries and Aquaculture Development must work with the Ministry of Justice and the Attorney-General’s Department to establishment environmental courts and train people along the prosecution chain to effectively resolve fisheries disputes.

11. Existing legal and regulatory frameworks for marine fisheries, oil and gas and ocean governance should be strengthened and harmonized to more effectively manage issues of conflicts between fisheries and the oil and gas sector. Government should
set up a team of legal experts to review all the laws and make amendments if necessary.

12. There is the need for a new fisheries legislation which will clearly require oil and gas operators to conduct comprehensive stand-alone Fisheries Impact Assessments in addition to Environmental Impact Assessments before the start of any oil and gas operation, and that must be strictly enforced.

13. The Fisheries Commission must ensure that provisions are made in the Petroleum Exploration and Production Bill 2014 which will protect fishermen against social, economic and livelihood losses which occur because of oil and gas operations.

14. Government must ensure proper land-use and seascape planning to reduce multiple-use conflicts in Ghana’s marine waters. The governance system should be improved to integrate the District Assemblies in land-use and development proposal decision-making since the District Assemblies are those on the ground in coastal communities where development projects actually take place.

15. Government should develop a comprehensive ocean governance and policy framework that will enhance integration, good governance and management of the ocean sector including fisheries and oil and gas.

7.4.2 Recommendations for further research
The following are recommended as areas for further research:

1. This research was conducted using qualitative methodology. Further research can focus on quantitative descriptions and analysis of some of the conflict issues identified and analyzed.
2. Researchers, fishers, communities, government, Non-Governmental Organizations and international agencies may have different reasons to support the declines in fish production. Declines in fish populations need to be further investigated.

3. More research should be conducted to identify inadequacies in legislative instruments for ocean governance in Ghana that are responsible for the overlaps in responsibilities of ocean governance agencies leading to the creation of conflicts.

4. In this research, conflicts between marine fisheries and other sectors in the maritime domain was focused on those that occur between fisheries and oil and gas. More research should focus on possible conflicts between marine fisheries and other coastal and ocean sectors.

5. Effects of oil and gas operations on marine fisheries in Ghana which serve as drivers of conflicts were not fully assessed in this research. This provides an opportunity for further research.

6. This study focused more on conflicts at the community level where fish and oil and gas production activities take place. Fisheries management and ocean governance conflicts at the national level need to be investigated further.

7. Because the study focused more at the community level, analysis of conflicts in small-scale fisheries were given more attention. It will be worthwhile to also investigate conflicts within industrial fisheries.
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APPENDICES

Appendix A: Conversation questions

(A) Conflicts within marine fisheries in Ghana

1) Are there really conflicts in the marine fisheries in Ghana?
2) Why is Ghana’s marine fisheries sector prone to conflicts/why do the conflicts occur?
3) Has the incidence of conflict increased or decreased between the past and now? Why?
4) What are the characteristics/nature of the conflicts?
5) What are the conflicts occurring at different levels?
6) What are the conflicts occurring within and between different fisheries sectors?
7) What are the different types of marine fisheries conflicts both at sea and on land?
8) What are the causes of the conflicts? What are the drivers of the conflicts?
9) Which time of year do conflicts occur most and why?
10) What are the consequences of the conflicts? Why is it important to address the conflicts?
11) How are the conflicts being managed? What are the existing conflicts management mechanisms?
12) Are the existing management mechanisms adequate in managing the conflicts?
13) What are the challenges with the existing conflict management mechanisms?
14) How can the existing conflict management mechanisms be improved?
15) Give some examples of fisheries conflict cases that have occurred in the past. How were they resolved?
16) How is pre-mix fuel managed at the national and community levels?
17) What are the conflicts associated with the distribution and sale of pre-mix fuel?
18) What are some of the fisheries management conflicts at different levels?
(B) Conflicts between fisheries and oil and gas

1) Do conflicts occur between fisheries and other sectors? Is there really conflict between fisheries and oil and gas?

2) What are the characteristics or nature of fisheries and oil and gas conflicts?

3) What are the causes and the drivers of the conflicts between fisheries and oil and gas?

4) What are the consequences of fisheries and oil and gas conflicts? Why is it important to address fisheries and oil and gas conflicts?

5) How are the conflicts between fisheries and oil and gas being managed? What are the existing conflicts management mechanisms for fisheries and oil and gas?

6) What role does the Fisheries Commission play in managing fisheries and oil and gas conflicts?

7) Are the existing management mechanisms adequate in managing fisheries and oil and gas conflicts?

8) How can the existing conflict management mechanisms be improved?

9) Give some examples of fisheries and oil and gas conflict cases that have occurred in the past. How were they resolved?

10) In your opinion, what are the impacts of oil and gas exploration and production activities on fisheries and the activities of local fishermen?

11) Is there communication between fisheries and oil and gas sectors? Please explain.

12) What are some of the things that oil and gas companies do in your community as part of their corporate social responsibility?

13) Are the existing legal, institutional and regulatory frameworks for fisheries and oil and gas adequate to address fisheries and oil and gas issues?
(C) General fisheries management issues

1) What do you think is the current state of the fisheries? What is the status of most Ghana marine fish stocks?

2) What do you think government/traditional leaders can do to protect or restore the fisheries? What do you think you can do to protect the fisheries?

3) Do you know about the fisheries law and regulations? If yes, what do you know about it?

4) Do you know if fishermen comply with the fisheries law and regulations? If no, why and how can it be addressed?

5) Are the rules and regulations that apply to fishing effective?

6) Are you aware of anyone who has been penalized for breaking fishing laws?

7) If these laws are enforced what would be your response with respect to your fishing operations? Would you still be able to fish? What would be the impact on your family?

8) In your opinion, what is the most important fisheries management issue in your community at present? What do you feel are the key management issues, given the status of fish stocks? What should be the goals of management? What combination of management measures do you think can be practically applied to achieve those goals?

9) Who, in your view, is responsible for managing the fisheries (Government, Traditional leaders, Community groups, Individuals, Fishermen, Everyone)?

10) What are the main problems that you have to deal with as a fisherman? What could be done to improve these issues?

11) Are you able to get all the pre-mix fuel you need at the fair price? If no, why? Would you be able to make a profit from fishing without cheap premix?
Appendix B: Tables of marine fisheries production trends, vessel statistics and change in crew numbers

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<th>Total marine fish production by all fleet (MT)</th>
<th>Total marine fish production by the canoe fleet (MT)</th>
<th>Sardinella aurita and Sardinella maderensis production by the canoe fleet (MT)</th>
<th>Total canoe catch per unit effort (catch/canoe/year)/MT</th>
<th>Change in numbers of semi-industrial vessels</th>
<th>Semi-industrial catch per unit effort (catch/vessel/year) (MT)</th>
<th>Total marine fish production by semi-industrial fleet (MT)</th>
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Appendix C: Permission from Ministry of Fisheries and Aquaculture Development of Ghana to Use National Fisheries Data for Analysis

MINISTRY OF FISHERIES & AQUACULTURE DEVELOPMENT

In case of reply the number and date of this letter should be quoted

My Ref No: Data 06/01/15

To whom it may concern

Permission was granted to Mr Godfred Ameyaw Asiedu to use fish production summary data (1971-2014) for his Doctor of Philosophy thesis by the Fisheries Commission of Ghana.

Paul Bannerman Deputy Director
(Fisheries Scientific Survey Division)

Deputy Director
Fisheries Scientific Survey Division
Fisheries Commission