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THE IMPACTS AND POTENTIAL IMPACTS OF OIL AND GAS EXPLOITATION ON FISHERIES AND CONSUMERS: THE EXPERIENCE OF WEST AFRICAN COUNTRIES

CASE STUDIES FROM SIX COUNTRIES IN WEST AFRICA

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ABBREVIATIONS AND ACRONYMS

ABE :	Beninese Environment Agency
ASECNA :	Agency for the Security of Air Navigation in Africa and Madagascar
CO ₂ :	Carbon Dioxide
CPP :	Production Sharing Contract
DDAEP :	Directorate of Agriculture, Livestock and Fisheries)
DGEC :	Directorate General for the Environment and Climate
DNSP :	National Directorate of Public Health
INSAE :	National Institute of Statistics and Economic Analysis
GIWACAF :	Global Initiative for West, Central and Southern Africa
GPS :	Global Positioning System
ONG :	Non Gouvernemental Organisation
OSC :	Civil Society Organisation
OMI :	International Maritime Organization
GDP:	Gross Domestic Product
PNIU	National Contingency Plan
PIU :	Contingency Plans
MAEP:	Ministry of Agriculture, Livestock and Fisheries
MCVDD:	Ministry of Habitat and Sustainable Development
MEM:	Ministry of Water and Mines
SOBEH:	Beninese Hydrocarbon Society
SDDAR :	Master Plan for Agricultural and Rural Development of Benin
CFA :	Communauté financière africaine
CIMTOGO :	Cement of Togo
CMA :	Collaborative Management Association
COVNM :	Non-methane volatile organic compound
CRO :	Ocean Research Centre
DPA :	Fisheries and Aquaculture Directorate
EIA :	Environmental Impact Assessment
EIES :	Environmental and Social Impact Assessment
EU :	Euro
FAO :	Food and Agriculture Organization of the United Nations
GHGs :	Greenhouse Gases

GNPC : Ghana National Petroleum Company
MRS : former TEXACO
NaFAA: National Fisheries & Aquaculture Authority
NOCAL: National Oil Company of Liberia
NOx: Nitrous Oxide
NPOA-IUU: National Plan of Action to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing
PM : Particulate Matter
DNP : Development National Plan
UNEP : United Nations Environment Programme
RAMSAR : Convention on Wetlands of International Importance
SAP : Société Africaine de Pétrole
SAZOF : Société d'Administration de la Zone Franche
SNPT : Société Nationale des Phosphates du Togo
SOx : Sulfur Oxide
STE : Togolese Storage Company
WACEM: West African Cement
WAGP: West African Gas Pipeline
WAPCO: West African Pipelines Company Limited
CZ : Coastal Zone
ICTZ : InterTropical Convergence Zone
ZEE : Exclusive Economic Zone

EXECUTIVE SUMMARY

The fisheries sector is a vital source of trade and income for financial needs and social development in most parts of the world. Indeed, fishing is a major source of food for humanity; providing employment and economic benefits to its practitioners. In addition to providing food, fisheries production contributes to GDP, provides livelihoods for fishers and processors, and beyond that, is a source of foreign exchange earnings and increases government revenues through fisheries agreements and taxes for many countries around the world. In 2016, world fisheries production reached a record value of about 171 million tons, estimated at US\$362 billion (FAO, 2018). The average annual increase in global fish consumption for human consumption outpaced population growth by a factor of two (3.2% versus 1.6%), surpassing that of meat of all terrestrial animals combined (2.8%) (FAO, 2018). In terms of per capita, the consumption of fish for human consumption increased from 9.0 kg in 1961 to 20.2 kg in 2015, at an average annual rate of about 1.5% to reach about 20.3 kg in 2016 and about 20.5 kg in 2017 (FAO, 2018).

The total added value of the entire fisheries sector in Africa exceeds US\$17.4 billion, or 1.26% of the GDP of all African countries (FAO, 2014). The importance of artisanal marine fisheries as well as inland fisheries is well established. Indeed, figures show that these fisheries contribute to one third of total catches in African countries (FAO, 2014). According to estimates, the fisheries sector as a whole employs 12.3 million full-time fishers, full-time and part-time processors of fishery products, which represents 2.1% of the African population aged 15-64 years with 42.4% being in fish processing with a majority of women processors (FAO, 2014).

In the context of this study, the analysis of the existing and potential impacts of oil and gas exploitation on fisheries revealed important aspects of the exploitation of these deposits in West African countries. Different situations can be observed with regard to the exploitation of oil, the place of hydrocarbons in the economy or the real risks of degradation on the environment, health and the social of the countries. On the one hand, as far as the producing countries are concerned (Nigeria, Ghana, Côte d'Ivoire), the environmental and social impacts and risks are significant and destructive of the economic, social and health fabric of fishing communities, women involved in processing and consumers. Ecologically, the marine and aquatic, terrestrial and wetland ecosystems are negatively impacted leading to environmental destruction, loss of biodiversity and thus compromising the survival of species and the livelihoods of communities living along the shores of oil and gas exploitation sites. As a result, poverty and hardship would be entrenched in the artisanal fisheries sector of these countries, which plays an important socio-economic role; contributing to the viable and sustainable local economy. On the other hand, non-producing countries (Benin, Liberia and Togo) present the same destructive potential risks outlined in the case of the producing countries.

In addition, important actors are involved in this extraction. Three types of actors are constantly mobilized, the six majors (Exxon-Mobil, Shell, BP, Total, Chevron Texaco, ENI), the national companies (e.g. NNPC, GNPC, PETROCI, NACOL), whose management is often controversial, and the smaller independent companies (Tullow Oil, Kosmos Energy, etc.). They form consortiums (in joint venture contracts) to maximize profits and minimize drilling and exploitation risks. It is also a way for national companies to develop their reserves without taking on all the risks involved.

This oil windfall and its use take on different aspects within the different countries, risky in Nigeria, ambitious in Ghana, morose in Côte d'Ivoire and full of hope for countries considering exploitation option (Benin,

Liberia and Togo). Thus, the management and redistribution of oil revenues is a key issue in the region and its resolution is still a long way off.

On the one hand, the oil and gas industry contribute greatly, in terms of revenue, to the budgets of oil producing States and to some extent to development. Apart from this positive impact, there are significant negative impacts of this industry, including economic, social, health and environmental impacts in these countries, especially in the coastal communities of fishermen, women processors and consumers. The artisanal fishing sector in these West African countries is being seriously affected and will continue to be affected by future new operations if the current regulatory frameworks remain ineffective and continue to fail to involve the interests of coastal communities in these policies.

Considering the global, regional and national efforts to reduce poverty, achieve food security, mitigate climate change and achieve sustainable development objectives, the management of the hydrocarbon economy does not sufficiently benefit the countries concerned by this study, more particularly, the communities bordering the exploitation sites. They are generally left out of the management and distribution of revenues in these case studies report, and record the bulk of the negative externalities on their livelihoods that is fishing.

Against this background of negative externalities, energy policies and regulatory frameworks for energy, fisheries and water sectors must be aligned with sustainability to safeguard the ecology and livelihoods of fishing communities and human health. Thus, a redefinition of mining, energy and agricultural policies is needed in the countries covered by the study and beyond, the West African region. The following avenues of solutions/recommendations could be taken to meet the requirements of sustainability of ecological, biological, economic and social systems in these countries. They are categorized among the various industry actors (states, civil society organizations, extractive and commercialization companies and affected local communities). They are, among others :

To States

- Promote and preserve local fisheries by fully implementing existing environmental protection laws and policies;
- Provide economic and social protection to fishermen and farmers who suffer from pollution from oil and gas exploitation;
- Reduce the emphasis on fossil fuels as a vector of economic growth and promote alternative development models based on science, technology and renewable energies by encouraging investors and oil marketing operators to invest in the just energy transition;
- Elaborate an exit plan from dependence on fossil fuels in response to the Paris Agreement and ensure a just energy transition;
- Take fishermen into account in planning the development of food security and provide incentives for them to remain in the profession;
- Strengthen multi-stakeholder dialogues and the social innovation platform for host communities;
- Consider long-term environmental planning through Integrated Coastal Zone Management (ICZM) ;
- Develop consensual approaches to conflict prevention and management ;
- Strengthen the financial and management capacities of the institutions in charge of the environment, fisheries and hydrocarbons;

- Adopt a policy of protection of the current fishing grounds in order to guarantee a real source of income to women in the fishing sector;
- Guarantee and protect the rights of affected communities, including women and children, through the exploration and exploitation of oil and gas.
- Empower fish processing women ;
- Adopt a legal and regulatory framework that promotes the mitigation of oil and gas adverse consequences;
- Promote local initiatives with CSOs and key stakeholders aimed at capacity building on the risks of oil and gas exploitation;
- Ensure that measures to mitigate negative impacts are implemented;
- Protect natural resources, human rights and implement sustainable development plans;
- Establish a regional legal framework with neighboring countries on offshore oil and gas exploitation;
- Strengthen the preventive measures of the Abidjan Convention on the Protection of the Marine Coasts;
- Improving the government's ability to negotiate and manage oil and gas companies;
- Ensure adequate legal infrastructure for the control of offshore oil operations;
- Require operators to provide the necessary insurance for clean-up and potential compensation;
- Establish a national fund in case of accidents or oil spills;
- Fully involve the riparian communities in the process of formulating and implementing oil and gas exploration and exploitation projects;
- Improve basic essential services as well as the conditions for financing loans to fish processors' and fishermen's associations for the financing and professionalization of their income-generating activities.

To Civil Society

- Contribute to environmental education and promote awareness of community rights and environmental protection;
- Build capacity and support fishing and fish processing communities to form organized groups to have a greater voice in claiming their rights;
- Support the empowerment of women to demand environmental and social justice from oil companies and government;
- Advocate for the full implementation by government and oil companies of relevant environmental laws and policies in favor of communities;
- Sensitize communities on the problems of pipeline vandalism and illegal oil refining for their cessation;
- Advocate for the adoption and enforcement of laws in favor of renewable energy;
- Advocate for adequate compensation of fishermen by companies responsible for the pollution of streams, soils, mangroves, rivers and air;
- Advocate for the respect of the rights of communities by the companies and multinationals responsible for pollution;
- Ensure strict compliance with the measures proposed in the impact studies;
- Support and/or act as spokesperson for fishermen and fish processors;

- To have a controlling look at the management of hydrocarbons;
- To assist the affected communities in the implementation of the measures that they themselves would have recommended;
- Advocate for a redefinition of mining policy that does not encourage the exploitation of fossil fuels such as oil, which is known to be dangerous for the environment, and promote community livelihoods;
- Advocate for a transition of countries' energy policy towards a carbon-free, clean energy economy;
- Undertake campaigns to sensitize decision-makers on regulatory reforms of the fisheries sector at the national level.

To Oil companies

- Use technologies that can reduce oil spills and gas flaring in coastal communities;
- Comply fully with national and international environmental policies;
- Clean up all streams and creeks that are critical to communities and that are affected by the oil spill;
- Engage traditional fishermen to understand the dimensions of the impact of oil spills on their socio-economic life;
- Provide alternative income-generating activities for affected fishing communities;
- Invest on a large scale in the production of alternative renewable energy for the benefit of the global effort to safeguard the climate and vulnerable indigenous communities;
- Respect the rights of communities and remove the threat to their livelihoods;
- Establish large-scale fisheries with fishermen affected by ocean and river pollution;
- Stop gas flaring and replace all vulnerable and corroded oil pipes in the short term.

To investors and commercializing operators of petroleum products

- Divest in petrol stations to invest in renewable energies (solar, wind, etc.);
- Promote respect for the rights of populations;
- Ensuring a fairer and more equitable corporate social responsibility.

To affected communities

- Refrain from stealing oil and vandalizing pipelines;
- Promote cultural activities that support environmental protection;
- Organize against pollution and destruction of the ecosystems;
- Support initiatives that require relevant government agencies to protect the environment from destructive oil production activities.

PART A: INTRODUCTION

BACKGROUND

The fisheries sector is a vital source of trade and income for financial needs and social development in most parts of the world. Indeed, fishing is a major source of food for humanity; providing employment and economic benefits to its practitioners. In addition to providing food, fisheries production contributes to GDP, provides livelihoods for fishers and processors, and beyond that, is a source of foreign exchange earnings and increases government revenues through fisheries agreements and taxes for many countries around the world. In 2016, world fisheries production reached a record value of about 171 million tons, estimated at US\$362 billion (FAO, 2018). The average annual increase in global fish consumption for human consumption outpaced population growth by a factor of two (3.2% versus 1.6%), surpassing that of meat of all terrestrial animals combined (2.8%) (FAO, 2018). In terms of per capita, the consumption of fish for human consumption increased from 9.0 kg in 1961 to 20.2 kg in 2015, at an average annual rate of about 1.5% to reach about 20.3 kg in 2016 and about 20.5 kg in 2017 (FAO, 2018).

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The West African sub-region has more than 6,069 km of coastal zone (CZ) and an Exclusive Economic Zone (EEZ) of 2,016,900 km² that supports fishing and other economic activities (Nadje, 2012). The region is bounded by latitudes 23 "N - 5 "S and longitudes 18 "W - 23 "E and comprises sixteen coastal states with a combined coastline of 7000 km, two island states (Sao Tome and Cape Verde) and four landlocked states (Burkina Faso, Mali, Niger, Chad) (Chaboud and Charles-Dominique, 1989). According to the most recent statistical sources (Fontana et al., 1989; Welcomme, 1979), artisanal fishing accounts for annual catches of around 1,300,000 tons (800,000 tons at sea and 500,000 tons in continental waters), or 52% of total landings. The main producers of fishery resources in this region are Mauritania, Senegal, Ghana and Nigeria (FAO, 2012). The fisheries sector has become a dynamic and market-oriented food security zone due to the growing interest and demand for fish and fish products (Mohammed and Uraguchi, 2013; Dahou et al., 2007).

But the discovery of oil and gas along the West African sub-region could jeopardize the development of the fisheries sector, its practitioners and the marine environment. Although the entire West African coastline is not currently exploited for oil or gas, this situation could change in the coming years as new deposits have recently been discovered. Many West African countries are engaged in oil exploration and/or exploitation operations. In addition to Nigeria, four states in the region are currently oil producers. These countries are Côte d'Ivoire, Ghana, Mauritania and Niger, while the other eleven states are still at the exploration stage. In terms of proven reserves, West Africa has the same proportions as production: productions were expected to reach nearly 40 billion barrels in 2012, or about 30% of Africa's total reserves (130 billion barrels) and 2.5% of global reserves (1,669 billion barrels), according to British Petroleum projections for 2013.

However, with the growing awareness of global warming and the role played in this phenomenon by carbon dioxide (CO₂) emitted in the process of exploitation and use of oil and gas, humanity is being forced to reduce carbon emissions, which requires changes in energy production policies as well as in the way energy is consumed, at governmental, industrial and individual levels. Today, 86 million barrels of oil are consumed per day, or 160,000 liters per second worldwide with incessant increasing demand ([http://energy4me.org/wp-content/uploads/French WEB.pdf](http://energy4me.org/wp-content/uploads/French_WEB.pdf), 2019). It is estimated that developing countries will account for 80% of the world's population by 2030, and they now hold the bulk of the world's fossil fuel resources. At the same time, oil and gas production in the United States and Europe is declining. The International Energy Agency (IEA) estimates that the increase in energy demand will require an investment of US\$20 trillion over the next 25 years: US\$3,000 per person living on Earth, more than half of which will go to the production and distribution of electricity. The challenge will be to produce clean, abundant and cheap energy.

In view of these enormous environmental, socio-economic and sustainability challenges of today's economic systems and in view of the ever-increasing needs of growing populations and global efforts to reduce CO₂ emissions to limit global warming to well below 2°C (in line with the Paris Agreement on Climate Change in 2015), and in view of the high reputation of the fisheries sector for the livelihood of millions of people in West Africa (FAO, 2014), it would be necessary to understand the oil/gas-fishers interaction and to elucidate the risks of a carbon economy for developing economies such as West Africa. It is, therefore, essential to identify the actual and potential impacts of oil and gas exploitation along the coastline, on other rivers and the fishing sector (fishermen, women working in fish processing and members of the alliance of fishermen's networks) and consumers in West Africa.

To this end, a study was conducted in selected countries in West Africa. The study initially covered eight West African coastal countries, namely, **Senegal, Gambia, Liberia, Côte d'Ivoire, Ghana, Togo, Benin and Nigeria**. However, due to budgetary constraints and difficulties in finding available consultants during the time period allocated for the study, only six case studies were carried out in the following countries: **Liberia, Côte d'Ivoire, Ghana, Togo, Benin and Nigeria** to give substance to this report. This report is the result of an initial research on the actors, impacts and risks of oil exploitation in the sub-region on the fishing world and consumers. It will be used as a tool to assist decision making on the future of investments in the extractive oil and gas sectors for the region in light of the negative impacts from the ecological, social and health points of view and the system of management and distribution of revenues from this industry.

The study covered both coastal areas and other water bodies in the countries concerned. It should be stressed that not all the countries concerned are at the same level of exploitation. There are three countries (Nigeria, Ghana and Côte d'Ivoire) which are in the exploitation phase and the other three countries (Liberia, Togo and Benin) are not yet in the exploitation phase but which have recorded exploration phases with conclusive results.

CONTEXT

1. General information on oil and gas development around the world

Humanity has been using oil for millennia with incremental increase over the last century. Indeed, oil is the most important source of energy, providing fuel for most means of transport and natural gas, which in turn is

used to produce much of the electricity on which our modern lifestyles are totally dependent. On the other hand, oil is also the raw material from which many materials are made, such as plastics, which are used to such an extent that it seems as if humanity could no longer do without them.

For centuries, in the Middle East, petroleum for lighting was distilled in small devices called stills before the modern era of oil, which began in 1853, when the Polish chemist Ignacy Lukasiewicz (1822-1882) discovered the way to carry out this operation on an industrial scale. In 1856, he set up the first crude oil refinery in Ulaszowice, Poland. Abraham Gesner (1791-1864), a Canadian, had figured out how to obtain kerosene from coal as early as 1846, but the oil-based technique was more productive and less expensive. Kerosene supplanted the other forms of fuel that existed at that time and became the lighting fuel in the West. Increasing demand triggered a rush for oil, especially in the United States.

In the United States, the number of vehicle owners ranged from 8,000 to 125,000 between 1900 and 1908, and exceeded 8 million by 1920. In 1930, 26.7 million cars were on U.S. roads, all using fuel made from petroleum. Speculation in the raw material took on enormous proportions. Prospectors drilled wherever oil was suspected in the subsoil. Many failed, but some lucky ones made fortunes by finding blow-out wells. In California, Oklahoma, and especially Texas, the oil windfall now fueled enormous economic growth that made the United States the richest country in the world. As automobile manufacturers and oil companies prospered, "black gold," the other name for oil, would transform the face of America and the world. This sparked a major wave of new firms in the oil and gas industry.

Thus, companies operating in the hydrocarbon sector have been created with different names such as Shell, Texaco, etc., which have been called "oil and gas companies". They relocated to other parts of the world where oil had just been discovered. Indeed, oil is a natural mineral material derived from the modified remains of living beings. Its name comes from the Latin *petrae oleum*, which means "stone oil". It is a dark, oily substance, liquid in its typical form, but can also appear solid or gaseous. The liquid form in which it is extracted is called "crude oil" if it is black and viscous, and "condensate" if it is clear and volatile. When it is solid, it is called "asphalt", and "bitumen" when it is semi-solid. Petroleum is a complex mixture of different chemical components that can be isolated by refining. These can be used to make a wide variety of substances.

Before oil is produced, it goes through a process. Prospection begins by studying rock outcrops or by studying radar or satellite images of the area being prospected. Once a potential area has been located, geophysical studies begin, using sophisticated equipment to produce an image of the subsurface, such as a medical ultrasound. The fossil fuels' industry is among the biggest users of the computer power that allows exploration specialists to interpret the appearance of geological structures thousands of meters underground. Engineers drill more than 8,000 m to reach resources under high temperature and pressure. They extract oil and gas through kilometers of drilling, and send them thousands of kilometers through pipelines to refineries, where the increasingly "heavy" and sulphurous crude oils are refined. Advanced technologies, such as GPS, satellite imagery, remote control and 3D and 4D seismic exploration, are now making it possible to discover reserves with less drilling, with more or less little environmental footprint and more economically than ever before.

The world's dependence on oil is therefore enormous (e.g. it powers our means of transport, heats or cools buildings and is used to create industrial and household chemicals). Indeed, most of the energy sources

essential to the functioning of our societies come from fossil fuels such as gas and oil. But their extraction also generates a series of present and future social and environmental costs, both direct and indirect, which must be compared with the benefits they bring. Thus, oil and gas production is not without risks.

2. The impacts of oil and gas development on fishermen around the world

Oil is a non-renewable energy which, during exploitation, produces impacts on the environment, living beings and amplifies global warming. The different operational phases of the oil and gas industry (onshore and offshore), including from exploration to production, are known to have direct and indirect negative socio-economic and environmental impacts on fisheries and the fishing sector and millions of people worldwide [Extractive Industries Assessment Report (EIR), 2000]. Existing evidence indicates that, in many oil-producing countries, oil exploration activities have led to the destruction of the marine ecology, which is the main source of livelihood for fishing communities, resulting in the loss of marine biodiversity, reduced catches of fish products, exacerbation of poverty, social conflicts, displacement of populations and loss of livelihoods. In addition, oil spills have altered mangrove forests, coral reefs and fisheries as a result of serious accidents and regular spills involving oil tankers, loading stations and drilling and production platforms; leading to major environmental damage.

Typically, offshore oil development begins with seismic surveys followed by exploratory drilling. The development of offshore oil exploitation is also accompanied by an increase in the traffic of support vessels and oil tankers. The general impacts of oil development, in general, include:

- noise and vibration;
- solid and liquid production wastes;
- increased water turbidity from dredging;
- disturbance of the seabed;
- avoidance of the area by marine wildlife such as fish and marine mammals due to construction noise, vibration and the presence of erected equipment; and
- possible invasions of alien species carried by ballast water from salvage/support ships and tankers (Steiner, 2003; Wills, 2002; Patin, 1999 cited in PRCM by Sandra Kloff and Clive Wicks, at http://www.prcmarine.org/sites/prcmarine.org/files/1_Gestion_environnementale_de_l'_exploitacion_de_petrole_off.pdf, 2019).

The environmental stress caused by offshore oil development can provoke different biological responses involving complex transformations at all levels of the biological hierarchy.

Small accidental oil spills, of high magnitude are of great concern, as they usually occur during routine operations when oil is loaded and unloaded from tankers: This normally happens in ports or oil terminals such as offshore production platforms. The amount of oil spilled during terminal operations is three times the total amount of oil spilled as a result of tanker accidents (ITOPF website). However, there are several examples of best practices worldwide with regard to port management and oil traffic control systems, where the problem has been reduced to very low proportions through the use of advanced technology and careful management. Two examples are the port of Sullom Voe in the Shetland Islands, where all oil companies adopted this system in 1979, and the Valdez Marine Terminal in Alaska, which has imposed the same zero-tolerance pollution regime since the Exxon Valdez disaster in 1989.

The effects of chronic contamination from offshore oil production: Research is increasingly revealing the existence of cumulative and long-term consequences. New evidence indicates that the species composition of marine microorganisms can change dramatically; bacteria that feed on hydrocarbons grow particularly rapidly at the expense of other microorganisms (Al-Hadhrami *et al.*, 1995; Bruns *et al.*, 1993). Other studies show high mortality and morphological abnormalities in fish eggs and larvae (NERC, 1994; MacGarvin, 1995; Klump & Westernhagen von, 1995). In addition, a Norwegian study showed that exposure of fish to very low amounts of polycyclic aromatic hydrocarbons (PAHs), present in the production waters, results in the feminization of male fish, which significantly reduces fertility and delays the spawning period by several weeks (Meier *et al.*, 2002). Cancers in fish and particularly in benthic organisms have been directly linked to pollution from offshore production facilities (Anderson, 1990 ; Klekowski *et al.*, 1994).

Impacts of spill on mangrove forest: When oil covers the aerial roots of mangrove trees, it prevents oxygen from circulating in the root tissues embedded in anoxic soils (Teas *et al.*, 1993). The oil can be absorbed by the roots, transported to the leaves and block transpiration (Getter *et al.*, 1985). Oil can disrupt root membranes, causing a lethal concentration of salt in the tissues (Page *et al.*, 1985). Sudden mass mortality of mangrove trees causes sediment erosion (Garrity *et al.*, 1994). Following an oil spill in Panama in 1986, many mangrove trees rotted and fell. Sediments in these habitats eroded at rates of up to several centimeters per day (Jackson, *et al.*, 1989). The eroded sediments and oil are deposited (to varying degrees of degradation) in nearby habitats such as coral reefs, which were not contaminated by the original spill. In many cases, the oil remained in these wetlands for decades, delaying the rehabilitation of these ecosystems (NCR, 2002). Negative impacts on coastal wetlands will inevitably be accompanied by a reduction in fishing catches; their function as nurseries for many species of fish with market of which value is well known.

The following examples from different countries/regions of the world reveal this well. For example, it is estimated that 16,000 spills occurred during the construction of the trans-Alpine oil pipeline (Dudley and Stolton, 2002). Oil tanker accidents are other well-known examples of ecological disasters that have long-term effects on the environment (e.g. the loss of control of the exploration field in Mexico in 1979, the Prestige accident off the Spanish coast in 2002 and the polluted coast in Saudi Arabia during the Gulf War in 1991, among many others). The Prestige accident is probably the saddest and most recent illustration. 80% of the cargo of 77,000 tons of combustible heavy oil polluted the French and Spanish coasts in 2003. This type of oil is the cause of the worst cases of pollution. Just before the spill, the Prestige suffered hull damage, listed heavily and drifted towards the Spanish coast. The decision of the Spanish government to tow the ship further offshore, in the hope of protecting the Spanish coast, worsened the problem and spread the oil even more widely when the ship broke in two in bad weather (New Scientist, 2003).

Accidents caused by large oil spills involving offshore oil installations can be caused by a variety of factors, of which oil spills or pipeline ruptures are the best known. A well spurt or loss of reservoir control can occur if a drilling platform encounters a pocket of subsea oil with excessive geological pressure or through technical damage and human error. One of the best-known spurts is the one that occurred in 1969 off the California coast near Santa Barbara, when 13,600 tons of oil spilled into the ocean (Charter, 2002). The media coverage of the event led to a ban on further offshore exploitation in this region. Technologies to reduce spills have been improved in recent years, but these accidents can and do happen. One of the most recent examples took place off the coast of Egypt in August 2004. The field contained mainly gas and fortunately relatively little oil.

In Australia, members of the fishing industry called for a moratorium on seismic surveys conducted by the oil and gas industry after a new Australian study showed that such surveys had serious impacts on invertebrates such as lobsters, scallops, abalone and crabs. (The Guardian : International Edition, 2018).

In an impact assessment of a drilling proposal by BG Trinidad on the east coast of Trinidad, the Institute of Maritime Affairs (IMA) highlighted several potential socio-economic and environmental impacts of the oil and gas industry on the marine environment.

Similarly, in a scoping study, the main problems faced by small-scale fisheries in Trinidad and Tobago and how they interact with the oil and gas industry were identified (Gordon and Tupper, 2011).

In overall, there is widespread agreement that extractive industries have made little obvious contribution to sustainable development and environmental protection (EIR, 2000). The oil and gas industry is seen by many civil associations and civil society organizations as having contributed to decay, corruption, pollution and social unrest, including wars in several countries, particularly in Africa.

3. The impacts of oil and gas exploitation on fishermen in West Africa

Fishing is the main economic sector in the region. Coastal waters are among the world's richest in fish thanks to the upwelling effects that develop at ocean level. Upwelling is the surge of nutrients from deep water to the surface of the oceans to aquatic and marine life. These are upwelling events with significantly higher nutrient salt concentrations at the surface water level. The sunlight that the region enjoys combined with the upwelling effect cause significant algal growth that forms the basis of a highly productive food chain for an abundance of fish (Wolff, *et al.*, 1993; PRCM, 2000; Samb and Demarcq, 1989; cited in the PRCM report by authors Sandra Kloff and Clive Wicks, at [http://www.prcmarine.org/sites/prcmarine.org/files/1 Gestion environnementale de 1 exploitation de petrole off.pdf](http://www.prcmarine.org/sites/prcmarine.org/files/1_Gestion_environmentale_de_1_exploitation_de_petrole_off.pdf), 2019). It is estimated that over 600,000 people work in the fishing industry. Local fishermen use small motorized boats (canoes) and fish in coastal waters, while large foreign industrial trawlers exploit fishery resources further offshore. Fishing licenses sold to foreign fleets contribute significantly to government revenues, particularly in Senegal and Mauritania. Fishing in this ecosystem generates some US\$600 million each year, making it a unique source of foreign exchange and an essential source of income for economic and social development. On the other hand, the resources of this rich marine ecosystem are under severe strain. Of the 22 commercially valuable fish species analyzed in the region, 5 are classified as overexploited and one endangered species (FAO, 2004; Bours, 2004).

It is in this precarious context that offshore oil exploitation is being introduced into the marine environment in West Africa. In 2002, the Australian oil company Woodside discovered the first commercially exploitable field off the coast of Mauritania: the Chinguetti oil field. The British oil company Premier, for its part, opened an office in Guinea Bissau following the discovery of the offshore Sinape oil basin. These discoveries draw attention to the possible environmental impacts of offshore oil extraction in the region. Public debate has focused on marine pollution and particularly on the compatibility of this new economic activity with the existing economy, which is based on fishing and partly on tourism. The risks associated with present and future maritime traffic are also discussed. An accident involving one of these ships would cause a very large oil slick. In this context of offshore oil development, the number of ships sailing in the West African maritime and coastal zone to load oil from future platforms could increase.

In the 1960s, Africa produced 10 million tons of oil each year but nowadays the continent produces 376.4 million tons of oil per year, or 10.6% of the world's production with West African oil qualified as being of excellent quality (http://www.prcmarine.org/sites/prcmarine.org/files/1_Gestion_environnementale_de_l_exploitation_de_petrole_off.pdf , 2019). The same site states, in the report by Sandra Kloff and Clive Wicks of the Regional Program for Coastal and Marine Conservation in West Africa (PRCM), that between 2003 and 2012 production in Africa would have exceeded 20 billion barrels, with a value of at least US\$500 billion and even US\$1000 billion if the price per barrel remained at US\$50). It should be remembered that 80% of African oil is produced by Nigeria and Angola and that a wave of superpowers such as China and the United States will sweep across the continent in search of "black gold".

This race for oil is causing and fueling conflicts in many parts of Africa, repeated massive oil theft in Nigeria allegedly perpetrated by terrorist and mafia groups, disgruntled rebel groups opposing their government and using the money from stolen oil to buy arms, fraud and corruption in the oil and gas sector is spreading to other sectors. In addition, oil companies are moving from Asia to Africa because they are getting more profitable deals from African governments, including licensing costs and profit-sharing with governments that are more advantageous than in Asia (http://www.prcmarine.org/sites/prcmarine.org/files/1_Gestion_environnementale_de_l_exploitation_de_petrole_off.pdf , 2019).

In light of the above assessment of the impacts of oil exploitation in Africa, there would be a great risk that the oil industries today penetrate fragile and remote ecosystems, in areas of exceptional biodiversity where governments often have few means to protect the environment, the inhabitants and other economic activities in the West African sub-region. Indeed, the increase in oil and gas production in West Africa is mainly ensured by offshore deposits located in very sensitive marine environments, which are essential for the economy and human survival through fishing. As proof, many marine and coastal ecosystems have been altered by oil activities in the sub-region, such as the Niger Delta in Nigeria. The World Bank's Extractive Industries Assessment Report (EIR) confirms this in the following words: 'Oil can be an important resource for countries in the region, but the history of oil exploitation in Africa is marked by social and environmental problems'. Every year, between 400 and 500 million tons of crude oil and refined products are transported from Nigeria, Gabon and Angola to European countries and the United States (UNEP, 2004). In 2002, the Australian oil company Woodside carried out an analysis of existing oil-related pollution off the coast of Mauritania based on satellite images of oil slicks taken between 1992 and 2001, which revealed that many of these slicks can be attributed to ships routinely discharging their oil waste.

In a study to investigate the impacts of oil and gas activities on fisheries in the Western Region of Ghana (Egyir, 2012), respondents, who were mostly fishermen and fishmongers, cited a real or likely negative impact of oil and gas exploration on their livelihoods and communities, including the loss/significant reduction in the normal amount of fish caught. In addition, fishmongers deplored the fact that the reduction in fishermen's catches will result in less fish available for purchase, which will reduce their combined income levels and thus negatively impact their livelihoods.

A rig accident in Nigeria in 1980 spilled 54,000 tons of oil into the sea. A pipeline rupture in 1998, also in Nigeria, caused the spillage of 14,300 tons of oil (UNEP, 2002). NGOs as well as some members of the

Nigerian government have prepared reports of oil spills that have not been officially notified by their officials. Pilots reported flying over areas of major spills that had never been reported (personal communication to Clive Wicks cited in PRCM at http://www.prcmarine.org/sites/prcmarine.org/files/1_Gestion_environmentale_de_l_exploitation_de_petrole_off.pdf, 2019).

In 1992, the region experienced the greatest risk of an oil spill, when the World Hitachi Zosen collided with a ship in dry dock off the Mauritanian coast (data provided by the International Tanker Owners' Federation, ITOPF). A ship-to-ship transfer was carried out and the coast suffered no oil spill. The West African Marine Ecoregion is now classified by ITOPF as an area requiring special attention with regard to oil spills mainly caused by oil traffic. On a scale ranging from 1 (low risk) to 3 (high risk) they place the region in category 2 (medium risk) (Moller, 2002). With increasing offshore oil exploitation, it is very likely that the area will move to category 3 in the near future (http://www.prcmarine.org/sites/prcmarine.org/files/1_Gestion_environmentale_de_l_exploitation_de_petrole_off.pdf, 2019).

Impact of chronic oil-related pollution on wetlands: Coastal wetlands in the West African Marine Ecoregion, such as mangroves, estuaries or marshes, are particularly vulnerable to the small amounts of oil and other production wastes routinely discharged by offshore oil installations. The light oil and heavy metal molecules present, for example, in production waters are easily absorbed by the high density of suspended particles in coastal ecosystems. These contaminated particles settle on the bottom, causing an accumulation of this pollution in these critical habitats. In deep, turbulent and relatively clear waters, these production wastes can be diluted more rapidly over large areas (NRC, 2002).

Tourism and especially the fishing industry could be negatively affected, although both economic activities have great potential for sustainable development. The oil industry, on the other hand, will only contribute to the regional economy for a short period of time. A palpable example is the first commercially exploitable oil field discovered off the coast of Mauritania, which has an estimated life span of only 8 to 15 years (Woodside, 2002). Beyond that, the destructive nature of this activity is even more threatening to social, economic and environmental well-being in these areas. This highlights once again the unsustainable nature of the exploitation of fossil resources such as oil and gas for the region, which is also at the antipode of the sustainable development objectives of the United Nations Agenda 2030 and antinomic to the objectives of the 2015 Paris Climate Agreement to which the West African region is a party with its member countries.

4. The oil and gas rush could be a blow to sustainable development, just and sustainable energy transition in West Africa

A review of the international, regional and national instruments that West African countries have adopted shows that all of these instruments promote development and economic growth that would support the sustainability of biological and ecological systems for the achievement of sustainable development goals (SDGs). Sectors such as fisheries, hydrocarbons and water resources could be categorized under the following SDGs: eradicate poverty and hunger (SDG 1); ensure food security (SDG 2); good health (SDG 3); access to and sustainable management of water resources (SDG 6); access to sustainable energy (SDG 7); combat climate change (SDG 13); and conserve and sustainably manage oceans, seas and marine resources (SDG 14).

These goals, for the West African region, could be compromised if oil and gas exploitation is promoted by states. This, therefore, calls for an assessment of the existing and potential impacts of oil/gas exploitation in West Africa and the need to protect the livelihoods of millions of people and the associated marine or aquatic ecosystem (used for fishing, recreation and tourism). This impact assessment could serve as a decision-making support tool for governments in the region for policies, programs, projects and actions that ensure, inter alia, the preservation of fishing communities' livelihoods, respect for communities' rights, and a just energy transition, an effective response to climate change and sustainable management of marine ecosystems in the perspective of sustainable development in West Africa, which is aligned and coherent with the Agenda 2020 of the Economic Community of West African States (ECOWAS), the Agenda 2063 of the African Union and the sustainable development goals of the United Nations (SDGs).

Moreover, we note that international institutions, namely the United Nations (UN, 2011, 2014), the World Bank (2012, 2014), the International Energy Agency (IEA, 2012) and firms such as Pricewaterhouse Coopers (PWC, 2013) are expressing, in economic terms, the urgency of taking action to counter climate change. To this end, the organizations deem it imprudent to invest in fossil fuels, especially oil and gas, and instead recommend a shift towards renewable energy, deemed more environmental-friendly and reinforcing a just energy transition. This approach would enable countries to achieve the United Nations sustainable development goals and the efforts to combat climate change of the United Nations Framework Convention on Climate Change (UNFCCC) with its flagship instrument, the Paris Agreement (whose goal is to reduce global temperature well below 2°C) to which they are parties and signatories.

OBJECTIVES AND SCOPE OF THE STUDY

The main objective of the study is to identify the impacts and potential impacts of oil and gas exploitation along the coastline and territorial waters of West Africa on fisheries (fishermen, women working in fish processing - members of the West African Fishing Networks Alliance) and consumers.

Specifically, the study aims to:

1. Map out the companies involved in oil and gas extraction in West Africa;
2. To identify the various forms of environmental pollution and health problems that West African communities are experiencing or will experience as a result of oil and gas extraction;
3. To highlight the difference between men and women in terms of financial impact and loss of income due to oil and gas extraction in West Africa;
4. Highlight the risks associated with fishermen in relation to oil and gas extraction (fishermen, women working in fish processing - members of the alliance of fishermen's networks) in West Africa;
5. Compare oil revenues to revenues from fishing activities in West Africa.

STUDY METHODOLOGY

To achieve the objectives of this study, a consultant was hired in each of the countries involved in the study. A total of six consultants were retained. The consultants engaged with their teams generally employed a mixed method of data collection and analysis (quantitative and qualitative approach) which made it possible to achieve the specific objectives while taking into account the specific context and realities of each country. Consequently, two main groups of countries can be distinguished :

- Countries exploiting oil and/or gas: Nigeria, Ghana, Côte d'Ivoire;
- Countries not yet exploiting oil and/or gas: Liberia, Benin and Togo.

Thus, on the one hand, we will talk about the impacts for countries that exploit oil/gas (Nigeria, Ghana, and Côte d'Ivoire) and, on the other hand, the potential impacts for countries that do not yet exploit oil/gas: Liberia, Benin and Togo.

The consultants used the methods best suited to the countries' context: a literature review and field survey followed by discussions with fishing communities bordering/living in oil and gas exploitation sites and with the officials of the institutions in charge of fisheries, the sea and hydrocarbons in each country.

The literature review made it possible to collect the information and data available in the institutions, agencies and services working in connection with the study theme (oil, environment, gas and fisheries) and on the internet through reports, articles, communications and other available documents.

The field survey was undertaken to see “in situ” the existing and real impacts of oil and gas exploitation on fishing and consumer communities and marine ecosystems in order to gather current information on people's experience of fishing. This was done through individual interviews and focus group discussions with targeted populations and fisheries-related institutions on the one hand, and visits to affected sites, depending on the contextual situation in each country (oil-producing and oil non-producing countries), on the other hand.

PART B: CASE STUDIES

OIL AND GAS PRODUCING COUNTRIES

NIGERIA

Abstract

How does oil pollution affect fishermen and fish consumption in the Niger Delta? This report seeks to document the social and economic impact of oil pollution on fishermen (men and women) and fish consumption as well as the ecological impact in coastal communities where oil is extracted in Nigeria. In addition, the study highlights the sources of oil pollution and existing laws, policies for regulating the activities of oil companies and the operations of oil companies in the Niger Delta. Based on data collected through focus group discussions, field visits to polluted sites and a review of the empirical literature, the study argues, among other things, that fishermen have not only suffered severe income losses in traditional peasant fishing, but also that their capacity for family livelihoods has declined.

Key Findings

- The local population, men, fishermen and women involved in fish processing and trade, is in decline;
- Incomes are low and fish catches reduced;
- Consumer access to fish caught naturally in marshes, streams, rivers or seas is increasingly becoming a luxury;
- The dissatisfaction of fishermen who continue to cherish their trade and their inability to continue to provide for their families is growing;
- Many have lost the authority to control their children;
- Easily, some of these children, especially the young, without education and without legitimate sources of income, have engaged in criminal activities such as kidnapping, armed robbery, cultivation and breaking oil pipes in order to siphon off the product to be sold illegally or refined locally;
- In the total absence of reliable alternative livelihoods and because oil companies have failed to provide employment for the majority of people affected by the oil pollution, the local fishing population has been experiencing difficult times;
- Fish consumption has decreased in local communities;
- Fishermen have seen their purchasing power gradually decrease for fish produced in areas not affected by oil pollution and for fish produced in cage fisheries;
- Cage fishing is an approach to fish production that is increasingly attracting the attention of many people with the resources and skills to invest in this sector, at a time when agriculture is regularly credited with the ability to reduce youth unemployment and is seen as the way forward when oil becomes less of an income generator;
- Traditional fishermen in communities affected by oil pollution lack both the skills and resources to invest
- Pollution has had a direct and indirect impact on the local populations' ability to meet their dietary needs for fish ;
- Women are visible victims in their limited possibilities to process the fish caught. They have also lost their prominent role as traders in the local fishing chain ;

- The social and economic life of the community members who depended on fishing for income and food has declined in the face of increasing pollution from oil spills and regular gas flaring;
- Oil spills and gas flaring have a serious impact on the survival of the peasant fishing culture and the local agricultural workforce ;
- International oil companies, led by the Shell Petroleum Development Company (SPDC, also known as Shell), are involved in oil spills and gas flaring while oil theft has become an additional burden, aggravating environmental problems in the Niger Delta with serious implications for traditional fisheries.

Recommendations

The Oil and gas companies

- To use adequate technologies capable of reducing oil spills and gas flaring in Niger Delta communities ;
- Fully comply with national and international environmental policies ;
- Clean up all streams and creeks affected by the oil spill in the communities;
- Engage local fishermen to understand the dimensions of the impact of oil spills on their social and economic life with a view to solving the problems through alternative fishing activities;
- Consider large-scale investments in alternative renewable energy production in the interest of the global effort to safeguard the climate and vulnerable indigenous communities whose livelihoods are threatened ;
- Establish large-scale fisheries with fishermen affected by oil spills ;
- Stop gas flaring and replace all vulnerable and corroded oil pipes in the short term.

The Government

- Promote and preserve local fisheries by fully implementing existing laws and policies for environmental protection, such as the EIA and EGASPIN (Environmental Impact Assessment Act, Directive and Environmental Standard for the Oil Industry).
- Provide economic and social protection to fishermen and farmers who suffer from oil and gas pollution;
- Reduce the emphasis on fossil fuels as a vector of economic growth and promote alternative development models based on science, technology, manufacturing and renewable energy;
- Include fishermen in planning for the development of Nigeria's food security and provide incentives for them to remain in the profession.

The Civil Society

- Give more voice to fishermen and accompany them;
- Support the empowerment of women to demand environmental justice from oil companies and the government;

- Provide environmental education and promote awareness on the rights of communities to a healthy environment;
- Advocate for the full implementation of relevant environmental laws and policies by the government and oil companies;
- Raise community awareness of the problems of pipeline vandalism and illegal oil refining;
- Advocate for an appropriate energy mix, of which renewable energy is the key element;
- Advocate for adequate compensation of fishermen by companies responsible for the pollution of streams, soils, mangroves, rivers and air.

The Local Communities

- Refrain from stealing oil and vandalizing pipelines;
- Promote cultural activities that support environmental protection;
- Organize to fight against pollution and destruction of aquatic ecosystems;
- Support initiatives that require relevant government agencies to protect the environment from destructive oil production activities.

1. Background

The fishing sector in Nigeria

Small-scale fish farming is common in the Niger Delta. For many coastal communities in Nigeria's oil-rich region, fish is an equally important commercial product that has fostered trade and prosperity. Overall, small-scale fishing is in decline, although the importance of the sector to the national economy and households continues to grow. The sector contributes about 60% of household protein requirements, particularly in the coastal states of Nigeria - Ogun, Lagos, Ondo, Bayelsa, Ondo, Delta, Akwa Ibom, Cross Rivers, Edo and Rivers State. The contribution of the sector to Nigeria's gross domestic production in the context of agriculture is in the order of 3-5%.

Oil spill and fishermen in Nigeria

Fishermen were unanimous on the impact of the two major oil spills in Goi in 2008 on household income and welfare. Prior to the 2008 oil spills, which destroyed mangroves and affected aquatic life in the Goi River, daily income from fishing was in the range of US\$12.8 to US\$51, but with the oil spills, fishing decreased. Income from periwinkles fishing by fishermen was higher in areas not affected by the oil spill. Before the oil spills, they earned about US\$ 178.744–255.480 per week. On the other hand, those in the communities affected by the oil spill earned a symbolic income of USD 485 per year. The income disparity of USD 1,041.38 per year represents a decrease of 55.25%.

The destruction of mangroves due to oil spills means more than the loss of biodiversity. It has an indirect impact on fish processing. It also means that the impact goes beyond the depletion of fish species that previously depended on the mangrove forest for reproduction, to limit the scope of economic and commercial activities related to fishing. Women are severely affected by the limited opportunities this implies in the context of the lack of alternative livelihoods. For men and women without formal education and skills for employment in a modern work environment, the loss of traditional means of survival has increased poverty.

2. Sources of oil pollution in Nigeria

Oil spills, the movement of sea trucks, bunkering and vandalism of pipelines and gas flaring are the main sources of pollution in fishing communities in the Niger Delta. Pollution is causing depletion of fish catches and low incomes. Today, many of the problems of fishermen's livelihoods and well-being are rooted in these sources of pollution. Thus, gas flaring and the dumping of unethical waste can be attributed to the practices of industry operators, particularly multinational oil companies. The oil industry started in 1908 with the first exploration activities of a German bitumen company. The interruption of World Wars 1 and 2 led to a delay in the discovery of oil in commercial quantities until 1956. The initial export of the product that launched Nigeria as an oil exporting country took place in 1958. SPDC (Shell), Mobil, Chevron, Agip, Texaco, are major US and European oil companies with oil activities in Nigeria. However, several smaller and indigenous companies have emerged as a result of government policies of local content to promote the participation of Nigerian companies in the sector. These companies are mainly responsible for much of the oil-related pollution that has occurred in the Niger Delta, due to equipment failure and lack of adequate technology.

3. Policies and regulations in the Oil and gas sector in Nigeria

It is not surprising that the oil industry in Nigeria, in the context of its colonial origins, did not start with relevant laws and policies to control pollution from the activities of oil companies. Early seismic and exploration activities were carried out by foreign companies without the necessary oil-related environmental policies. Environmental protection was not a priority even after Nigeria's political independence from Britain in 1960. Oil spills and gas flaring are key environmental problems of the oil industry in Nigeria. The Petroleum Act of 1969 did not contain adequate provisions to deal with the management of oil spills and waste disposal, nor did it contain provisions to discourage gas flaring. Gas flaring was not even considered a problem and was therefore not included in the provisions of that Act. The shortcomings of the Act quickly led to the adoption of the Petroleum Act (Drilling and Production) Regulations of 1969. The Minister of Petroleum is not empowered to request a feasibility study on the use of gas until five years after the start of a company's production. But in addition to being insufficient to ensure accountability, this personalization of responsibility has been used for political and economic purposes by successive administrations (Nelson, 2015). Gas flaring in Nigeria was banned in 1984 after the formulation of a Gas Re-injection Act that required oil companies to produce plans for the re-injection or use of gas. By 2014, Nigeria was the second largest gas flaring country in the world. Meanwhile, policy makers motivated by economic growth have articulated the economic value of associated gas well. Today, there are several laws and policies that, if properly implemented, can help address the problem of oil spill and gas flaring in Nigeria, including the Environmental Impact Assessment Act, the Environmental Directive and Standard for the Petroleum Industry in Nigeria (EGASPIN) of 1991 (amended in 2002), and the National Environmental Policy Act, Oil Spill Detection and Control Agency (Rim-Rukeh, 2015).

None of these laws specifically address the livelihood concerns of fishing communities. None of them seek to address the problem of oil pollution from a comprehensive perspective where the interests of local oil communities and peasant labor are taken into account. The analysis shows that an oil-dependent Nigeria working to protect the environment from oil pollution has many drawbacks. The key is to elevate oil money above the interests of the environment. In addition, environmental problems associated with the oil and gas industry are treated as an unfortunate aspect of the industry that can be managed as opportunities arise.

4. Oil Company Operations in the Niger Delta

The Royal Dutch Shell Petroleum Development Company (SPDC) is Nigeria's leading oil company with a history of operations dating back to the 20th century. As mentioned earlier, the company was granted a license by the colonial authorities to explore for oil, but it was interrupted by the World Wars. The period prior to independence and shortly after the official detachment from British colonial rule, saw the entry of other international oil companies into Nigeria's oil sector. The SPDC operates a joint venture with Nigeria's own oil company, the Nigerian National Petroleum Corporation (NNPC). Under this joint venture, Nigeria holds 55 per cent of the capital, while the SPDC holds 30 per cent. Total Exploration & Production Nigeria Limited holds 10%, while ENI Agip Oil Company holds 5%. Chevron and Mobil Producing Nigeria are other international oil companies operating in Nigeria, as well as other local companies that have emerged as a result of Nigeria's Local Content Act. Bonga is the SPDC's first deepwater field, operated by its subsidiary Shell Nigeria Production Company (SNEPCO). Bonga is a large field, with a production capacity of 200,000 barrels per day and 150 million cubic feet of standard gas per day. SPDC is also involved in gas distribution through its subsidiary Shell Nigeria Gas.

SPDC operates a joint venture with Nigeria LNG to produce natural gas for export. The company owns 25.6% of the capital. NNPC holds 49%, while Total and ENI hold 15% and 10.4% respectively. SPDC's oil activities at Ogoni began in 1958, with a total of 96 wells. The company reached 28,000 barrels per day in 1992, representing 3% of the company's production in Nigeria. The company has two major export terminals in Nigeria - Bonny and Forcados. Overall, SPDC owns about 50 oil fields under the joint venture agreement in Nigeria and is active in the Bonny area. Bonny has oil concessions 76, 68 and 70, and 353 oil wells.

Today, in a context of violent conflict and increasing risk of community interference in production, many onshore oil fields are being handed over to local oil companies. This development is also due in part to the profitability of many of these onshore fields.

5. Ecological Crisis

One aspect of the ecological crisis in the oil-rich coastal communities of the Niger Delta is the destruction of much of its robust and widely recognized mangroves and what this means for the sustainability of marine and aquatic ecosystems. Oil has caused considerable damage to the mangrove forest through oil spills, reducing its "ecological, economic, socio-cultural, scientific and recreational importance". Leaks, ruptures of third-party pipelines, abandoned facilities, are some of the main sources of depopulation of these resources.

The magnitude of the impact of oil on mangrove forests can be better appreciated when considering the significance that people attach to the fact that mangroves were once a huge source of ecosystem services. Visits to polluted sites easily elicit emotions that eventually win the sympathy of the inhabitants. Themes such as reduced fish catches, lack of firewood, lack of commercial activities, pollution and the expression

ecological crisis and oil pollution were common in the focus groups organized as part of the socio-economic impact assessment of the study.

Environmental degradation is a reality that transcends the simple superficial failure of mangroves to provide essential services to broader issues of competing notions of access to energy. In the Ogoni district, for example, mangrove forests provide a rich source of local energy for cooking.

Indeed, fish processing and market participation rely on the availability of fuelwood from mangroves. Women are responsible for most fish processing and marketing, which is in itself a distinct means of earning income. With fuelwood becoming increasingly scarce, the use of kerosene stoves has not been an easy experience. Many women and villagers in general have suffered varying degrees of burns from using kerosene that has been poorly treated by bush refinery operators. The so-called illegal oil refineries, or oil theft, function as alternative sources of products for the local people who buy them at lower cost. But this has a serious cost in terms of loss of life for users who are not so lucky.

Mangroves are central to the livelihoods of local communities. Their recovery from the damage caused by the oil spills in Niger will take countless years. Both the reports of the United Nations Environment Programme (UNEP, now UN Environment) on the 2011 environmental assessment and numerous scientific studies have confirmed that it will take several years to restore mangroves that have been destroyed by oil. The primary and secondary sources of information in the focus group transcripts strongly highlight the issue of the oil spill and its impact on mangroves and the local peasant economy. The ecological crisis is therefore just as much a materialistic interpretation of the relationship between the economy and the environment, which depend on capitalist power structures for their livelihood. Solving the problem therefore requires a critical look at the social, economic, political and cultural structures that have delayed change. Power inequality in oil-producing states tends to favor environmental problems, is a hypothesis from Paul Burkett's writings on the ecological crisis, which is useful for further exploration.

Broader theoretical and political issues include the role of unequal power, the economic exploitation of nature against the access of future generations to nature, and what can be done to avoid the chaos that is embedded in a blind human-environment relationship. The issue of sustainable development, which the oil companies and the Nigerian state have continued to espouse, belies this campaign, given the chaos or disorder that follows political preferences that elevate models of economic growth that place the exploitation of natural resources as a source of wealth.

This study examined the impact of oil pollution on fishermen (including women as processors) in the Niger Delta, focusing on two main communities of Bodo and Oloma in Rivers State. Data generated from the focus groups and review of empirical literature was used to meet the objectives of the study. The study analysed the impact of oil pollution on fish consumption and the actors by which this pollution occurs. The study revealed that traditional fishing communities are suffering a huge impact due to depletion of catches and lack of income. The increasing rate of fish consumption has been altered by the growing risk of oil spills, gas flaring and the increasing activities of industry operators in the sea. Although inadequate and disjointed, laws, policies and regulations have emerged over the years to address the environmental problems associated with the oil industry. However, they are not yet fully implemented. The study confirms the findings of previous studies that identify traditional fish production as being seriously threatened by the activities of oil and gas industry operators, the latest being illegal operators through bunkering and vandalism of pipelines. The

impact on streams, rivers and wetlands has been devastating. Two oil spills in Goi, Bodo, in 2008 damaged the Goi River and all its tributaries, destroying mangroves and fish species. The hatchery role that these mangroves played and the resulting failure of fishing in terms of reduced catches in the immediate environment made fishing more tedious and less successful for the majority of fishermen. Women are one of the main victims because of their role in maintaining the family through fish processing and the extensive commercial aspect in the peasant fish trade chain.

Recommendations

The Oil and gas companies

- To use adequate technologies capable of reducing oil spills and gas flaring in Niger Delta communities;
- Fully comply with national and international environmental policies;
- Clean up all streams and creeks affected by the oil spill in the communities;
- Engage local fishermen to understand the dimensions of the impact of oil spills on their social and economic life with a view to solving the problems through alternative fishing activities;
- Consider large-scale investments in alternative renewable energy production in the interest of the global effort to safeguard the climate and vulnerable indigenous communities whose livelihoods are threatened;
- Establish large-scale fisheries with fishermen affected by oil spills as the majority stakeholders;
- Stop gas flaring and replace all vulnerable and corroded oil pipes in the short term.

The Government

- Promote and preserve local fisheries by fully implementing existing laws and policies for environmental protection, such as the EIA and EGASPIN (Environmental Impact Assessment Act, Directive and Environmental Standard for the Oil Industry).
- Provide economic and social protection to fishermen and farmers who suffer from oil and gas pollution;
- Reduce the emphasis on fossil fuels as a vector of economic growth and promote alternative development models based on science, technology, manufacturing and renewable energy;
- Include fishermen in planning for the development of Nigeria's food security and provide incentives for them to remain in the profession.

The Civil Society

- Give more voice to fishermen and accompany them;
- Support the empowerment of women to demand environmental justice from oil companies and the government;
- Provide environmental education and promote awareness on the rights of communities to a healthy environment;
- Advocate for the full implementation of relevant environmental laws and policies by the government and oil companies;

- Raise community awareness of the problems of pipeline vandalism and illegal oil refining;
- Advocate for an appropriate energy mix, of which renewable energy is the key element;
- Advocate for adequate compensation of fishermen by companies responsible for the pollution of streams, soils, mangroves, rivers and air.

The Local Communities

- Refrain from stealing oil and vandalizing pipelines;
- Promote cultural activities that support environmental protection;
- Organize to fight against pollution and destruction of aquatic ecosystems;
- Support initiatives that require relevant government agencies to protect the environment from destructive oil production activities.

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GHANA

Abstract

The discovery of oil and gas in Ghana has revived an elaborate discourse on the phenomenon of the "resource curse", this time focusing on a potential conflict between the fisheries sector and the oil and gas sub-sector. As Ghana joins the community of oil-producing nations, key stakeholders, particularly fishermen, have raised unanswered questions about the respective roles of stakeholders in facilitating or restricting oil and gas extraction and regulating environmental pollution, economic and health externalities due to oil and gas extraction with a focus on gender, financial impact/loss of revenues due to oil and gas extraction, specific risks related to oil and gas extraction and comparison between oil revenues and revenues from fishing activities in Ghana. The Government of Ghana and the oil companies appear to be satisfied with the way issues relating to oil contract negotiations, social responsibility and community expectations have been addressed so far. However, these issues need to be addressed with some degree of rigor and precision. For this reason, this study undertook to identify the actual or potential impacts of oil and gas exploitation on fishermen (fishers, women working in fish processing) and consumers along the Ghanaian coastline and in other water bodies in the country. The study took into account a balance of gender, age, level of education and professional representation in all selected districts. In terms of local awareness of oil operations, it was noted that the majority of fishing communities in the 5 districts were vaguely aware of the respective roles of stakeholders in facilitating or restricting oil and gas extraction in Ghana. On the other hand, fishermen were very aware of environmental pollution, economic and health impacts of oil and gas extraction, financial impact/loss of revenue, specific risks associated with oil and gas extraction at the community level. Among other observations, it was noted that the effects of these negative externalities are also felt by local farmers, small traders, local artisans and other actors in fishing communities. It was clearly noted that the combination of the impacts of the 500 km closed fishing zone and the closed fishing season exacerbates the financial losses of local fishermen. To the extent that local communities have been involved in these political processes, local fishing communities still feel that their concerns have not been taken into account. It was noted that 6 per cent of respondents indicated that their communities have been affected by oil spills, while 83 per cent indicated that they are likely to be affected by oil spills. This observation is most striking as it clearly indicates that, although some environmental, economic or health risks are currently not very significant, the livelihoods of fishermen are still threatened by their occurrence. Given the weak monitoring capacity for natural resource management in Ghana, it is not an exaggeration to conclude that fishing communities need a high level of preparedness for oil spills, oil leaks and well-funded safety nets to cope with the impending economic, social and environmental downward spiral among Ghana's coastal communities and fishermen. It was further noted that 39% of male respondents identified that their communities are threatened or likely to experience an increase in the price of fish, while 90% of female respondents identified that their communities are threatened or likely to experience an increase in the price of fish. Similarly, 95% of males identified that their communities are threatened or at risk of increased confiscation of fishing equipment. Again, gender disparities are striking with regard to the impacts of oil and gas on fishers. While women bear the brunt of the overall impacts of the externalities of oil and gas, the specific impacts tend to vary significantly in terms of gender. In the final analysis, the observed data indicate that the current impacts on fishers represent only a small fraction of the likely long-term impacts they are likely to face if adequate provisions are not made immediately. On the basis of the above, it is essential to conclude that the government and private oil

companies need to do more to reverse the dangers that oil exploitation poses to host communities. Thus, it is important to reassess the provisions for safety nets for oil host communities and to ensure that these safety nets are adequately funded. The government and oil companies must compensate these host communities adequately and promptly and ensure the sustainability of their livelihoods by investing in renewable energy.

1. Background

Ghana's fishing industry started in the 1700s as an artisanal fishery with very simple and inefficient gear, craft and methods, operating close to coastal waters, lagoons, estuaries and rivers. Currently, the sector is based on fishery resources from the sea and, to a lesser extent, inland fisheries and aquaculture. While marine species are fished in the abundant territorial marine waters, freshwater fish are sourced from Lake Volta, rivers, reservoirs and inland aquaculture systems. The fisheries sector plays a significant role in the socioeconomic development of Ghana. Bordered on the south by the Gulf of Guinea, Ghana, spanning an area of 238,500 km², has a narrow continental shelf with a total area of about 24,300 km². Ghana has a territorial sea of 12 nautical miles (nm), a contiguous zone of 24 nm and an Exclusive Economic Zone (EEZ) of 200 nm, covering an area of 225,000 km². With this combination of valuable attributes, and a 550-kilometer coastline which stretches from Aflao in the East to Half Assini in the West, Ghana's fisheries sector contributes significantly towards sustainable livelihoods, food security and poverty reduction. The sector consists of a varied and vigorous spectrum of fishing activities, ranging in scope from subsistence to semi-industrial, to industrial fisheries (MOFAD, 2015). The fishing operations in Ghana consist of three subsectors: industrial, semi industrial and artisanal subsectors - the artisanal subsector responsible for over 70% of the total fish production and employing over 60% of the women involved in the fishery value chain. 2.6 million Ghanaians, representing 10% of the population, are dependent on the fisheries sector for their livelihoods. Lake Volta is Ghana's single most important source of inland fish catch. It hosts about 140 fish species and provides livelihood for about 300,000 Ghanaians who live around the lake. The predominant fishing gear used in the artisanal fishery includes seines, set nets, draft gill nets and hook and line. Direct fisheries contribution to Ghana's economy is significant, accounting for 4.5% of GDP, 12% of the agriculture GDP and 10% of the workforce. Fish has, over the years, maintained a prime position as the favorite source of animal protein in Ghana, with about 75% of annual production being consumed locally. The mean per capita fish consumption in Ghana is estimated at about 26 kg. Further, fish notably accounts for as much as 60% of animal protein in the average Ghanaian diet, and 22.4% of household food expenditures. Fish is the second most important non-traditional export after horticultural products, Ghana's longstanding economic mainstay and premium traditional export commodity being cocoa. Given that, the fisheries sector also plays a very important role in poverty alleviation in Ghana. Ghana's waters host a total of 485 fish species, out of which 347 representing 72% and belonging to 82 families are captured in the coastal waters. There are also 17 cephalopod species from 5 families and 25 crustacean species from 15 families in Ghana's territorial waters. Some of these fish species include small pelagics of the families Clupeidae, Scombridae (chub-mackerels) and Engrulidae (anchovies); large pelagic species of the family Thumidae (tunas); and demersal species of the families Sparidae, Lutjandae (Snappers), Mullidae, Pomadasyidae, Serranidae (groupers), and Polynemidae (threadfins). Yellowfin tuna (*Thunnus albacares*), skipjack (*Katsuwonus pelamis*) and bigeye (*Thunnus obesus*) are the major commercial tuna species which occur in Ghana's waters. Tuna is of major commercial importance in Ghana as a result of its export revenues and sustainability, which has been estimated at 100,000 tons annually by the Fisheries Commission. The two tuna species of utmost importance in Ghana's EEZ are skipjack (*Katsuwonus pelamis*) and yellowfin (*Thunnus albacares*). The tunas, being the major large pelagic fish

in Ghana's waters, undertake long-range migrations in the Atlantic Ocean, across national boundaries, and constitute the major fisheries resource that can withstand considerable expansion in Ghana. On average, Ghana produces about 430,000 metric tons of fish each year from its numerous waters, including fish culture systems. Most of Ghana's domestic marine fish supply is from the artisanal fishery and, of this, the dominant resources are small pelagic, especially the round sardinella, flat sardinella, anchovy and chub mackerel, which collectively account for about 70% of total marine fish production. Seasonal upwelling, which occurs in the coastal waters between December/January–February and again between July–September, influences marine fisheries in Ghana. Fish abundance is higher during the upwelling seasons, resulting in landings being greatest during the major upwelling period of July–September.

However, many of Ghana's fish stocks are heavily overexploited, as unlawful fishing methods and poaching, amongst other factors, have combined to cause the capture fish production to be on the decline. Factors responsible for the declining trend in the fishing industry in Ghana include, amongst others, overfishing and lack of good fisheries management systems, lack of infrastructure and modernization of the industry; dominance of, and poaching by foreign distant-water fleets. Many of the countries where Ghanaian fleets had historically fished declared their own EEZ in the 1980s. This led Ghana's industrial fleet to relocate to Ghana, resulting in the overexploitation of fish stocks in its EEZ and the collapse of its industrial distant-water fleet.

Table 1: Major inland water bodies and their fishery potential

Lakes and Reservoirs	Area (Km ²)	Fishery Potential (Metric tons /year)
Volta	8 482	40 000
Lake Bosumtwi (Ghana's only natural lake)	49.0	600
Weija	37.0	420
Kpong	36.5	-
Tano	18.6	22.5
Barekese	6.4	80
Others	117.0	145
Total	8 746.5	41 267.5

Source: Adapted from, Bank of Ghana (2008). *The Fishing Subsector and Ghana's Economy*. [https://www.bog.gov.gh/privatecontent/Research/Sector Studies P.10.Table 4 – Ghana – Inland Water Bodies and their Fishery Potential](https://www.bog.gov.gh/privatecontent/Research/Sector%20Studies%20P.10.Table%204%20-%20Ghana%20-%20Inland%20Water%20Bodies%20and%20their%20Fishery%20Potential)

Not only fisheries, research indicates that since the discovery of oil and gas in Ghana's water bodies, the oil and gas sector is also a major source of jobs and revenue for many oil producing economies globally. Since 2010, Ghana's petroleum sector has generated over \$3 billion dollars in revenue and currently the second most important sector for the economy and therefore expected to contribute to improved living conditions of Ghanaians in general, and citizens in the fishing communities around the oil enclave. Existing evidence show that, in Ghana, oil host communities are asking questions that remain not answered by government and policy makers. Fishing communities have noticed their environment is being endangered by oil and gas pollution in the form of oil spills, gas flaring, effluents and destruction of vegetation. For instance, some fishing communities in the Ellembelle District claimed there are certain large weeds on the seashore perceived to have come as a result of oil and gas operations, which are polluting their environment and affecting fishing activities. Also, fishermen are told to move their boats and other fishing gears to allow for drilling activities that disrupt fishing activities and force most of these fishes to run several kilometers away, thereby reducing the number of catches. This never should have been the case. Therefore, this study seeks to provide ground evidence on how oil and gas exploration and production impacted on the fishing industry in Ghana. The outputs from this research will serve as a basis for securing livelihoods and peaceful co-existence between the petroleum and the fisheries sectors in Ghana.

2. Methodology

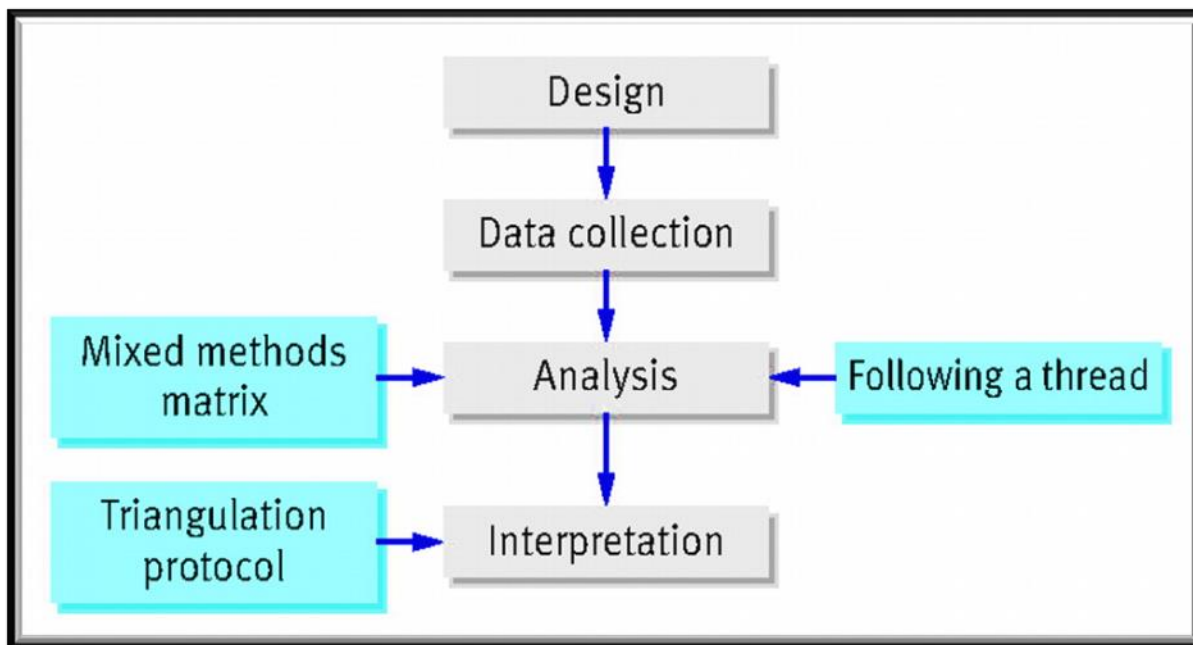


Figure 1: The illustration on the overall methodology for the study

3. Oil and gas related institutional frameworks in Ghana

The revenue for the government

The exact governmental revenue percentages are defined in the Petroleum Agreements which have been signed between the Government of Ghana and the various petroleum companies. Despite a number of promises, these contracts have not yet been made public. A Model Petroleum Agreement from the year 2000 can be downloaded from GNPC's homepage. The parameters, which are usually referred to in public, are taken from this model agreement: Petroleum Income Tax = 35%; Carried Interest = 10% (through GNPC); Royalty = 5%; Additional Interest = 3.75%; Additional Oil Entitlement = 3.75%. According to the Ghana Oil news portal (www.ghanaoilonline.org), the production rate was expected to supply more than \$400 million to the government's 2011 budget and around \$1 billion per year into the country in the early years.

The advisor to the Minister of Finance announced 42.20% as the effective percentage share of total revenue that would accrue to Ghana. The effective share is not a simple addition of the above listed percentages (that would be 57.5%); because for example the taxes are calculated after the carried interest has been taken away. The World Bank base case 2009 uses the same parameters, but no Additional Interest and, more importantly, different Additional Oil Entitlements: A share of petroleum revenue net of royalty and initial interest that is linked to the project rate of return (ROR) on a sliding scale; the terms of each contract are understood to differ so, for this analysis, a four-point sliding scale has been assumed as follows: @ ROR >18% AOE = 10%; @ ROR >23% AOE = 15%; @ ROR >28% AOE = 20%; @ ROR >33% AOE = 25% (where AOE is = Additional Oil Entitlement) (World Bank assumptions)". According to the World Bank assumptions, the effective governmental share over 19 years of production would be 51.7%. This leads to total government revenue of US\$19, 39 billions.

The oil policy of the government of Ghana

Transparency Measures

Ghana is member of the Extractive Industries Transparency Initiative (EITI). The organization was launched in 2002 and “encourages government, extractive companies, International agencies and NGOs to work together to develop a framework to promote transparency of payments in the extractive industries” [EITI Ghana, 2011]. The aim of the initiative is to create an environment of transparency and accountability between companies, governments and citizens in resource rent-seeking states. After publishing data and independent reports on the country’s mining sector, Ghana achieved compliance with the EITI in October 2010. Even though the membership of Ghana in the EITI is a major step towards a transparent resource management policy, it has to be noted that it is first and foremost focusing on Ghana’s mining sector. Yet, the initiative has been extended to the oil sector in April 2010. The main criticism towards the EITI is the lack of efficiency due to non-compulsory guidelines of the organization. This deficit means that Ghana can voluntarily fulfill the transparency standards of the organization as it happened in the mining sector. However, in the oil sector, no action has been taken to improve the overall transparency because there are no legal measures that are backing up the fulfillment of EITI standards. The current lack of transparency in Ghana’s oil policy envisages in the refusal of the Government to publish the contracts that were signed with the companies involved in the oil production.

The Petroleum Revenue Management Bill

In early 2010, the Government of Ghana proposed a ‘Petroleum Revenue Management Bill’. The purpose of this legislation is to regulate the use and management of the rents that will be generated through the oil industry. According to a publication by Dr. Amoako-Tuffour from the Ministry of Finance and Economic Planning, a central feature of the bill is to split the revenue into the Annual Budget Funding Amount (ABFA) and into two long-term funds. These funds were established to back up the country’s economy in case of oil price variability and “to generate an alternative stream of income for the future” [Amoako-Tuffour, 2010]. The bill suggests using at least 30% of the oil revenue for the long-term funds. The other 70% of the revenue will stream into the annual budget of the Government. The “Petroleum Revenue Management Bill” suggests various limitations for the spending of the ABFA and also rules for reporting on oil findings and investments, along with the creation of an independent regulatory body. However, it does not provide a detailed plan that shows which sectors/ministries will profit most from the revenue. For instance, it is not possible to directly derive investments in the infrastructure of the country from the bill. Even though it is widely appreciated that the government tries to introduce legal measure to regulate oil revenue management, the lack of details is the target of many critics [ibid].

Even more important is the fact that the bill was pending in front of the parliament for almost a year and has still not become a law. The main conflictive issues in the parliament debate were the percentages of the revenue that will stream into the budget and respectively into funds and the question if a Public Interest and Accountability Committee (PIAC) should be established to enhance public accountability and transparency in the management of the petroleum revenue [Ghana News Link, 2011].

4. Evidence of a possible clash of two critical sectors

The “resource curse” phenomenon is often advanced in the literature to shed light on resource extraction and its outcome in resource-rich regions. The “resource curse”; is a term social scientist use to describe the phenomenon where countries which have abundant natural resources, such as oil and gas, perform poorly in economic development and governance compared to countries with fewer resources. According to Soros (2007), the “resource curse” is a complex phenomenon which involves three different processes. The first is what is known as “Dutch Disease” which results when resource revenues increase the value of the local currency making local exports uncompetitive. Secondly, a country that is dependent on a natural resource is

prone to global fluctuations in commodity prices which can have disruptive effects. Thirdly natural resource wealth can affect political conditions in a country since rulers of resource-rich countries have greater financial means at their disposal hence they have greater incentives to remain in power. While the “resource curse” is a global phenomenon, it is particularly associated with countries in Africa such as The Democratic Republic of Congo, Angola, Sudan and Nigeria. The World Bank maintains that the resource curse is not inevitable, and that *good governance* and *sound economic policies* are measures that can guard against it. This stance of the World Bank stems from the example of Botswana, a country in Africa which authors like Obeng-Odoom (2014) see as problematizing the resource curse doctrine. Officials of the World Bank believe the case of Botswana illustrates how a natural resource curse is not necessarily the fate of all abundant resource countries and that prudent economic management can help avoid or mitigate the detrimental effects of the resource curse. In line with this argument, scholars such as Amundsen (2013) contend that a country is cursed when the discovery of petroleum resources precedes the adoption and consolidation of *democratic* institutions. The author notes that countries like Norway and UK had *democratic* institutions in place before subsequent oil and gas discoveries, with these supporting the distribution of the resultant economic benefit.

On the other hand, countries such as Nigeria, Sudan, Sierra Leone and Equatorial Guinea were *authoritarian* regimes, and that this accounts for their negative economic performance although the massive resource wealth. Hilson (2012) similarly identifies *constitutional* challenges as one of the two main issues that have confronted developing countries who have attempted to develop their extractive industries. The author notes that most developing countries made decisions about their extractive industries shortly after they had gained independence or when countries were in transition to independence hence these countries could not handle the enormous wealth from resource extraction. The wealth from mining and oil, therefore, transformed these fragile *democracies* into *autocracies* since the ready wealth from resource extraction freed governments from the need to tax their citizens. Heilbrunn (2014) similarly argues that the political and economic conditions present in a country before the discovery of hydrocarbons influence that country’s development and political trajectories. If the argument put forth by Amundsen (2013), Hilson (2012) and Heilbrunn (2014) is accurate then a country that is *democratic* stands a better chance of ensuring resource revenues result in widespread economic and political benefits. Ghana is often touted as a model of *democracy* in Africa and hence provides us with an interesting case study about these issues and the question of whether *democratic* institutions improve policy choices when it comes to the handling of resource revenues.

As Ghana joins the community of oil-producing nations, oil and gas host-communities have been asking questions that remain unanswered. One critical question that remains unanswered is how the government plans to integrate community livelihoods sustainability into oil exploitation processes rather than treating sustainability as an afterthought. With issues of sustainable development taking center stage globally, one would have expected that effective sustainability planning would be the number one priority of districts within the oil enclave. Host-communities in Ghana have perceived their environment being affected by oil and gas pollution in the form of gas flaring, effluents and destruction of vegetation. Effective channels by which local communities can voice out their concerns and get these concerns addressed need to become an absolute imperative in order to ensure long term sustainable coexistence between fisheries resources and oil and gas extraction in Ghana. In this regard, the foregoing observations indicate that there is still a debate to be had. This debate begins by asking the question what is the exact impacts of oil and gas exploitation on fisher folks (fishermen, fish processing women) and consumers along Ghana’s coastline and in other water bodies in Ghana. The following section primarily, is an attempt to address this question.

5. Oil location in Ghana

The Jubilee field is located in the Gulf of Guinea; 60 km off the Ghanaian coast, near the Côte d’Ivoire border (see Figure-2). It is spread out in the Deepwater Tano and West Cape Three Points blocks. The wells

are at a water depth between 1,100 and 1,300 meters and at a total depth between 3,400 and 4,200 meters. The field covers 110 km², which is about the size of 155 football pitches [Offshore-Technology.com, 2011].

The Tweneboa field (6 km east of Jubilee) was discovered in March 2009. In July 2010 the Owo-1 drilling confirmed the reasonably big amounts of the field. A maximum depth of 4,000 meters has been drilled. There does not seem to be an underwater channel connection between the Tweneboa and the Jubilee field. Apart from these major findings, there are also several smaller wells close by. In total, the companies engaged in the discovery have discovered more than 15 wells in the western Ghanaian sea territory.

The exact positions of the wells have become of great interest, as in April 2010 the Government of Côte d'Ivoire enquired, if all drillings had taken place within the Ghanaian territory. Since then a Boundary Commission has been negotiating the exact maritime boundary. In particular the Owo-1 well in the Tweneboa field and the small Dana GH Western Tano field are located very close to the Côte d'Ivoire border. For these drillings precise locations have not been made public, but all the exact coordinates of the Jubilee wells have been published and it seems clear that they are within Ghanaian territory [Ghanaweb.com, 2010(I)].

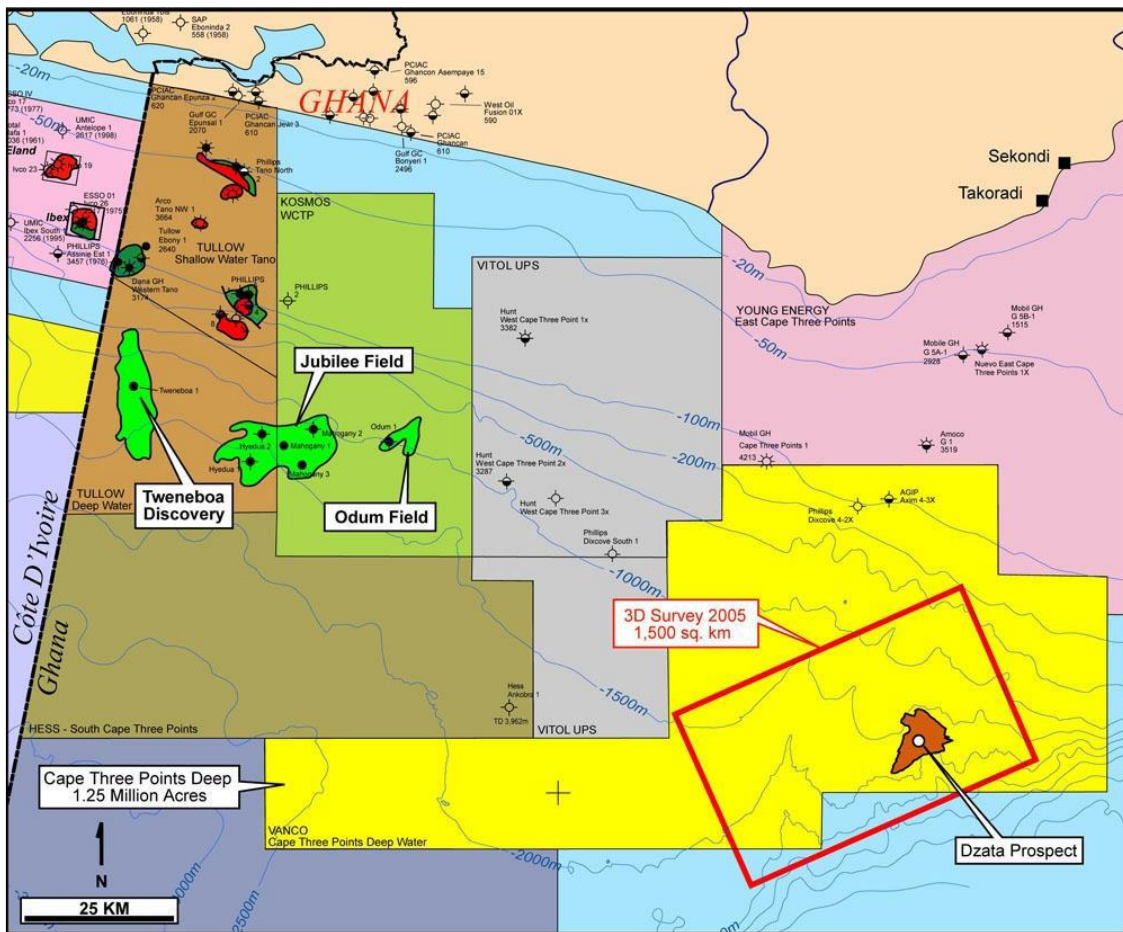


Figure-2 : Ghana's Oil Findings.

Source : www.ghanaweb.com

The figures of the amount of oil expected in the Jubilee field, published by Ghanaian news-papers, vary between 1 and 2 billion barrels of crude oil. One barrel is 158,987 liters. As it is quite often not stated,

whether the authors are referring to the recoverable or the total amount, it can only be assumed, the total amount is meant. This makes a huge difference, as only 30-50% of a total field amount will be recovered. In their status report 2008, the state-owned Ghana National Petroleum Company (GNPC) published figures stating that 800 million barrels of oil is the total field amount, with an upside potential of 3 billion barrels of oil [GNPC, 2008]. The International Monetary Fund (IMF) and the World Bank assumed in their base cases 2008/2009 a recoverable amount of 490/500 mmbo [World Bank, 2009].

The field operator, Tullow Oil, reveals on the company's website that there are at least 500 mmbo through a most likely 700 mmbo to an upside of 1.000 mmbo recoverable reserves. As shown in the table below, the production amount depends on the number of drilled wells. The injection wells are especially important, as they maintain the field pressure. It is estimated that the field contains an additional 1.2 trillion cubic feet of gas, which are approximately 162 million barrels of oil equivalent (mmboe). This measurement of gas in the unit of barrel is based on the approximate energy released by burning one barrel of crude oil. Gas is 100% recoverable [Tullow Oil, 2010].

Article 257(6) of the Ghanaian Constitution of 1992 states: "Every mineral in its natural state in, under or upon any land in Ghana, rivers, streams, water courses throughout Ghana, the exclusive economic zone and any area covered by the territorial sea or continental shelf is the property of the Republic of Ghana and shall be vested in the President on behalf of, and in trust for the people of Ghana." However, the right for exploration, development and production of different offshore blocks was sold in 2004. In the following are stated the ownership shares of each oil field:

Deepwater Tano Block

Tullow Oil & Gas (Operator) 49.95%, Kosmos Energy 18%, Anadarko Petroleum Corporation 18%, Ghana National Petroleum Corporation 10%, Sabre Oil & Gas 4.05%.

West Cape Three Points

Kosmos Energy (Operator) 30.875%, Anadarko Petroleum Corporation 30.875%, Tullow Oil&Gas 22.896%, Ghana National Petroleum Corporation 10%, EO Group 3.5%, Sabre Oil & Gas 1.854%.

Jubilee Field (located in both blocks)

Tullow Oil & Gas (Operator) 34.705%, Kosmos Energy (technical operator for development) 23.491 %, Anadarko Petroleum Corp. 23.491 %, Ghana National Petroleum Corporation 13.75 (10% carried interest, potential 3.75% working interest, if they decide to apply for their back-in right within 60 days after production started), Sabre Oil & Gas 2.813 %, EO Group 1.75% [Offshore-Technology.com, 2011].



Figure 2: Ghana's Oil Blocks

Source: GNPC, 2011

It is important to point out that most the Ghanaian land is either owned by stools, skins, families or clans, usually held in trust by the chief or the head of family/clan. But as stated in the constitution, “minerals under or upon any land” belong to the Government of Ghana. Professor Kenneth Attafuaah (Executive Director of the Justice and Human Rights Institute Ghana) recognizes a “sense of ownership” by the local communities for the oil. Especially directly after the findings, there should have been better communication between the Government and the local communities. Apparently, the chiefs and people of Ahanta and Nzema, the local ethnic groups next to the oil exploration sites, were very disappointed that they were not officially informed about the discovery of oil on their ancestral land. Though by law the oil clearly belongs to the state, demands for royalties arose (Osabutey, 2010).

6. Companies involved in Oil and Gas exploitation in Ghana

Tullow Oil & Gas

Tullow Oil & Gas is an independent Irish exploration and production company, quoted on the London and Irish Stock Exchanges. In 2004, it acquired Energy Africa. It employs 900 people (2011). Its headquarters are in London and it runs two offices in Accra. The company has 23 licenses around the world, with the focus on Africa. Tullow has production sites in Gabon, Côte d'Ivoire, Mauritania, Congo-Brazzaville and Equatorial Guinea and two development programs in Ghana and Uganda. The Jubilee field was their largest discovery so far. In Europe, the company concentrates on gas production. In 2010, the company had an operating cash flow of US\$762 million and a profit after tax of US\$73 million. The profit was more than doubled compared to the results of 2009. In total, 58,100 barrels of barrel oil equivalent per day (boepd) were produced. The management reports regularly on their projects to their shareholders. The reports are published. On www.tulloil.com detailed information on the Jubilee field and other exploration sites can be found. Tullow gives an insight into the company's structures, regularly updates news, and provides various reports online. In some countries Tullow has been willing to publish their oil contracts [Tullow Oil, 2011].

Kosmos Energy

Kosmos Energy is an independent American Oil and Gas Exploration and Production Company. It was founded in 2003 by five partners. All of them had previously worked for Triton Energy, which was acquired by Amerada Hess Corporation in 2001. Kosmos Energy has its headquarters in Dallas, TX and they operate an office in Accra.

According to their own website "Kosmos' strategy is to aggressively pursue growth organically through drill-bit success rather than acquisition." Their main operation venue is West Africa, with on-going drilling in Ghana, Cameroon and Morocco. The Jubilee field was their first major discovery success. Though the company itself has very limited capital of its own, they have access to a rather big budget: the private equity companies, Warburg Pincus and Blackstone Capital Partners, provide Kosmos with monetary resources. These companies manage worldwide investments, worth more than US\$100 billion. Looking at the company's structure, in comparison to other international corporations, Kosmos Energy is a rather small player in the oil and gas industry. In Ghana, Kosmos Energy was the first company to start extensive exploration of the Tano Basin. At the beginning Kosmos had an 86.5% interest in West Cape Three Points Block (GNPC 10%, EO Group 3.5%). [*Kosmos Energy, 2011*]

Anadarko Petroleum Corporation

Anadarko Petroleum Corporation is one of the world's largest independent oil and gas exploration and production companies, quoted on the U.S. Top 500 Stock Exchange. It employs 4300 people (2011). Anadarko has its headquarters in The Woodlands, Texas, U.S. They do not have an office in Ghana.

Anadarko mainly operates in the U.S. and Algeria. It does onshore and offshore drilling as well as midstream processing of minerals. The company calculated 2.3 billion bboe of proved reserves and an annual production rate of 220 million bboe at the end of 2009. In 2008 it made a US\$3.3 billion profit after tax. Anadarko has a 25 % working interest in the Gulf of Mexico field where the Deep-Water Horizon spilled 4 million barrels crude oil in April 2010. If the field operator (BP) cannot be proved to have been grossly negligent, it might mean the insolvency for Anadarko. Of all stakeholders in the Jubilee field, Anadarko has the most technical experience. [*Ana-darko Petroleum Corporation, 2011*].

Ghana National Petroleum Corporation

The Ghana National Petroleum Corporation (GNPC) was formed in 1985. It belongs to the Ghanaian state. GNPCs working field has been outsourced by the Ministry of Energy to accelerate the promotion of petroleum exploration activities to ensure early commercial discovery and production, to undertake the appraisal of existing petroleum discoveries to ensure production to meet national requirements and to ensure that Ghana obtains the greatest possible benefits from the development of its petroleum resources. Currently, GNPC concentrates on data management of geological and geophysical information, the promotion of further exploitation sites, and the control of oil companies which are operating in Ghana. It owns a 10% interest in the various Ghanaian offshore blocks. Therefore, a 10% carried interest in the Jubilee field belongs to them. The GNPC runs the Tema Oil Refinery. The company's revenues flow into state funds and budget. For upcoming revenues from the Jubilee field see chapter "Revenues".

EO Group

The EO (Edusei - Owusu) Group was formed in 2002, by the Ghanaians Dr. Kwame Barwuah Edusei and George Owusu. For a long time, Dr. Kwame Barwuah Edusei worked as a physician in Washington D.C. After the Petroleum Agreement between the EO Group, Kosmos Energy and GNPC was signed in July 2004, Dr. Kwame Bawuah-Edusei became Ambassador to the UN in Switzerland and in September 2006 he

became the Ghanaian Ambassador to the United States. His diplomatic career ended February 15, 2009. George Owusu is an environmental scientist, who has been working in the energy industry (i.e. Shell Oil, Houston. U.S) for about twenty years. During the exploration time of the Tano Basin, he worked as a representative of Kosmos Energy in Ghana.

Legal regime for joint-ventures

Current reports from the Ministry of Energy indicate that there is no express provision for the regulation of joint ventures in the petroleum industry. Membership and operation of joint ventures are regulated by the standard rules of contract and other petroleum laws that are relevant to such joint ventures. Therefore, currently the joint venture partners are as shown in tables 2 and 3.

Table 2: Joint-Ventures in the Jubilee Oil Field

Company	Country	Percentage Ownership
Tullow Ghana Limited	United Kingdom	35.48%
Kosmos Ghana HC	United States	24.8%
Anadarko WCTP Company	United States	24.8%
Petro SA	South Africa	2.73%
GNPC	Ghana	13.64%
*EO Group	Ghana	1.75%

*The EO Group has since sold its 1.75% stake to Tullow

Source : *Kimathi & Partners, 2019*

Table 3: Joint-Ventures in the TEN Oil Fields

Compagnies	Pays	Pourcentage d'actionnarat
Tullow Ghana Limited	Royaume Uni	25%
Kosmos Ghana HC	Royaume Uni	30.2%
Anadarko WCTP Company	Etats Unis	30.2%
GNPC	Ghana	12.5%
Petro SA	Afrique du Sud	1.8%

Source: *Kimathi & Partners, 2019*

All issues dealing with petroleum exploration and development are governed mainly by petroleum laws such as the Petroleum (Exploration and Production) Act 2016 (Act 919) and the Ghana National Petroleum Corporation Law (PNDC Law 64). The fiscal aspects of petroleum operations are regulated by the Petroleum Income Tax Act 1987 (PNDC Law 188). It is submitted that joint venture agreements will generally be regulated by specific contract terms as well as the various statutory provisions.

At the moment, under the Petroleum (Local Content and Local Participation) Regulations, 2013 (LI 2204) (the Petroleum Local Content Law), all foreign companies who intend to provide goods or services in the upstream petroleum sector are required to incorporate a joint venture company with an indigenous Ghanaian company and afford that indigenous Ghanaian company at least 10% equity participation. These joint ventures are required to register with the Petroleum Commission in order for them to legally engage in tenders or bids to provide goods or services to the contractors, licensees, subcontractors or the GNPC.

This notwithstanding, Ghana is increasingly leaning towards promoting local content in the petroleum industry. In 2018, Ghana launched the first-ever oil and gas competitive licensing round bid evaluation and negotiation. This tendering process is aimed at ensuring transparency, value for money and getting companies with the requisite financial and technical expertise to exploit the country’s oil and gas resource. In March 2019, the cabinet approved a policy on local content and participation in the downstream petroleum industry. This policy is intended to ensure a Ghanaian-driven and Ghanaian-owned petroleum downstream industry capable of attracting increased local value-added investments.

7. The environmental pollution, economical and health issues that communities in Ghana are experiencing or will experience due to oil and gas extraction

Ground evidence of environmental pollution and health issues were obtained from a survey conducted in five (5) districts (Shama, Ahanta, Nzema, Jomoro and Ellembelle) in Ghana. The field survey revealed an economically active and youthful participation of people in the fisheries sector with a maximum of secondary school level education across the districts. The study revealed after an inclusive and participatory techniques for data collection (stakeholders’ consultation, focus group discussions, transect walks) the following:

Table 3: Identified major environmental pollution, economical and health issues that communities in Ghana are experiencing

Environmental	Economic	Health/Social
Oil spills	Increased fish prices	Decreased women’s reproductive health
Oil leaks	confiscation of fishing equipment	Increased sanitation related diseases (Malaria, Diarrhea)
Fish pollution	Increased cost in fishing	Increased prostitution and STDs
Increased seaweed	Loss of jobs	Increased school drop outs
Increased environmental degradation, land-use change and ecological destabilization	Increased cost of living	Increased teenage pregnancy
Water pollution	Increased cost of rent	Local institutional corruption
	Loss of incomes	Increased resource conflicts

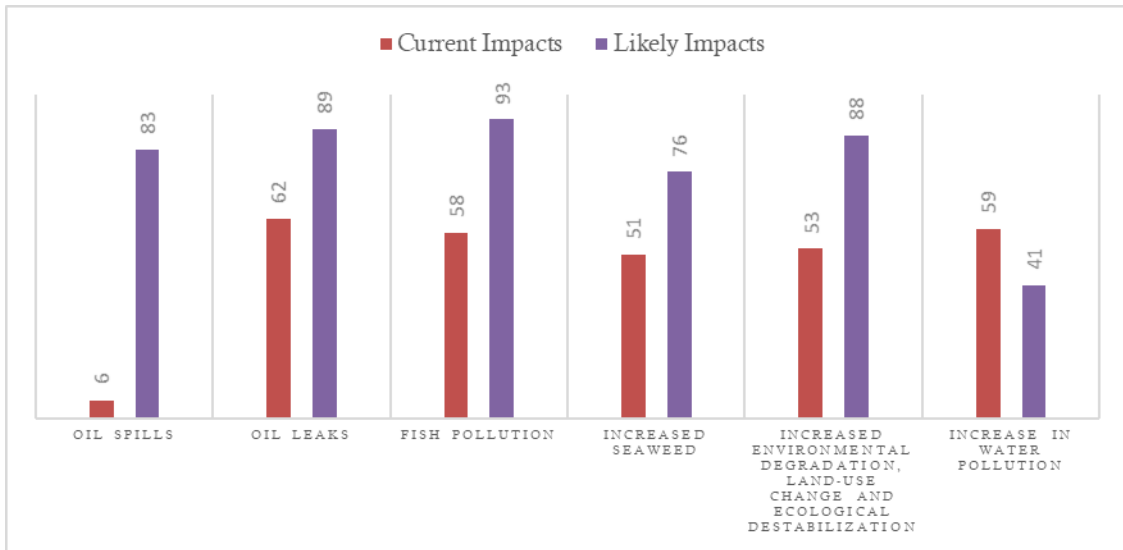


Figure 3: Identified major environmental impacts that communities in Ghana are experiencing or likely to experience

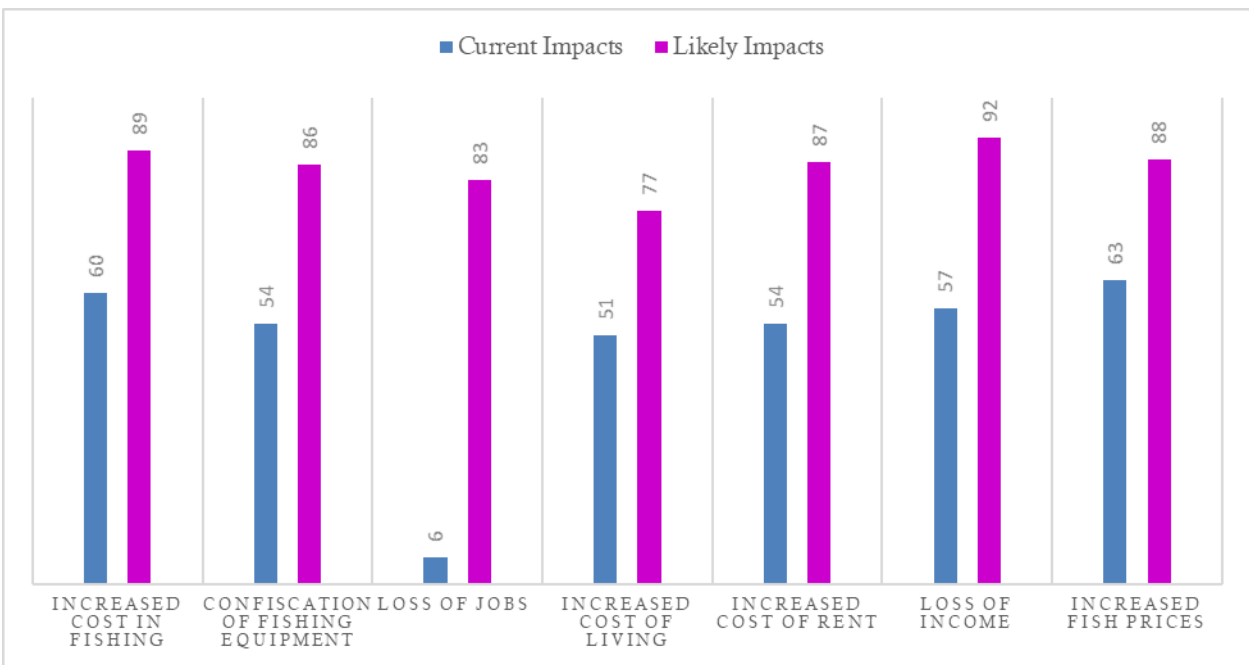


Figure 4: Identified major economic impacts that communities in Ghana are experiencing or likely to experience

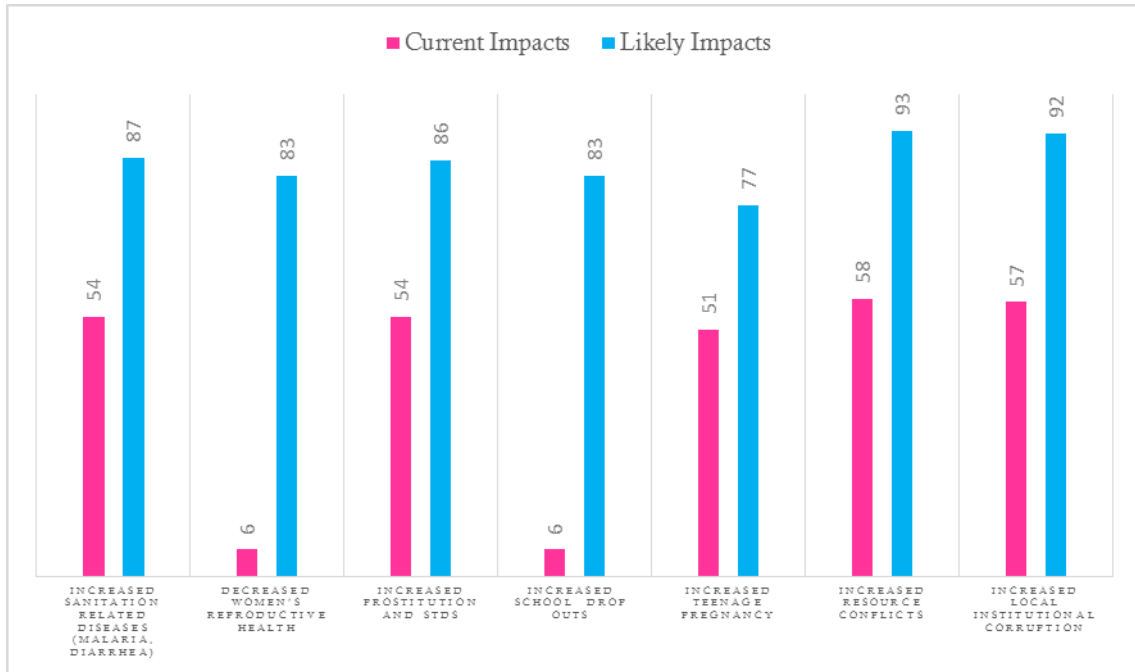


Figure 5: Identified major health and social impacts that communities in Ghana are experiencing or likely to experience

8. The difference in the financial impact/loss of incomes due to oil and gas extraction between men and women with special focus on gender issues in Ghana

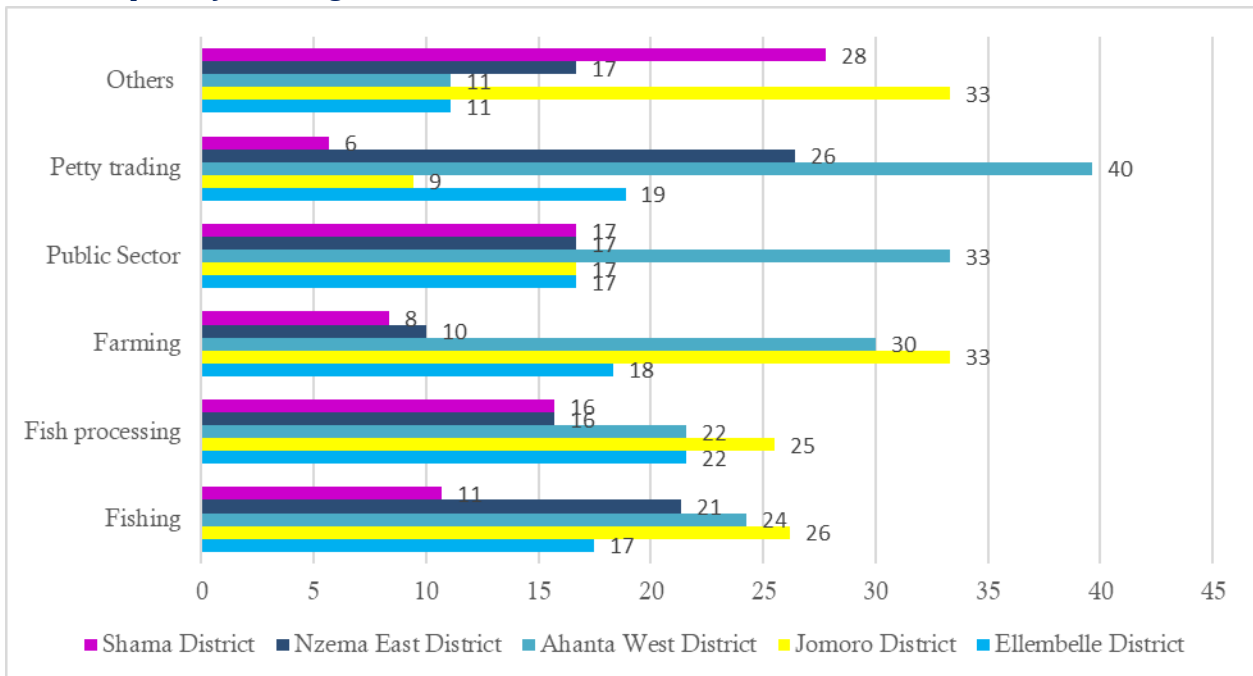


Figure 6: Participants who reported of a loss in income in the last 10 years by district

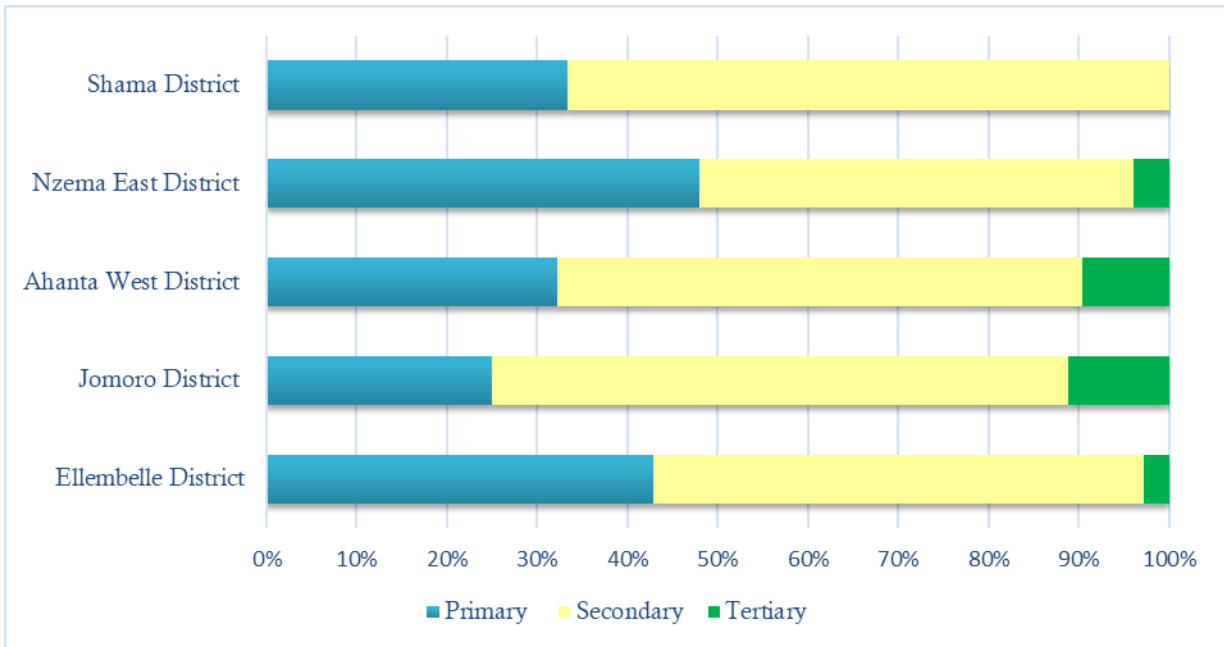


Figure 7: Participants who reported of a loss in income in the last 10 years by level of educational attainment

It worthies mentioning that aside from Shama District, the majority of participants who reported of financial loss were men. This is mainly due to the confiscation of their fishing equipment. As further depicted in the radar chart below, it was observed that the majority of fisher folks (36% male, 21% female) who have experienced financial loss indicated that they had experienced a financial decrease of about 20% and below. This is made more demonstrative in figures 8 and 9 below.

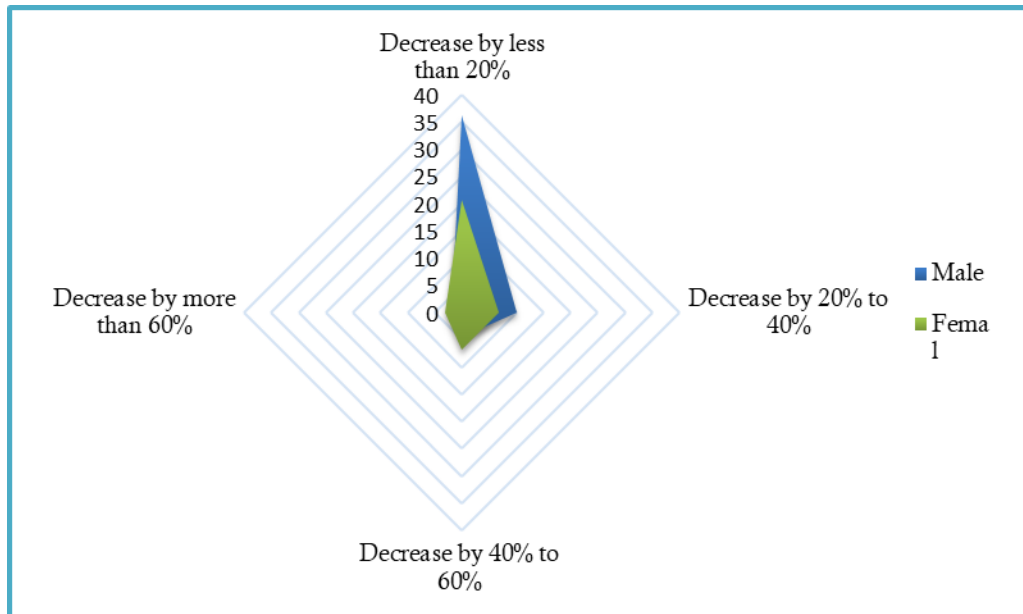


Figure 8: Proportion of income decreases among fishing folks by gender

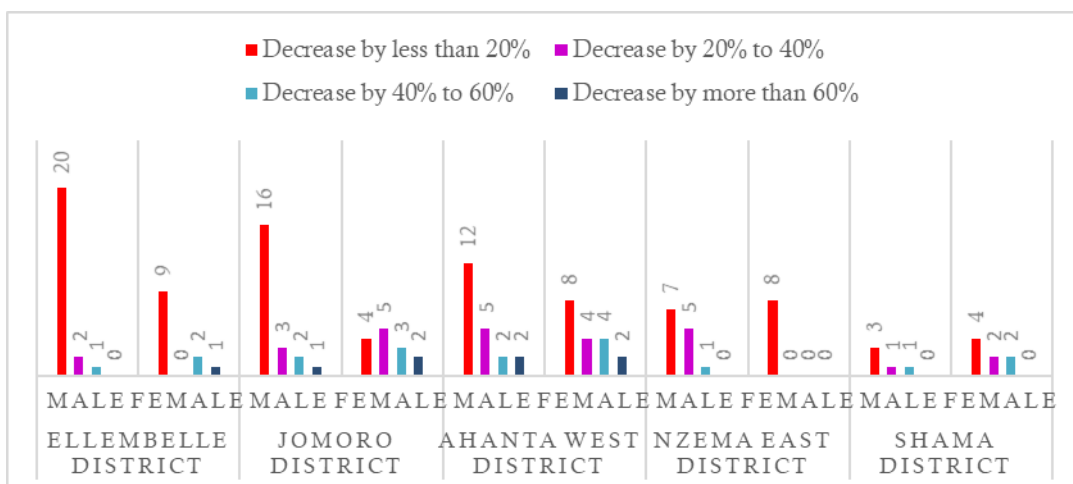


Figure 9: Proportion of income decrease among fishing folks by gender and district

9. Risks associated with oil and gas extraction for fisher folks (fishermen, fish processing women) in Ghana

The major risks associated with oil and gas extraction in the 5 studied districts included increase in fish prices, loss of income, increased school drop outs, increased fish pollution, loss of biodiversity, increase in sanitation related diseases, loss of jobs and increased cost of living. Table 5 is an illustration of the observations of major risks that fisher folks associated with oil and gas extraction.

Table 4: Identified major risks associated with oil and gas extraction

Environmental	Economic	Health/Social
Increase in oil spills	Increase in fish prices	decrease in women's reproductive health
Increase in oil leaks	Increase in confiscation of fishing equipment	Increase in sanitation related diseases (Malaria, Diarrhea)
Increased fish pollution	Increase in cost in fishing	Increase in prostitution and STDs
Increase in seaweed	Increase in loss of jobs	Increase in school drop outs
Increase in environmental degradation, land-use change and ecological destabilization	Increase in increased cost of living	Increase in teenage pregnancy
Increase in water pollution	Increase in cost of rent	Local institutional corruption
	Increase in loss of income	Increased resource conflicts

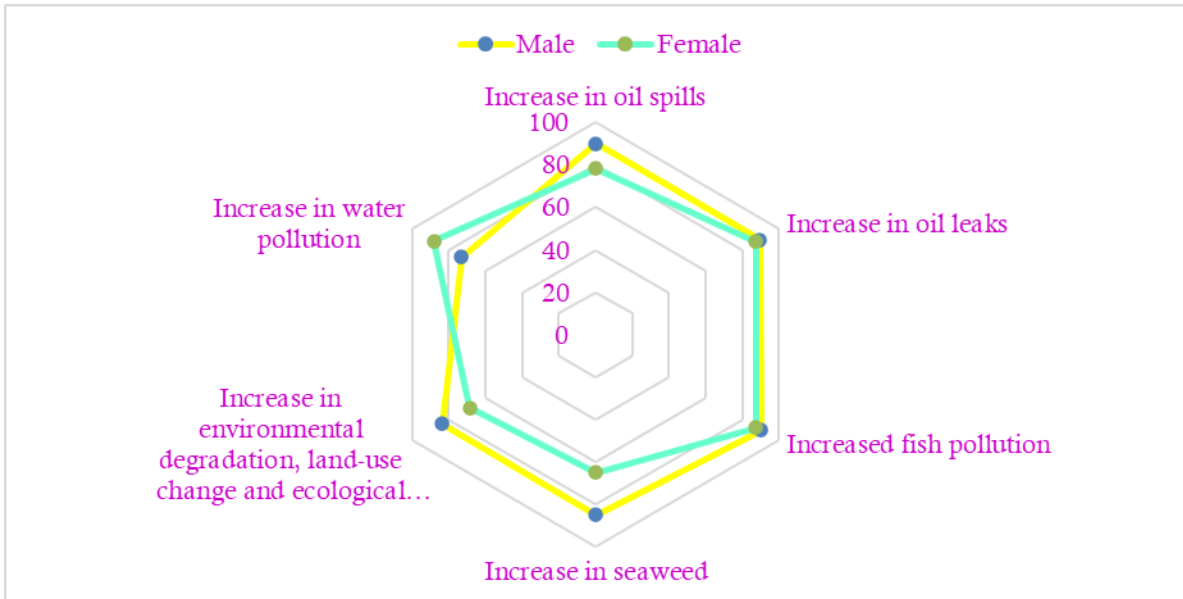


Figure 10: Identified major environmental risks associated with oil and gas extraction by gender

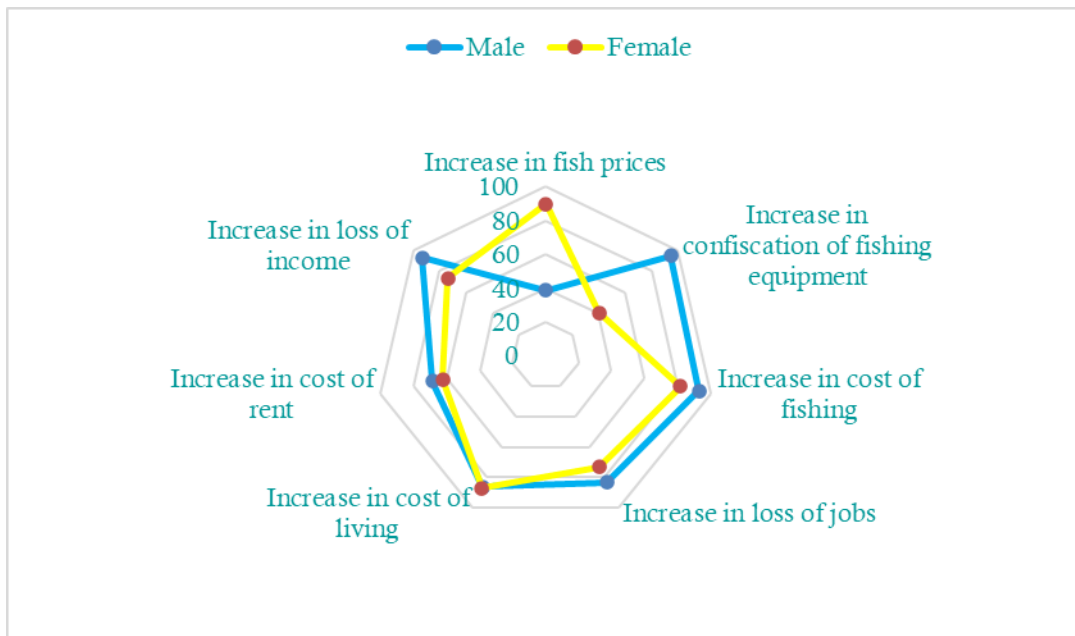


Figure 11: Identified major economic risks associated with oil and gas extraction

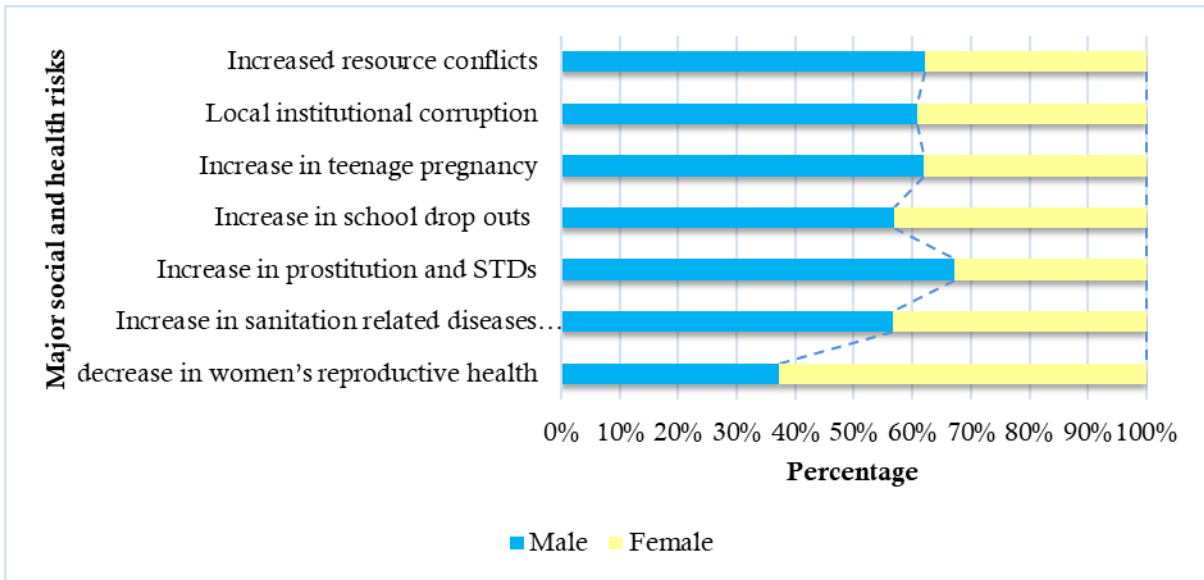


Figure 12: Identified major social and health risks associated with oil and gas extraction by gender

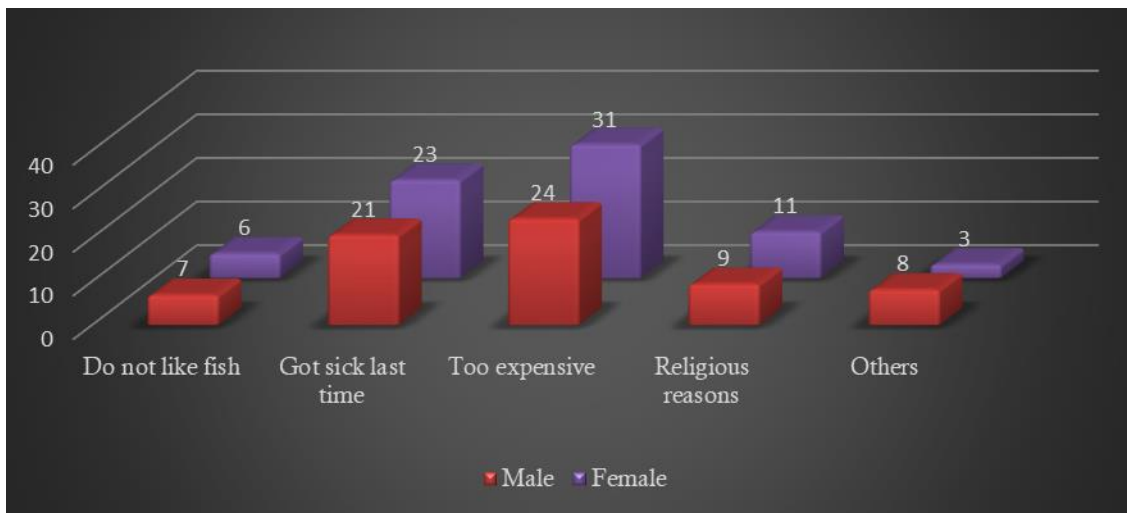


Figure 13: Illustration of the reasons attributed to the specific decrease in fish consumption among fish consuming households

As indicated in figure 14 about 30% to 70% of fish consuming households could go for 2 weeks without fish due to two main reasons; either due to the increasing price of fish or poor health resulting from fish consumption

10. Is oil/gas benefiting the studied communities in Ghana?

In spite of this risk, most fish consumers in the districts could not mention any physical, economic, social or environmental benefits that his/her community has obtained from the oil and gas exploitation in their district. Further probing revealed that fisher folks and fish consuming households had raised some of these concerns through community engagement with some CSOs including Hen Mpoano, Friends of the Nation, and

Western Region Coastal Foundation (WRCF) among others. These CSOs have sought to raise awareness and capacity in mitigating the negative impacts of oil and gas activities through Sensitization about companies working on oil and gas extraction, oil impacts on communities and also mobilization of communities for fight for their rights. When asked about Free, prior and informed consent (FPIC) in these engagements, it was noted most fisher folks across the five districts had close to zero awareness on FPIC.

11. Comparing oil revenue alone to fisheries activities revenue in Ghana and highlight who is benefiting from the revenue

Making reference to existing literature, it was noted that Ghana's fish production from marine fisheries has been declining since 1999, from almost 420,000 tons to 202,000 tons in 2014. Total fish exports showed a peak in 2003 with the value at USD 120 million but declined sharply to USD 44 million, while the peak of total fish export in quantity was at about 60,000 tonnes (product weight) in 2001. In order to sustain the *per capita* annual consumption of fish (estimated at around 24.2 kg in 2010), imports have increased substantially in the most recent years, reaching USD 373 million in 2013. As a result, the seafood trade balance moved from a USD 33 million surplus in 1997 to a USD 319 million deficit in 2013. It is estimated that the fisheries, mostly artisanal, employ over 29,300 fishing vessels, more than half without engine, and involve over 250,000 fishers.

Ground observations confirm that Ghana's dwindling fishing industry could reach an irreversible damage due to the offshore oil exploitation as mentioned in the review of existing evidence. As the economy struggles to find antidote to illegal fishing practices such as the use of dynamite and monofilaments in its territorial waters, records at the Fisheries Commission (FC) are pointing to a worsened situation as a result of the oil exploration. Dynamite fishing, also known as Blast fishing is the practice of using explosives to stun or kill schools of fish for easy collection. Reports show that this practice can be extremely destructive to the territorial water ecosystems, as the explosion often destroys the underlying habitat including coral reefs that supports the fish.

Reports from the Public Interest and Accountability Committee (PIAC) indicate that Ghana has benefited a total sum of \$4.009 billion from petroleum revenue in the seven years of petroleum production. Out of the total sum of \$4.009 billion in 2011 to 2016, the government had spent GH¢790,736,394.73 on roads and highway ancillary projects and GH¢110,656,071.10 was spent on transport infrastructure. It further indicates that the expenditure of GH¢70,992,432.00, was spent on education in the seven years, which included Hostel, classroom blocks, science resource centers, staff and office accommodation, buildings and equipment in tertiary institutions among others. Aside that, research showed that GH¢357,063,439.91 was spent on agriculture sector, but the money was rather spent on infrastructure, which did not help the sector to promote food security in the country.

Interviews with state institutions indicated out of the total oil revenue paid to government, 10% is paid to national government. The remaining 90% is distributed as follows: 55% goes to district assemblies, 20% goes to the paramount chiefs and 25% goes to the stool land. Local communities indicated that they had no knowledge of any direct cash payments in the form of corporate social responsibility to local communities. However, most fisher folks indicated that any revenue from oil activities is captured by the elite in the communities namely, traditional authorities and local government officials.

12. Recommendations

The following are a few technical and policy recommendations:

1. **Stronger Multi-Stakeholder Dialogues and Social Innovation Platform for Host-Communities:** Conscious and concerted efforts need to be taken to advance participation of fisher folks in coastal resource management using constructive dialogues platforms involving fishermen, fish processing women, youth groups, CSOs/CBOs, District Planning Department, development practitioners, policymakers and researchers at the district level. Such a multi-stakeholder process could lend support to the passage of the National Fisheries Co-Management Policy. Again, the lack of consistent evidence gathering process undermines multi-stakeholder dialogues and increases the risk of underestimating the impacts of oil activities on community livelihoods. Therefore, Multi-Stakeholder actions need to focus on social innovation and innovative cooperation project which will improve coastal resource data-sharing (increase availability, adequacy, and accessibility of information) as a means of empowering local communities to promote best practices and ensure the sustainability of livelihoods in oil enclaves. Multi-stakeholder dialogues coupled with strong data sharing could be used to mobilize support for the passage of the National Fisheries Co-Management Policy which will strengthen community participation including the district level by-laws to safeguard coastal livelihoods. Also, stronger Multi-Stakeholder Dialogues will also require periodic face-to-face engagements between fisher folks and the District Chief Executives together with the sector ministry, Ministry of Fisheries and Aquaculture Development (MoFAD) and Fisheries Commission.
2. **There is the need for Long-term Environmental Planning through** Integrated Coastal Zone Management (ICZM): Local government (Metropolitan, Municipal and District Assemblies) need to develop long term natural resource management strategic plans that include specific actions for catering for future compensation and management of environmental damages that might occur at the local level as a result of oil and gas production. This strategic plan needs to detail out the means by which fisher folks and fishing communities will be compensated should there be oil spills or oil leaks that affect their livelihoods or loss in their fishing rights due to oil and gas activities. This strategy should also include collaborative approaches to monitoring oil activities in order to forestall oil spills, oil leaks and associated impact on fisher folks and marine ecology. In this regard, government needs to revitalize ICZM as a holistic and participatory process that will reduce rapid oil-led livelihood threats in the oil enclaves, promote economically viable alternative coastal livelihoods, improve inclusive resource management and sustainable fishing activities as well as forestry and biodiversity conservation in the Western Region.
3. **There is an urgent need for Co-developed Conflict Management Approaches:** Reducing the potential of widespread coastal conflicts needs to be made an urgent national issue with the aim of drawing out both short- and long-term plans at the local level to address it. Already there is an observed population increase in coastal communities as a result of the oil and gas activities which places increased pressure on scarce social amenities such as housing, schools, and health facilities across all the 5 districts. If not properly managed, this will inflate social pressures and further marginalization of the poor communities. In this regard, it is important to first undertake an investigation into oil revenue allocation at the local level including corporate social responsibility and compensation payments to coastal communities in order to reduce elite capture of oil revenues. The

co-developed conflict management plan must take into account community-led approaches to addressing confiscation of fishing equipment, corporate social responsibility and compensation payments as well as restrictions on the use of the ocean resources due to oil and gas activities.

4. **Coastal Assertive Financial Actions:** It is an absolute imperative for government to mobilize funds from oil and gas companies through corporate social responsibility to establish coastal assertive financial actions fund that seek to strengthen safety nets for fisher folks and host communities. This will go a long way to enhance the capacity of these fishermen to join alternative economic livelihoods to ensure sustainable wellbeing in the communities. Given proper implementation of the assertive financial actions, this could reduce the potential for an economic, social and environmental impoverishment and also reduce conflicts between fishermen on one side and oil and gas companies on the other hand.
5. **Promote women-led alternative livelihoods networks:** The development community (district assemblies, donors, CSOs) need to develop and promote women-led alternative livelihoods networks with the aid of an icon-based mobile application to connect wide fish processing women, consumer markets, financial support services, market intermediaries and media attention to support highly economically viable community-based alternative livelihoods across Western Region.
6. **Strengthen Environmental Protection Agency (EPA) Offices in Western Region:** Strengthen Sub-EPA offices in all oil and gas enclave to complement the work of Environmental and Sanitation Officers and the Social Welfare and Community Development. When effectively and efficiently executed, this could strengthen and build their capacity to enhance constant or regular monitoring and evaluating of the operations of oil and gas companies in host communities to avoid any oil spills, gas flares and other effluents. However, in order to foster long term conservation of the fisheries sector, local actions need to be taken to facilitate participatory needs assessment of fishery conservation & breeding sites preservation at the district level, supported by independent/community-led monitoring of illegal fishing, coastal ecosystem services and land use changes and sustainable alternative livelihoods leading into an evidence-based Coastal Adaptation Plan for Metropolitan, Municipal and District Assemblies.

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COTE D'IVOIRE

1. Background

Côte d'Ivoire, which claims to be an oil-exporting country, has, for decades, been engaged in extensive exploration in the sedimentary basin of the Gulf of Guinea. Since the 1980s, several discovered wells have begun producing oil and gas. This has led to a situation that results today in the decline of artisanal fishing activity and its main actors. Indeed, the economic stakes of oil exploitation has relegated to the background this job-creating activity (artisanal fishing) on which several communities in the district of Abidjan depend.

2. Methodology

The methodology consisted, in a first phase, in making a literature review to map out the companies involved in oil and gas extraction, analyze the institutional and regulatory framework of the oil and gas exploitation sector, including the national policy; the national legal texts and national conventions and agreements in which the State of Côte d'Ivoire is engaged and their adequacy in implementation to document the potential or existing impacts of oil and gas exploitation on the fisheries sector and consumers in Côte d'Ivoire. In a second phase, surveys/field visits and exchanges with local communities including fishermen, fish processing women and consumers in the district of Abidjan and customary authorities. Three sub-districts of the city of Abidjan, namely Abobodoumé, Adjahui and Zimbabwe, in which fishing activities and other actors cohabit, constituted the study area. With the exception of Abobodoumé, these precarious sub-neighborhoods concentrate almost all artisanal fishermen and other fish folk members. However, huge communities practicing fish farming live in Abobodoumé. This map below shows the geographical location of these neighborhoods.

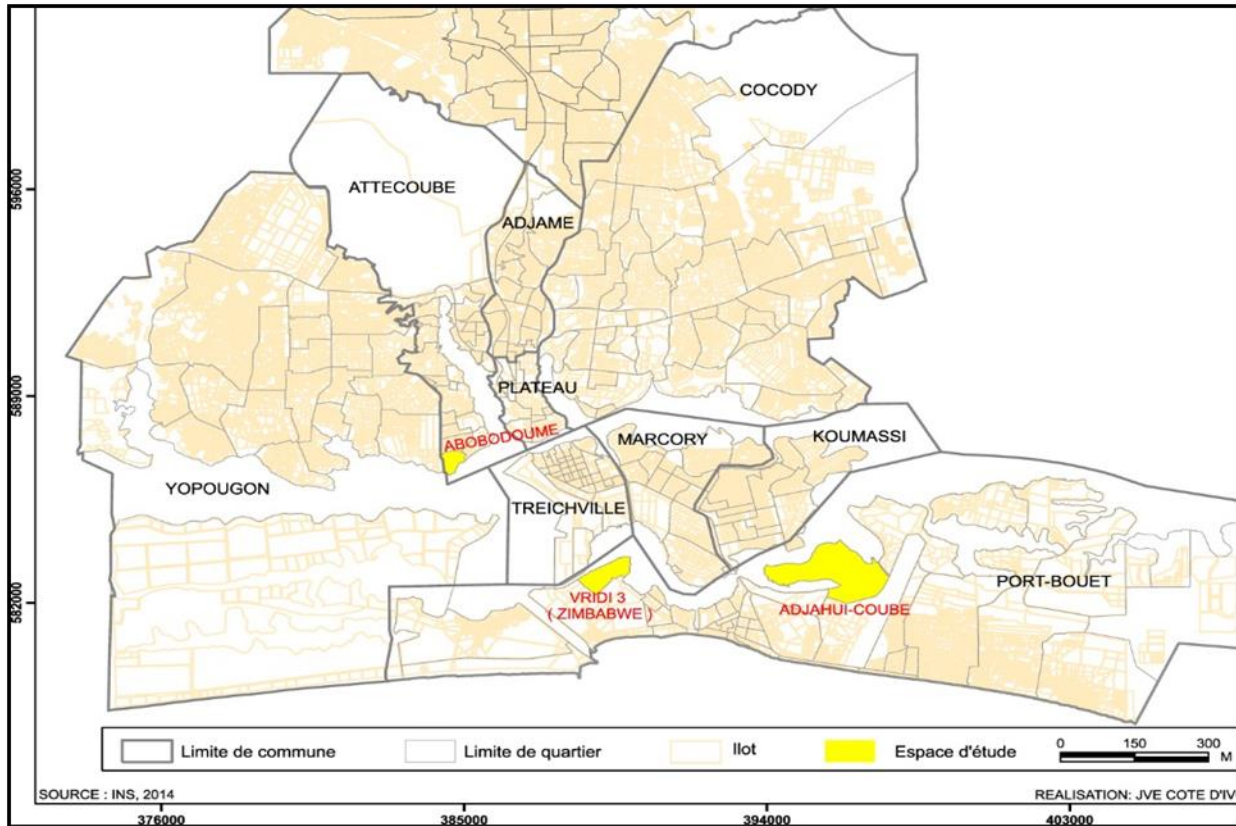


Figure 14: Map of the location of fishing activity and actors in the district of Abidjan.

Source : JVE Cote d'Ivoire

3. Oil and gas exploitation in Côte d'Ivoire

With a surface area of 8700 km², the Ivorian sedimentary basin, which represents 2.5% of the territory, occupies 3/5 of the seafloor. 360 km long, it extends from the southwest (Fresco) to the southeast (Ghanaian border). Following the discovery of traces of hydrocarbons (oil, gas and others) in Southern Côte d'Ivoire, the authorities will take several initiatives to boost oil and gas production in order to increase national revenue and reduce dependence on hydrocarbons. These initiatives revolve around:

- Subdivision of the sedimentary basin
- The setting up of research or exploration structures

Indeed, the Ivorian sedimentary basin has been divided into several blocks in order to control its exploitation. These blocks, allocated to private entities, are exploited under the supervision of a state-owned company, Société Pétrole de Côte d'Ivoire (PETROCI). There are 61 Blocks to date, including 54 offshore and 7 onshore. Of the offshore blocks, 48 are shallow and 6 are ultra-deep. Of the 61 blocks, 20 are currently in operation (4 in production and 16 in exploitation) and 41 are free, of which 11 are under negotiation. A producing field is a defined area where oil is extracted or produced. For example: the Aries field. The only small difference with the producing field is that the producing field is necessarily in activity, but the former (in

production may not be). These blocks have led to the discovery of several deposits, including the BELIER, ESPOIR, PANTHERE and FOXTROT deposits.

It should be noted that in order to increase oil and gas production, the state has continued private-public partnerships. These often-concerned prospecting or the re-evaluation or redevelopment of old blocks.

In this respect, several projects have been undertaken with the private sector, namely:

- The CIO-01 block called "Lion" has been reallocated to two other groups, UMIC and YUKONG, to increase energy capacity.
- Block CIO-02 which composes the "Aries" and "Gazelle" platform was conceded to the same operator as the previous block to reinforce and increase the energy capacity of the country.
- The CI-12, CI-24, CI-105 projects have all been reallocated to private structures with the participation of PETROCI for the drilling of new wells or prospects. It should be noted that the CI-12 project is intended to intensify oil production with a private participation of 70% and public participation of 30%.
- To the other above-mentioned blocks, blocks CI-202 and CI-102 are to be added, which relate to the processing and reinterpretation of old seismic lines. Several holes will also be drilled on these two blocks.

Finally, this concession strategy has led to the discovery of several oil and gas deposits in recent years.

The various sedimentary basin research or exploration structures

The exploration structures in the case of Côte d'Ivoire are of two types: state structures and private structures. While the number of public companies is limited, this is not the case for private companies, which are relatively numerous.

- **State owned structures:** the Centre de Recherche Océanologique (CRO) and the Société Pétrole de Côte d'Ivoire (PETROCI) are the only two state exploration structures.

The first is to establish the geological structure of the sedimentary basin while establishing a topographic map of the entire coastline. This study is based on the search for oil shows through crude oil traps. This step is necessary prior to exploration.

The second company plays several roles. First of all, its mission is to orient oil policy. Then, it signs contracts with exploration companies on behalf of the State. In this framework, it can also participate up to only 40% in exploration. Thus, it is associated with a private company WAYERTECH to explore the sedimentary basin. This has enabled them to have several oil fields over an area of 55,000 km². However, this company was able to finance 100% of the BELIER OUTPOST exploration project.

- **Private structures:** these are the most numerous. Among them is one of the first exploration structures, the African Petroleum Society (SAP) which started in 1957 and 1963 in vain. After this, companies such as the Phillips Petroleum consortium (1960), UMIC and YUKONG. The ELF

company which carried out the prospecting in 1996 on blocks I-101 and CI-103. Finally, we have the company, CNR INTERNATIONALE.

4. Oil and gas extraction Companies

Côte d'Ivoire currently has more than 29 blocks, 25 of which are offshore. These are operated by several companies (14 in total), most of which are American:

- CNR INTERNATIONAL (Côte d'Ivoire) SARL is a subsidiary of Canadian Natural Resources Limited (Canada).
- FOXTROT INTERNATIONAL LDC (USA)
- STRATIC (USA)
- VANCO Ivory Coast LTD (USA)
- TALVERAS ENERGY RESOURCES Ltd (Dominica)
- EDISON INTERNATIONAL SPA (Italy)
- TULLOW OIL (United Kingdom)
- DEVON ENERGY CI Ltd (USA)
- SINOPEC (China)
- OIL INDIAN LTD (India)
- YAM'S PETROLEUM (France)
- AL THUMI GROUP (United Arab Emirates)
- UMIC (United Meridian Incorporation) (USA)

5. Mapping of oil and gas companies

The oil companies in Côte d'Ivoire are located all along the Gulf of Guinea from the southwest to the southeast. Crude oil (oil and condensate) production in 2016 was 15,495,895 barrels, or an average daily production of 42,147 barrels/day. The breakdown of the production fields is as follows :

Table 5: Mapping of oil blocks in Côte d'Ivoire

Blocks	FIELD	BARIL	PERCENTAGE
CI-11	Lion et Panthère	9846649	63,83
CI-26	Espoir	4609039	29,88
CI-27	Foxtrot	828270	5,37
CI-40	Baobab	141937	0,92
TOTAL		15425895	100

Production fields

They are installed according to the blocks (see Figure 15) below. This map shows all the oil potential and the hydrocarbon production areas of the various oil and gas companies in Côte d'Ivoire).

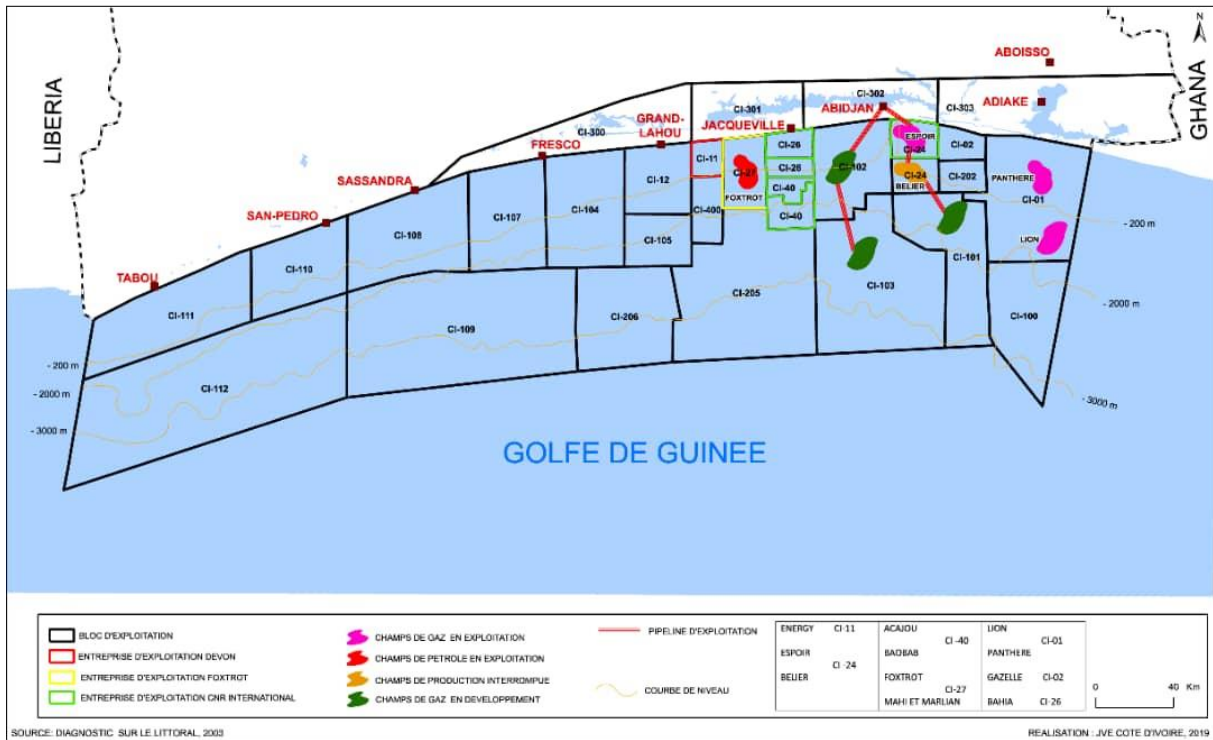


Figure 15: Exploitation of the Gulf of Guinea Sedimentary Basin by Oil Companies

6. Politique pétrolière, cadre légal d'exploitation des hydrocarbures en Côte d'Ivoire

Oil policy

Oil policy in Côte d'Ivoire is based on private companies. Indeed, oil activity is mainly carried out by subsidiaries of foreign multinationals. In order to attract these companies, the state has set principles and objectives that guide this policy :

The principles and objectives of the policy: here the State defines the energy policy and entrusts its execution to the private sector. The State, while guaranteeing the orientation of the oil activity, sets up actions to regulate the sector but also minority shares in some private companies. The State has also set itself the principles of not taking part in the risks of exploitation activities and of participating in the development of oil production up to a maximum of 20%. All these principles are aimed at achieving the following objectives: making scientific data (technical information on the sedimentary basin) available to the oil industry, reforming the contractual framework and reducing the costs of expensive research operations.

Legal framework of the oil sector

In order to achieve the objectives of development of the oil sector, the State has given itself the legal means which are expressed through the following legal texts:

- **The Petroleum Code:** it is the backbone of the oil industry's legal arsenal. It is a set of legislative texts that govern the oil industry. In Côte d'Ivoire, there have been three petroleum codes since 1970. The last one, now in force, is the 1996 one, which succeeded the 1990 one. The latter contains important provisions for the preservation of the environment. They can be seen in two articles: 49 and 50. These

provide for oil operations that conserve biodiversity. This code provides for the protection of people and their property while requiring private actors in the sector to make available certain information, data, documents and samples of their oil operations.

- **The Decrees and orders:** Orders or decrees are decisions taken by the executive to implement laws passed by the legislature. These legal decisions derive their source from the decrees taken in this framework by the colonizer. One can cite some important legal texts such as the decrees of 10/20/1926 which relates to the construction of infrastructures or depots for the distribution of petroleum products in the colony. As well as the general decree n° 5926 TP of 28/10/1950 fixing the rules for the interior development of liquid hydrocarbon deposits. Several other decrees or orders could also be cited, such as article No. 6589 of 23/10/52 or Act No. 92-466 of 30 July 1992.
- **Environmental Impact Assessment (EIA):** is a study that is carried out before any oil development activity in order to limit the environmental impacts of all these projects. It should be noted that it was in early 1970 that the need for these studies was raised in the face of the dangers presented by mass exploitation. The EIA studies and compares the ecological, acoustic and landscape impacts from the construction site to deconstruction. It must evaluate the advantages and disadvantages of the solutions chosen.

In summary, it can be noted that the development policy (Konan, 2004) of the oil sector and its legal framework involve several actors, namely:

- The government which orders;
- The National Assembly which votes the laws and projects;
- The ministries that apply the various laws;
- The BNETD (Bureau National d'Etudes Techniques et de Developement) which designs and evaluates the costs;
- The specialized departments that monitor and control the activities;
- The oil units and companies that carry out the orientations for final production.

7. The potential socio-economic and environmental impacts of oil and gas exploitation on Fishing in Côte d'Ivoire

Table 6: Potential socio-economic and et environmental impacts of oil and gas exploitation on the fishing industry in Côte d'Ivoire

ECONOMIC IMPACTS	
Oil revenues	<ul style="list-style-type: none"> - Clear increase in revenues with the increase in production in 2018 - Revenues of CFA 197.25 billion (nearly '301 million) derived from the valuation of its share in the national production of crude oil and natural gas. - That is to say an increase of 17.22% compared to 2017 achieved thanks to the combined effects of the improvement of crude oil prices, the ongoing developments on block CI-40 and the modification of the sharing conditions on block CI-26. - 32,287 barrels/day on average over the year for crude oil production, an annual increase of 5.27% compared to 2017. - Natural gas production was estimated at 189,291 MMBTU/day, or approximately 189.3 million cubic feet, up 9.2% year-over-year.
Revenues from fishing	Artisanal fishing in Côte d'Ivoire, 85% of which is carried out by Ghanaian fishermen, is estimated to account for 3.1% of the GDP of the whole activity. This share is in perpetual growth according to the Ministry of Fisheries and Animal Resources.
Artisanal fishermen	<ul style="list-style-type: none"> - Difficulty in carrying out their activity; - Loss of fishing grounds; - Increase in working time which affects the revenue to be earned; - 50 % loss of their monthly income which oscillates around 150 000 frs CFA or 220 Euros/month; - Difficulty of the charges to be paid (tax, fuel, insurance); - Inaccessibility of certain fishing areas due to the presence of oil companies;
Fish processing women	<ul style="list-style-type: none"> - Decrease in income over the last 20 years; - Declining business performance; - Increase in the price of fishing products (fish bowl) from 20000 francs CFA to 25000 francs CFA.

SOCIAL IMPACTS	
Mareyeuses	<ul style="list-style-type: none"> - Decline in the supply of fishery products; - Disruption of commercial activity; - Decline in their economy; - Loss of customers; - Disruption of women's social experience.
Fishermen	<ul style="list-style-type: none"> - Fishing grounds are scarce; - Decrease in fishery products; - Abandonment of fishing activity; - Inflation of prices of fishing equipment (nets, fuel etc.); - Disruption in the cost of fishermen's yield.
Consumers	<ul style="list-style-type: none"> - Decline in supply to the local market; - Disruption of the household economy; - Inflation of fishery products; - Populations no longer able to feed themselves properly; - Dietary disruption.

IMPACTS ON THE ENVIRONMENT	
AT COASTLINE AND BEACH LEVEL (LAND)	
	<p>ENVIRONMENTAL EFFECTS</p> <ul style="list-style-type: none"> - The spillage of large quantities of oil leads to an absence of light rays in the flora and the combination of dissolved oxygen molecules with those of the crude oil, producing carbon dioxide which is harmful to animal life by increasing the Biological Oxygen Demand (BOD); - Decrease in the production of nutrients for fish (the first victims are pelagic fish); - Destruction of phytoplankton (plants) that participates in the energy fixation of the marine environment and provides food and oxygen by using the sun's rays to convert it into a vital material; - The biotope made up of beaches, bays and estuaries, which represents the physical environment of the coastline, is subject to oil pollution with major

	<p>consequences for the organisms that live there;</p> <ul style="list-style-type: none"> - An imbalance of the micro-organisms living in this environment and the soiling of the beaches by oil spills; - After the passage of oil residues, there is an impoverishment of coastal biodiversity; - The analysis carried out by Marchand and Martin (1995) on the bays of Ebrié Lagoon shows that Cocody Bay and Biétry Bay have reached a maximum pollution threshold.
<p>Potential effects on the marine and lagoon environment</p> <p>AT SEA AND LAGOON LEVEL</p>	
	<p>ENVIRONMENTAL EFFECTS</p>
<p>Natural pollution sources</p>	<ul style="list-style-type: none"> - Oil deposits of marine origin that sometimes ooze, the eruption of oil wells, marine well accidents that cause fire risks, pollution risks.
<p>Man-made sources of pollution</p>	<ul style="list-style-type: none"> - Losses from the transport of oil by sea that contribute to air pollution; - Leaks from pipelines, discharges such as ballast water, and process units such as refineries that contaminate water; - These substances destroy biological resources; - Offshore oil exploration and production activities cause discharges that pollute waters enormously.
<p>Shoreline Pollution</p>	<ul style="list-style-type: none"> - Oil spilled in the water is an ecological hazard to resources. These are fisheries, areas with a high density of amenities and industrial installations; - Petroleum effects also affect soils or living organisms that play a major role in the biological environment. Hydrocarbon discharges obstruct the aeration of the soil which can give it oxygen; - Asphyxiation of the soil because it can no longer supply itself with oxygen, eventually dying; - Loss of soil productivity.

Large oil spills	<ul style="list-style-type: none"> - Spilling in large quantities results in the immediate destruction of the fish by clogging of the gills; - The long-term toxicity of oil on marine organisms is manifested by the accumulation of these products after their ingestion at sea; - Molluscs and fish are those organisms which generally store oil in their fatty tissues (liver or muscles) where it is found in considerable quantities; - The appearance of cancers on the gills and lips of fish by discharges of carcinogenic poly-aromatic hydrocarbons contained in variable quantities crude oil: 400 to 1600 ppb; - Many birds, turtles and marine mammals perish because they have ingested non-degradable detritus or are unable to get rid of it; - The oil spill is a major source of contamination because it can prevent the reproduction of species in the future; - There is a risk that the oil residue will invade the body of water while leaving a deposit. And this residue is incorporated into the phytoplankton used as fish food.
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IMPACTS ON HEALTH	
General effects	<ul style="list-style-type: none"> - Pollution can cause headaches; - Accidental oil discharges at sea according to the CIAPOL report (2006), fishermen diving to tie up their nets experience burns to the eyes and itchy skin, which can later lead to pneumonia, cholera and contaminated fish products; - The impacts of spills present enormous carcinogenic risks through the skin, bladder, lungs etc. The impacts of a spill present enormous carcinogenic risks through the skin, bladder, lungs, etc. The pathologies mentioned above will not appear until 10 to 25 years after the spill if they are to manifest themselves (Sangaré, 1996).

<p>Pollutants (gases) from car emissions</p>	<ul style="list-style-type: none"> - Their toxicity can affect the genomes and attack the immune system to the point of promoting cancers and respiratory infections (asthma); - According to studies, particles emitted by diesel vehicle exhaust have health impacts. According to studies, the particles emitted by diesel vehicle exhaust have an impact on health. This can be observed in fragile people through a reduction in life expectancy, asthma attacks, an increase in heart attacks, etc.; - Carbon monoxide (CO), a colorless and odorless gas produced, among other things, during the incomplete combustion of hydrocarbons, is toxic because it enters the bloodstream through the lungs and alters the transport of oxygen to organs and tissues; - Lung cancer, and other chronic and acute respiratory diseases; - Reduced lung function; - Irritation of the eyes, nose, mouth and throat; - Increased respiratory diseases such as bronchitis, headaches and dizziness.
<p>Emissions from ships, aircraft and industries discharged into the atmosphere</p>	<ul style="list-style-type: none"> - At high doses, (OC) can lead to fatal coma, cardiac risks, visual acuity and reduced work capacity; - Aircraft and ship emissions are sources of harmful pollution; - Boats emit large amounts of fumes with a high sulphur content, the inhalation of which affects the heart and lungs; - Lead, which causes serious consequences, has irreversible health effects. Lead released into the air is harmful to children, adult men and women. When inhaled in large amounts can cause nutritional deficiency, in that children are more sensitive than adults; -Reduced cognitive capacity.
<p>Health reproduction</p>	<p><u>In Men</u></p> <ul style="list-style-type: none"> - Some pollutants have serious consequences on reproduction. They affect certain organs and cause malfunctions in the body (kidney function, blood pressure);

	<ul style="list-style-type: none"> - Disturbance of the reproductive and immune system; - Cases of genetic alterations; - Premature death; -Case of sterility; - Cancer of the testicle; -Reproductive disorders in men (Decreased sperm count); -Male reproductive disorders (Decreased sperm count) <p>In a child's body, lead can damage the central nervous system, brain, blood system, kidneys and skeleton;</p> <ul style="list-style-type: none"> - Slow growth in children.
Differentiated impacts on women	<ul style="list-style-type: none"> - The development of endometriosis; - Reproductive disorders in women; - Lead, a toxic metal, affects the pregnant woman and her fetus because it's vulnerable; - Transmission of lead accumulated in the body from mother to developing child; - Lead can be transferred through breast milk when present in a nursing mother.

8. Recommendations

The question that remains and which is topical is whether it would be possible for the State to give up this ambition or to find other alternatives by developing aquaculture for the benefit of these communities? In this regards, the following recommendations are envisaged :

- It is necessary to adopt a policy of protection of the current fishing grounds in order to guarantee these women a real source of income and empowerment;
- Adopt a legal and regulatory framework plan that favors the mitigation of negative consequences;
- To set up a monitoring mechanism to which fisheries stakeholders and the authorities can develop better relationships;
- Advocate with government authorities to provide assistance to those impacted by oil exploitation;
- Promote local initiatives with CSOs and key stakeholders aimed at capacity building on the risks of oil and gas exploitation;
- Adopt technical and environmental prevention and mitigation measures due to oil spills;

- Undertake campaigns to sensitize decision-makers on fisheries regulatory reforms at the national level;
- Establish a monitoring and assessment system for damage to fishing vessels and nets to avoid loss of income that may be associated with reduced catches;
- Put in place mechanisms to mitigate the impact of hydrocarbon-related fishing activities on areas of special interest, on landscape quality and on noise (which attracts fish) in the area of oil exploitation.

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NON OIL AND GAS PRODUCING COUNTRIES

BENIN

Summary

This study was carried out following a methodological approach in order to better collect and process documentary and field survey information. This information was collected from 60 fishermen and fish processing women on the one hand and from state institutions and resource persons on the other. From 1950 to date, Benin has been in the oil exploration phase, with some periods of exploitation in 1982 and 1998. Infrastructures are abandoned on the high seas. Therefore, pipelines of the West Africa Gas Pipeline Project were installed along the Beninese coast in 2005 leaving Nigeria for Ghana. These installations (platforms and pipelines) cannot remain without impact on the fishing industry. Fishermen's camps generally serve as fish landing points and are found in four main communes, namely Cotonou, Ouidah, Grand-Popo, and Sèmè. Along the coast of Benin, 24 main landing sites have been identified. The oil and gas sector has legislative and regulatory texts that provide a framework for operationalization. Several institutions are involved in the management of hydrocarbons, namely the Ministry of Health, the Ministry in charge of the Environment, the Ministry in charge of Water and Mining, and the Ministry of Defence. During the research, 70% of the respondents stated that they have a perfect knowledge of oil exploitation of this and 8% stated that they were only aware of the installation of oil platforms. Fishermen and fish smokers claim to be negatively impacted by the current oil and gas installations on their activities and income. 19% have observed the death of fish, 42% felt that the installations have consequences on the loss of income, 2% see their nets torn during their activities, and 77% fear a decrease in their income. The abandonment of wells and platforms in the open sea is a source of impact. Respondents also claim that exploitation causes diseases (eye diseases (32%), malaria, asphyxia, skin disease 15% ...), 6% report injuries, 11% say pollution (waste discharges, air pollution ...). Measures to offset or mitigate the likely negative impacts and risks, some of which are currently being implemented, include the simulation activities of the Global Initiative for West, Central and Southern Africa (GIWACAF) and prior environmental and social impact studies on oil and gas infrastructures.

1. Background

Located in West Africa in the Gulf of Guinea, the Republic of Benin covers an area of 114,763 km² with 11,884,127 inhabitants (INSAE, 2019). Benin has 8,300,000 hectares of cultivable land of which only 1,700,000 ha, or (20%) of the total, are developed each year (SDDAR, 2000). It also has 31,000 ha of lakes and lagoons, 200,000 ha of lowlands and floodplains and about 120,000 ha of irrigable areas through the valleys of the main rivers (SDDAR 2000). Due to its geography, it benefits from a 120 km straight sandy coast interrupted by two river mouths. There are two major fishing areas in Benin : sea fishing and continental fishing.

Sea fishing, subdivided into industrial and artisanal fishing, is practiced by Beninese, Ghanaian and Togolese fishermen. As for continental fishing, it includes river lagoon fishing and aquaculture. The fishing sub-sector is one of the levers of action of the strategic plan for the revival of the agricultural sector in Benin.

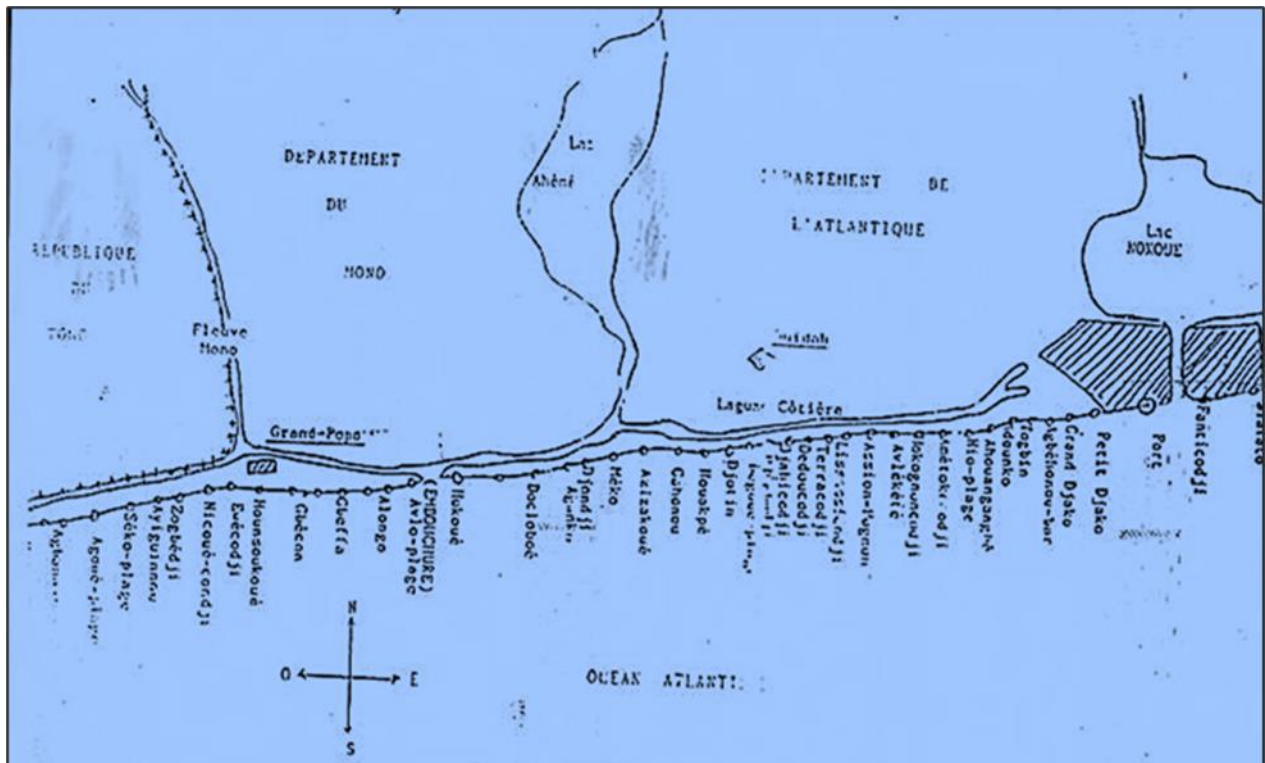


Figure 16: Mapping of neighborhoods along the coast of Benin
 Source : SOBEH, 2013

At the level of the ancient shoreline barrier (ancient quaternary sand, yellow ochre), there is a clear forest located in Pahou a dense coastal forest with *Dialium guineense* and *Diospyros*. The characteristic of this coastal formation is in danger of disappearing. There remains a remnant of a few feet in the villages Ekpè and Ahozon. Mangroves are visible in the swampy areas along the coast from the Bouche du Roy to the east of the village Avlékété. They shelter an important animal community such as fish, molluscs and crustaceans that live between the roots. It is a privileged place for fish reproduction and food ; their branches are refuges for insects, lizards, reptiles and birds. As a result of possible oil spills, pneumatophores (the respiratory organs of plants) and roots very close to the shore can easily become fouled.

Benin has had to explore and exploit oil and gas. Thus, infrastructure for oil platforms in Sèmè-Kraké and West African gas pipelines along the Beninese coast have been built. Being installed in the sea where fishing activities take place, these infrastructures cannot remain without impact on the marine and fishing world.

2. Methodology

The methodology used is scientifically based and is conducted according to the following approach :

- Literature review;
- State of the study area and contact with fishermen and resource managers/people ;
- Data collection and measurements (georeferencing of the site, photographs of the site) ;
- Processing of the collected data ;

- Analysis of impacts and risks associated with oil and gas extraction on fish harvesters and fish processors in the Study Area ;
- Report writing.

Literature Review

It consisted in reading the documents related to this study (general works, dissertations, theses, project documents, ESIA's similar to the this project, scientific articles or newspaper articles). These documents were used to analyze the institutional and regulatory, physical, and socio-economic frameworks of the study. The documents consulted are listed in the bibliography.

Field visit

The field visit is conducted in the study area (along the shoreline). During this visit, direct observations were made in order to take stock of the situation.

Data collection

Within the framework of this study, a GPS (GARMIN, Etrex 10) is used to take the geographical coordinates of strategic points in the study area. Photos were also taken in the field. In order to allow a broad consideration of the people concerned, several target groups were approached according to their interests. Fishermen and fish processors were interviewed by means of a direct interview (questionnaire).

Meetings are held with some CSOs working in the field of ecotourism and the environment to gather information.

Two tools were used (a questionnaire addressed to fishermen, fish smokers and an interview guide for exchanges with the executives of the ministries concerned).

Given the time limit, the surveys could not cover all landing sites. Data collection was carried out on 10/24 landing sites closest to the infrastructures (platforms and pipelines), which are probably more sensitive to the effects of the latter. These landing sites are in close proximity to oil and gas infrastructure. Information is received at the executive level from various relevant ministries.

The number of direct interviewees is 366, broken down as follows :

Table 7: Number of respondents in Benin

Respondents	Number	Percentage (%)
Fishermen	330	90
Fish processing women	36	10
Total	366	100

This number is defined on the basis of the availability of resource persons in the communities. In order to collect this information, questionnaires were sent to the respondents.

The collection of quantitative and qualitative data is carried out through :

- on-site visits ;
- semi-direct interviews ;
- direct observation to assess the information collected.

The collection of these data in the field made it possible to complete the information obtained from the literature review. Data on the biophysical and socio-economic environment are collected.

Risks Associated with Oil and Gas Extraction

Identification of affected components

Sources of impact are defined as all human interventions that may directly or indirectly modify a component of the physical, biological and human receiving environment. They are identified using the Bisset (1986) checklist. The checklist is completed by Leopold's matrix, which cross-references the environmental components with the potential sources of impact generated by oil and gas development in the intervention zone.

Impact analysis and assessment

The analysis and assessment of impacts was carried out by comparing the sources of impact with the components of the biophysical and human environment. This relationship takes the form of a matrix in which each identified interrelationship represents a probable positive or negative impact of a project element (source of impact) on one or more components of the environment.

Strictly speaking, an effect that generally describes a phenomenon observed during project implementation, such as gas leaks, water pollution, waste production, can be distinguished from the economic and health impact compared to the post-project state compared to the initial state.

Three (03) criteria are used to evaluate the impacts of the project activities :

- the intensity or degree of disturbance;
- Extent of disturbance;
- Duration.

The significance of the impact is the result of the intersection of the three criteria and gives an overall account of the effect of a project activity with respect to a component of the environment. The grid used to assess the significance of impacts is that of Fecteau (1997).

Mitigation measures

The study then proposes the actions, corrective measures or alternative management methods that will have to be applied to mitigate or eliminate the negative impacts of the project. Measures to maximize positive impacts are also highlighted.

Processing and analysis of data

Quantitative and qualitative data processing was carried out using Word, Excel and Arc Gis. The analysis of the results obtained during the fieldwork is coupled with the data from the literature review. This made it possible to examine the risks associated with oil and gas extraction on fishermen and fish processing women ; to compare oil revenues to revenues from fishing activities and to identify those who benefit from them; with a view to making recommendations to limit the negative socio-economic and environmental impacts of oil and gas exploitation on the lives and livelihoods of fishermen.

Cartographic analysis was carried out for better visualization and spatialization of information and results.

3. Oil and Gas sector in Benin

The coastal sedimentary basin of Benin is subdivided into 17 oil blocks including: 2 onshore blocks A and B and 15 offshore blocks. Of these 17 blocks, Blocks B, 3, 4, 5 and 6 are occupied and Blocks A, 1, 2, 7 to 15 are free.

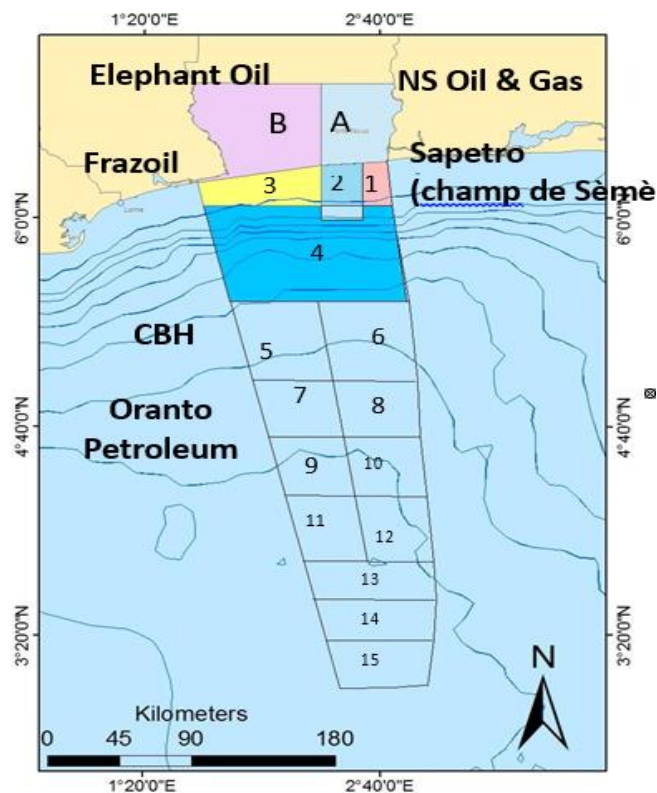


Figure 17: Map of oil blocks in Benin

Source: DGIMP/SOBEH, 2013

History of oil exploitation in Benin

The search (exploration) for hydrocarbons began in Benin in the 1950s and can be broken down as follows:

- In 1952, the French Geophysical Society CGG carried out a geophysical campaign over the entire sedimentary basin of Benin ;
- In 1964, Benin and the Union Oil of California signed a contract over an area of 15,125 km² for the exploration of the Benin Coastal Sedimentary Basin (BSCB), of which 3,500 km² covered the offshore part. Geological and seismic data acquisition started in 1965 and drilling operations in 1968. During the five (5) years following the signing of the agreement, Union Oil drilled a total of nine (9) wells leading to the discovery of the Sèmè oil field;
- In 1971, Union Oil retroceded part of its domain to Dahorex/Shell Benin and another part to the Zairian company PIVIPOY int. Co.
- In 1979, the Government of Benin and the Norwegian company SAGA Petroleum signed a service contract on the Sèmè oil field. After signing the contract, SAGA Petroleum started production in 1982. A total of eight wells were drilled. On August 27, 1985, SAGA Petroleum's contract was terminated and a team of Beninese engineers took over the management of the Project until a new partner could be found. In the same year, the Beninese Government signed a service contract with the Swiss company PANOCO which abandoned the field in 1986. The national technicians took over the field until a new service contract was signed with the American company ASHLAND in 1990. ASHLAND withdrew in 1992 after drilling three wells, but its expatriate directors remained and created a private Beninese company called Atlantic Petroleum Incorporated (API) to continue the implementation of the project ;
- On March 10, 1989, the Canadian Trilogy Resource Corporation of Calgary and the Government of Benin signed a production sharing contract on onshore Blocks A and B. This contract was terminated in 1992 ;
- In 1989, Benin signed a production sharing contract with International Petroleum Limited (IPL) based in Geneva, Switzerland. This contract was terminated.
- In 1996, the Beninese government terminated the API contract and Beninese executives took over the management of the Sèmè Oil Project until production ceased on December 31, 1998. This stoppage was due to the fall in the price of crude oil per barrel (9 to 10 USD for a production cost of about 12 USD) and to the sale of the "AMAZONE" platform. When the field was shut down, only three (03) wells were still in production due to the lack of work to recondition the field;
- In October 1996, the Beninese State signed a production sharing contract with TARPON BENIN S.A. This contract was terminated in 1999 ;
- In 1997 and 1999, the Government of Benin signed a production sharing contract with the Canadian company Archean Bénin Energy Sarl on Block 2 and Block 3 respectively. The contract on Block 3 was terminated and the contract on Block 2 ended on June 24, 2013 after extension periods;
- On February 1, 1997, the Beninese State signed a production sharing contract with the Abacan-Addax Consortium on Blocks 1 and 4. This contract was recovered by Kerr-McGee Oil & Gas Corporation on December 5, 2000 ;

- In May 2004, a development contract for offshore Blocks 5 and 6 was signed between the Beninese State and TGS-NOPEC (TGSN). Through this contract, TGSN obtains the exclusive license for the acquisition and marketing of seismic data on these blocks ;
- December 2004 a contract for oil exploration and exploitation on Block 1 and the Sèmè oil field was signed between the Beninese State and SAPETRO. This company carried out several works and proceeded to the drilling of five wells including one for exploration, two for appraisal and two for production. It was in the process of restarting production from the Sèmè field when the price of a barrel of oil fell sharply at the end of 2014, dropping from US\$110 to less than US\$30 ;
- In November 2009, the Beninese government signed an exploration and exploitation contract on Block 4 with Compagnie Béninoise des Hydrocarbures (CBH). This company entered into a consortium in 2012 with Shell and Petrobras ;
- December 2009 and October 2010, between the Beninese government and ORANTO, an exploration and exploitation contract on Blocks 6 and 5 respectively;
- March 2011, an exploration and exploitation contract on Block 7 was signed between the State of Benin and the oil company MONCRIEF ;
- In July 2011, an exploration and exploitation contract on Block 3 with Signet Petroleum was signed. This contract was terminated in 2014 ;
- In August 2013, an exploration and exploitation contract on Block 2 with the HUNT OIL Company Benin/ Century consortium was signed.
- In October 2013, an exploration and exploitation contract on Block B with ELEPHANT OIL was signed;
- In 2014, an exploration and exploitation contract on Block A with NS Oil and Gas was signed;
- In December 2014, an exploration and exploitation contract on Block 3 with Frazoil was signed.

It should be noted that the frequent breaches observed in the various contracts are due to the :

- Fluctuating oil prices due to geopolitical problems;
- Non-fulfillment of contractual obligations recorded in the contracts;
- Non-observance of the rules of the art in force in the international oil industry.

The following table (Table 9) présente the 24 main landing sites in the country :

Table 8: Main landing sites in Bénin

Location	Ouémé	Port	Atlantic	Mono
Main Landing sites	Kraké-plage	Port	Fanti-codji	Avlo-plage
	Okou-sèmè		Djako	Kindjèhoun
	Djèffa-plage		Adounko	Yondocodji
			Hio	Nicoucodji
			Amétotocodji	Ayiguinnou

		Hocognoncodji	Atigangonmè
		Assion codji	Séko2
		Djègbadji	Agoué
		Dégouè	Hillacondji
		Houakpè plage	
		Méko	

Source : MAEP 2004



Figure 18: Mapping of landing sites and companies in the oil and gas sector in Benin

4. Negative impacts of the project during the operation phase

On the marine ecosystem

Hydrocarbons spilled on the ground can seep into the subsoil until they reach the water table. They also contribute to the degradation of air quality as a result of exhaust gases from supply ships, crew transport helicopters, engines, generators and production platform flaring. Accidental oil spills, spills of waste and untreated wastewater (production water) from supply ships and the production platform are sources of water pollution. There are no impacts on aquatic plant species as they are virtually absent in the project area. As part of the plant species, mangroves located along the coast will not be affected due to their distance from the sea.

Given the location of the oil platform in Benin's waters, probable impacts can be identified through a loss of fisheries production or threat to fisheries resources and the impoverishment of various ecosystems linked to the future exploitation of oil.

On Humans

The negative impacts of the project during the exploitation phase are : (i) the poor management of waste generated by ships and a possible accidental oil spill could lead to pollution of marine resources, resulting in a deterioration of the health of the people who would consume these resources ; (ii) the pollution of the canal water could lead to a disruption of port activities and (iii) the health and safety of workers.

On fisherfolks

The presence of the oil production platform and pipeline requires, for safety measures, an easement area around the platforms and pipelines. This area is closed to all fishing and other marine activities. This results in a reduction of the fishing area.

Fishermen and fish smokers believe that the installation of the platforms and pipelines will have a negative impact on their activities and income. Among the latter, 19% stated that they had already observed dead fish (Figure 19) ; 42% stated that they had lost income and 2% of the fishers surveyed stated that they had already noticed their nets torn during their activities (Figure 20). 77% of these respondents feared that this would affect their future income (Figure 21).

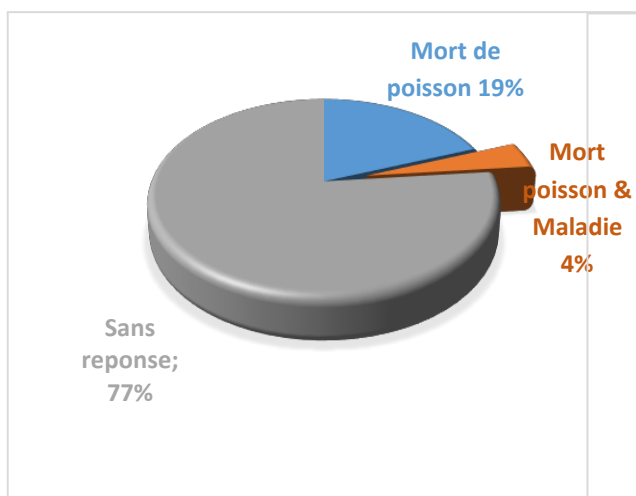


Figure 19 : Damage to fishermen

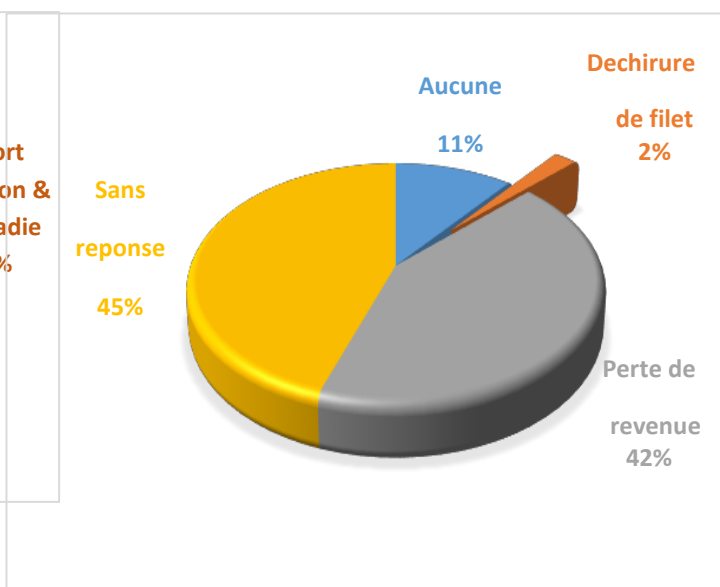


Figure 20 : Consequences of installations on fishermen

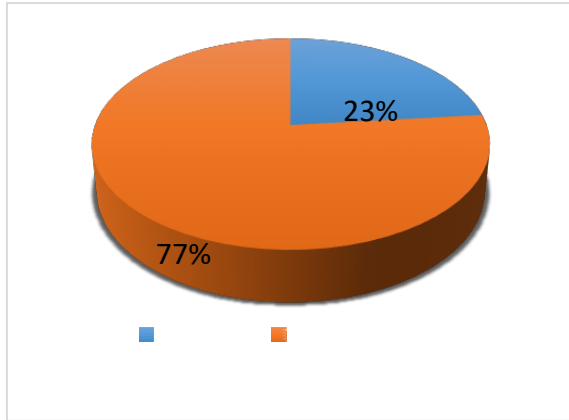


Figure 21 : Damage and nuisance in case of a future installation

Source : JVE-Bénin, 2019

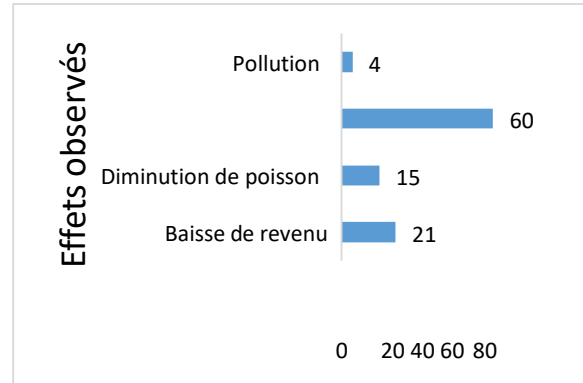


Figure 22 : Observed effects as a result of installation of oil and gas infrastructure

Impact on human health

The exploitation of oil and gas presents disadvantages on human health and especially on sinners (64% of respondents). 32% of respondents said that exploitation causes eye diseases, 15% skin diseases, 6% said they have injuries and 11% said they have noticed pollution (waste discharge, air pollution, etc.).

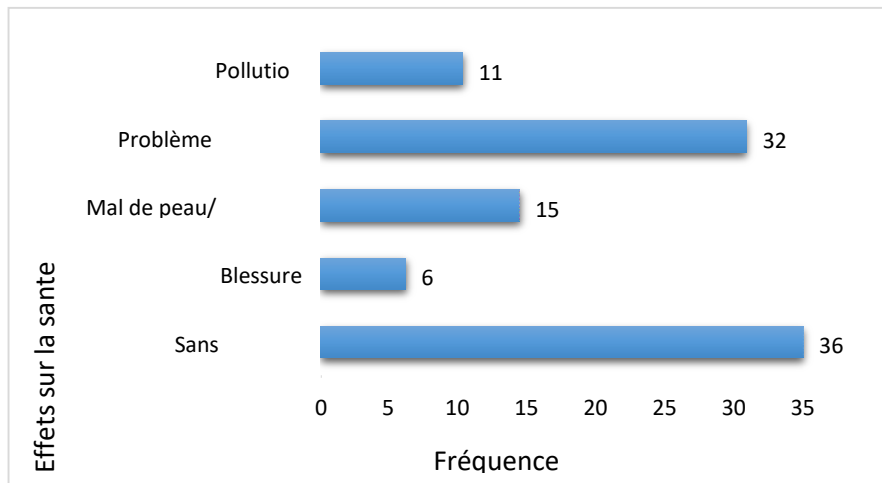


Figure 23 : Effects of oil development on human health

Source : JVE-Bénin

Socio-economic and environmental impacts of oil and gaz development

Information sources have shown that Benin has not been exploiting oil since 1998, but rather is in the exploration phase. Oil platforms and pipelines are being installed in the open sea. Based on the information gathered from respondents during the data collection phase, fishermen and fish-smoking women believe that the installation of platforms and pipelines along the coast of Benin has no impact on their income and on consumers. Despite the likely negative impacts on the biophysical

environment, fishermen and fish processing women currently find advantages in the exploitation of gas and oil. 37% of fishermen and fish processing women say that during the installation of the platforms their children had to work as labourers. This allowed them to earn money from the work done on these infrastructures. According to 13% of these respondents, ecological and nutritious conditions for fish are formed around the pipelines and platforms. These conditions allow the creation and multiplication of marine wildlife habitats under these installed infrastructures. The fishermen who manage to go and do their activities around the infrastructures produce results and therefore see their incomes increase. Meanwhile, 27% of the respondents affirm that there are no benefits from these installed oil and gas infrastructure.

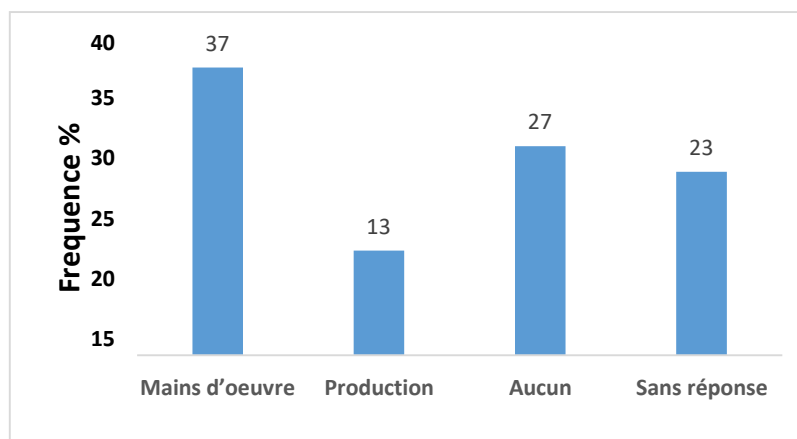


Figure 24 : Benefits of oil and gas development
Source : JVE-Bénin, 2019

5. Recommendations

To Policymakers

- Involve environmental protection agencies, fisheries stakeholders and coastal zone communities in the development of strategic environmental studies and in the identification of areas and periods sensitive to seismic surveys;
- Ensure the implementation of measures to mitigate negative impacts ;
- Establish an inter-ministerial committee to monitor the extractive industries ;
- Protect the natural resource base, human rights and sustainable development plans ;
- Ensure that SEAs and EIA/S are independent;
- Ensure strict adherence to the measures proposed in the Impact Assessments.
- Undertake risk and vulnerability assessments ;
- Avoid seismic surveys in shallow and vulnerable areas such as Marine Protected Areas, mangrove areas, estuaries, seagrass beds and any other areas known to be nurseries ;
- Require a prior environmental impact assessment before authorising a seismic survey and encourage companies to use the "soft start" technique ;
- Establish a regional legal framework with neighbouring countries for offshore oil and gas exploitation ;

- Collaborate with other regional legal frameworks for the marine environment ;
- Improve the government's capacity to negotiate and manage oil companies ;
- Obtain international assistance in negotiations and management ;
- Strengthen environment-related ministries to increase environmental control ;
- Ensure adequate legal infrastructure for the control of offshore oil operations;
- Enforce all laws, conventions and treaties and terminate contracts with companies that violate the law;
- Identify the risks caused by major oil spills, minimize them as much as possible and prepare sufficiently.
- Require operators to provide the necessary insurance for clean-up and potential compensation ;
- Insist on the highest levels of safety for all operations, including drilling, storage, transfer, and transport ;
- Establish a national oil spill and accident fund ;
- Involve local communities in the process of exploration and exploitation of projects ;
- Involve CSOs in the management of hydrocarbons.

To Civil Society

- Ensure strict compliance with the measures proposed in the impact studies ;
- To be the spokesperson for fishermen and fish smokers ;
- To be a control body on the management of hydrocarbons ;
- Ensure consumer/population awareness.

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LIBERIA

1. Background

Fisheries in Liberia contribute about 10% to the country's Gross Domestic Product (GDP), and the sector provides full or part-time employment for an estimated 15,000 fishermen in fish harvest and a further 25,000 fish processors and traders in processing and marketing, providing at least 50% of national protein requirements. It is noticed that small-scale fisheries provide employment for 33,000 people, 60% of whom are women. Small-scale fishers provide the majority of the domestic fish supply, while the industrial sector is primarily operated by foreign companies that export their catch. Women who live in coastal communities often engage in subsistence fishing for their households. The marine fisheries sector contributes significantly to Liberia's socio-economic development as demonstrated below.

- It generated USD 3.6 million in revenue for 2017 (BNF annual report 2017)
- It accounts for an estimated 40,000 people employed directly or indirectly in the sector.
- More than 50% of protein requirements in the Liberian diet come from fish.
- It generates USD 136,000 in foreign exchange export of fish and fisheries products in 2016-2017.

The Liberia Basin presently consists of thirty concessionary blocks. 17 of these blocks are from the continental shelf to water depths of between 2500 to 4000 meters. 13 of the blocs are considered "ultra-deep" with water depths up to 4500 meters (Figure 19) (<http://www.nocal.com.lr/operations/block-status>).

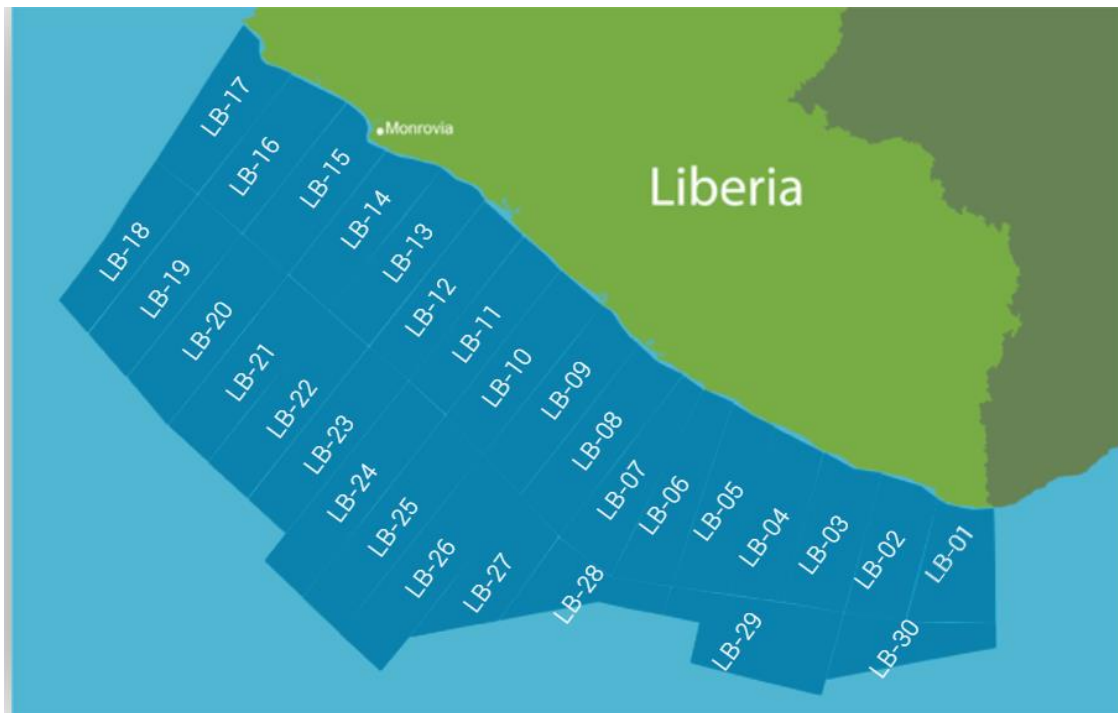


Figure 19: Etat du Bassin pétrolier du Liberia

Source: (<http://www.nocal.com.lr/operations/block-status>)

2. Oil & Gas related Institutional Frameworks in Liberia

The National Oil Company of Liberia (NOCAL) established in April 2000, by an Act of Liberia's National Legislature for the purpose "...of holding all of the rights, titles and interests of the Republic of Liberia in the deposits and reserves of liquid and gaseous hydrocarbons within the territorial limits of the Republic of Liberia, whether potential, proven, or actual, with the aim of facilitating the development of the oil and gas industry in the Republic of Liberia" (nocal.com.lr) is the state recognized entity that oversees the oil and gas management in the country. Prior to the formulation of NOCAL, the affairs of the Liberian petroleum industry had been administered by the Ministry of Lands, Mines and Energy. In 2016, the 2000 Act that created NOCAL was amended to usher in the New National Petroleum (Exploration and Production) Law of Liberia. Under this New Act (Section 9), NOCAL is governed by a Board of Directors responsible for the general policies, overseeing and direction of the affairs of the corporation. In the same vein (Section 12), the day-to-day affairs of the corporation are managed by a President and Chief Executive Officer appointed by the President of Liberia with the consent of the Senate.

The short to long term goals of the Liberian petroleum sector is also guided by the 2012 National Petroleum Policy with the overarching goal of managing Liberia's petroleum resources in an environmentally responsible manner, to optimize returns for Liberia and ensure equitable benefits to the people of Liberia now and in the future. The Petroleum Policy covers Liberia's governance of the upstream petroleum sector, including activities related to reconnaissance, exploration, development, production, transportation of crew oil and decommissioning, as well as provisions for the management of revenues generated by upstream petroleum.

Oil and Gas resources are accessed by international oil companies (IOCs) through Production Sharing Contracts (PSCs) with NOCAL, prior to rigorous bidding processes. Under a PCS, the IOCs will share part of the potential petroleum produced with the country/government in addition to royalties or taxes levied. PSCs are negotiated between the companies and the Hydrocarbon Technical Committee (HTC). This is a cross-governmental committee, chaired by NOCAL. It includes Justice, Finance, Lands and Mines, NIC, EPA and the Legal Advisor to the President. All the PSCs are ratified by the Legislature before they come into effect.

3. Operators and Exploitation Companies

To date, NOCAL has at least 10 existing PSCs with some eight IOCs. Among them are the global oil giants Chevron and Exxon-Mobil (Table 10). These PSCs means that the IOCs are licensed/authorized to carry out petroleum exploration and production activities in the Liberian basin. Besides these companies, NOCAL also partners with other oil & gas service operators such as seismic data companies that conduct geological surveys of the sea-bed.

Table 9: Activities of exploration companies and operators in the Liberian oil sector since 2000 and Creation of NOCAL

Year	Company/Operator	Activity in Oil Sector
2000	National Oil Company of Liberia (NOCAL)	Created through an Act of the 51st National Legislature
2001	TGS NOPEC	Hired by NOCAL to conduct Seismic Surveys on the Liberian shelf

	TGS NOPEC	Completed seismic work program and data submitted to NOCAL
2004	NOCAL	Re-demarcated the Liberian basin into 17 offshore Blocks
	Repsol	Signs PSC with NOCAL for Block 17
2005	African Petroleum	Awarded Blocks 8 and 9
	Oranto	Awarded Blocks 11 and 12
	Broadway	Awarded Block 13
	Woodside	Awarded Block 15
	Repsol	Awarded Block 16
2007		
2009	Oranto	PSC signed for Block 14 and ratified by Legislature
	Anadarko	PSC for Block 10 signed with NOCAL and ratified by the Legislature
2010	Chevron	Enters Blocks 11, 12 and 14 as majority operator
2011	Anadarko	Conducts exploratory drilling in Block 15
2012	African Petroleum	Exploratory drilling in Block 9; announces potentially significant discovery
	Chevron	Drilling exploratory well in Block 11
2019	Core Laboratories	Signs a multi-year Data Management Agreement with NOCAL for the management value addition and re-

		organization of Oil Well Data collected by oil companies that operated in Liberia since the 1970s
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4. Environmental pollution and health issues that communities in Liberia are experiencing or will experience due to oil and gas extraction

In general, the various operational phases of the offshore oil and gas industry, from exploration to production, are known to have adverse socio-economic and environmental impacts on fisheries and fisherfolks worldwide.

Looking at previous studies, existing literature on the oil and gas sector in Liberia, and consultation of different stakeholders concerned by oil and gas in the country, this report has come to the conclusion that though Liberia is an oil-endowed country, it has not started any oil and gas exploitation of importance. Therefore, the following other aspects of this study (e.g. i. Environmental pollution and health issues experience due to oil and gas activities ii. difference in the financial impact/loss of incomes due to oil and gas extraction in Liberia between men and women, iii. risks associated with oil and gas extraction fisher folks (fishermen, fish processing women – members of fishnet alliance in Liberia) and iv. comparison of oil revenue alone to fisheries activities revenue in Liberia) could not be dealt with tangible results.

TOGO

Abstract

The study made use of a participatory methodological approach with potential stakeholders (communities, trade union leaders, consumers, national institutions, etc.). A sample of 165 individuals, members of the three major fishing communities on the Togolese coast (Gbétchogbé, Katanga and Doevi Kopé) was subjected to survey techniques using questionnaires, interviews and group discussions. The majority of the respondents (62.6%) find fishing very difficult against a relatively average profitability. In fact, only 23.7% find it very profitable, 59.7% find it moderately profitable and 15.1% find it unprofitable. In general, the fishing industry appears to be very poorly organized and not very associative. In terms of potential impacts, oil exploitation is likely to produce congestion of maritime and port space, as well as a certain increase in water turbidity, destruction of the habitats of certain species and the migration of certain fish due to installations and noise, pollution of marine waters by hydrocarbons and the extinction of marine and aquatic biodiversity. The problems related to fish consumption noted by the respondents are of two (02) types: diarrhoea (88%) and gastroenteritis (12%). The impacts of the oil and gas facilities identified by the communities are ranked in order of their importance and their physical impacts: damage to fishing tools by the pipeline facilities (19%), the presence of scum buried in the sea sand (13%), olfactory nuisances (9%) and an increase in diseases (3%). Another identified impact is the appearance of black grass on the sea during the months (June-July), which hinders the movement of boats. In addition, cases of respiratory infections such as pneumonia, bronchitis, flu, rhinitis, digestive infections, gastroenteritis, conjunctivitis related to the release of smoke and gas from gas plants are reported by the managers of existing health facilities in the area. On the question of income, over the last 10 years, it has generally decreased at all levels (women and men). The majority of respondents (47%) experienced a decrease of about 20-50%, 37% experienced a decrease of more than 50% and 16% experienced a decrease of less than 20%. 97% stated that there has been a change in income from their activities (fishing and fish processing). In terms of recommendations, the following measures are recommended:

To Civil Society

1. Build capacity and support fishing and fish-processing communities to form organized groups to claim their rights;
2. Assist riparian communities in the implementation of the measures that they themselves may have advocated;
3. Advocate for a redefinition of the mining policy in Togo, which prohibits the exploitation of fossil fuels such as oil, which is known to be dangerous to the environment;
4. Advocate for a transition of the country's current energy policy towards a green economy based on renewable energies;

To policymakers or Government

5. Set up a multi-stakeholder committee for consultation and implementation of measures relating to the potential impacts and risks of oil exploitation in Togo.

6. Improve basic essential services as well as the conditions for financing loans to fish processors' and fishermen's associations for the financing and professionalization of their income-generating activities;
7. Promote renewable energies by encouraging petroleum product marketing operators to invest in the just energy transition;
8. Set up a compensation fund for communities;

With regard to operators involved in the marketing of petroleum products

9. Divestment in petrol stations to invest in renewable energies by financing alternatives to fossil fuels (solar, wind, etc.);
10. Promote fairer and more equitable corporate social responsibility.

1. Background

Togolese fishing is a significant source of employment for about 10,000 fishermen (made up of indigenous and foreign fishermen), 60% of whom are full-time, and 12,000 fish traders and processors, directly supporting about 150,000 people (FAO, 2007). It contributes 4% to the GDP of the primary sector. The value of artisanal fisheries production can be estimated at more than 5 billion CFA francs (US\$ 13,000,000) and the value added by the processing and marketing of fishery products at more than 10 billion CFA francs (US\$ 26,000,000) (FAO, 2007). Togolese fisheries are carried out on maritime, lagoon, river, dams and fish ponds. They are artisanal and industrial at sea and exclusively artisanal in other fisheries. Despite their relative poverty, fishery resources enable fishermen to make permanent catches at sea and in lagoons and seasonal catches in rivers, with annual estimates varying between 12,000 and 17,000 tonnes (DPA, 2018). Apart from fishing resources, the Togolese maritime system abounds in oil resources, the first discoveries of which date back to the end of the 1960s (Direction des Hydrocarbures, 2011). This deposit is reported offshore. The oil reserves that have been discovered and that can be exploited for the moment are offshore, notably the blocks: Block-1 and Block-2 known as OTI-1 and KARA-1, respectively located 17 km and 63 km from the Togolese maritime coast.

2. Methodology

The methodology used was participatory with a mixed approach (qualitative and quantitative). The methodology is presented as follows :

The literature review: It comprises of consulting online documents, reports and articles from national and international institutions for information on:

- The biophysical, human, socio-economic and institutional environment of Togo in order to produce a general description of the biological, human, physical, socio-economic and institutional environment of Togo;
- The political, legal and institutional framework that summarized the policies, laws, strategies, plans, programs, regulations, international conventions and the institutional framework on the water, fisheries, hydrocarbons sectors;
- The fisheries sector, the marine environment, the marine environment and the borehole history;

- The analysis of the initial state of the offshore sites and the environment: Description of the receiving environment (biological, physical, human, socio-economic and cultural) on which the implementation of the project could have consequences;
- Analysis of economic, environmental and social impacts: Identification, analysis and assessment of the impacts (positive or negative as well as direct or indirect and cumulative) on the various receiving environments concerned.

A field Survey: It was conducted using questionnaires administered in interviews and focus groups with the targets (fishers, fish processors and consumers in the study area. It is made up of three fishing communities located (Katanga, Gbétchogbé and Doevi Kopé) within the immediate perimeter of the Togolese offshore deposit.

Study Area

The study area is a highly industrial zone with socio-economic activities with impacts felt on all compartments of the environment (air, water and soil) (Republic of Togo and UNEP, 2007). Three fishing communities (Katanga, Gbétchogbé, Doevi Kopé) located near the perimeter of the two boreholes located 17 km and 63 km from the Togolese coast formed the study area. The fishing industry appears to be very poorly organized and not very associative. Fishermen organized in associations account for 22.3% while those organized in unions account for 9.4% (Bagbohouna, 2018).

Table 10: Sample of respondents in Togo

Communities	Categories of Sampled Peoples	Sampled peoples	Workforce by gender (F=Female; M=Male)
Katanga	Women	48	48 F
	Fishermen	12	12 M
	Consumers	10	5F/5 M
Gbétchogbé	Women	22	22F
	Fishermen	26	26 M
	Consumers	10	5 F/5 M
Doevi Kopé	Women	17	17 F
	Fishermen	12	12 M
	Consumers	8	4 F/4 M
TOTAL		165	

3. Overview of offshore oil exploration and drilling studies in Togo

Since independence in 1960, Togo has initiated several offshore oil exploration operations which are summarized in the tables below:

Table 11: Overview of seismic surveys carried out during oil exploration in Togo

<i>Search in the 1990s</i>	
Year	1999
Contractor	PGS
Technology	3D Seismic
Prospecting Area	Togolese Offshore Block 1 and 2

<i>Search in the 1990s</i>	
Year	December 2008 – May 2009
Contractor	TGS
Technology	2D Seismic
Prospecting Area	Togolese Offshore Block 1 and 2

Source : Direction des hydrocarbures, 2011 ; cited in EIES, 2012

Table 12: Presentation of drilling carried out during oil exploration in Togo

<i>Search in the 1960s</i>	
Year	1969-70
Prospecting zone :	Block A
Actors/operators :	Union Carbide
Technology used	Drilling
Results and Conclusions :	drilling of two wells (Lomé1 and Lomé2) with the presence of hydrocarbons
<i>Search in the 1980 :</i>	
Year	1984/86
Prospecting zone :	Block A
Actors/operators :	Texaco
Technology used :	Drilling
Results and Conclusions :	Drilling of two wells (Haho et Mono)
<i>Search in 2000</i>	
Year :	2004/2006
Prospecting Zone :	Block B
Actors/operators :	Hunt Oil
Technology :	Drilling
Results and conclusions :	Drilling of two wells (Barracuda et Capitaine). No result

Source : Direction des hydrocarbures, 2011 ; cited in EIES, 2012

4. Regulatory, Institutional and Legal Frameworks

The analysis of the framework takes into account hydrocarbon regulations, decentralization and local liberties, management of waste removed on board ships, land and state legislation, in particular the new land and state code, the mining code, the water code, regulatory texts relating to environmental impact assessment and public participation, and the new investment code for the Togolese Republic of 2019. It should also be mentioned that Togo's Extractive Industries Transparency Initiative (EITI) lends itself as an instrument for good governance and management of the extractive sector because it is based on the principles of wealth management for the benefit of citizens, transparency in revenues and expenditures relating to extractive industries and the involvement of all stakeholders in the search for solutions, among others.

At the institutional level, the management, control and monitoring of Togolese fisheries is the mandate of the Ministry of Agriculture, Animal Production and Fisheries. This institution develops and enforces measures for the conservation and management of fisheries production in the country. These include, inter alia, the following conservation and management measures:

Measures relating to fishing gear: These concern the control of the mesh size of fishing nets. The standard in force is (40-60 mm);

Measures relating to fishing vessels: Although not determined, these concern fishing vessels (e.g. pirogues);

Measures relating to fishing activity as stipulated by the decree regulating fishing, Law No. 98-012 of 11 June 1997.

Other ministries such as those in charge of the environment and mining are institutions in charge of implementing policies relating to the protection of the environment and mining and extractive resources (e.g. hydrocarbons, gas, etc.) The National Environmental Management Agency (ANGE), the technical arm of the Ministry of Environment, Nature Protection and Sustainable Development, is the agency empowered to monitor, execute and implement environmental studies, assessments and monitoring of projects and activities with a view to their approval by the parent ministry.

5. Geographical Position of oil deposits (block-1 and block-2)

Oil exploration results have confirmed the presence of a significant amount of offshore oil. A possible exploitation of this deposit could only start with these two blocks (conf. The sharing and production contract signed in 2010 by the Togolese government with the company Eni-Togo).

Table 13: Geographical coordinates of wells in Togo

Wells	Geographical coordinates (UTM WGS84 31 N)	
	E	N
Oti-1	319159 m	664653 m
Kara-1	348000 m	626893 m



Figure 205: Location of wells and their distance from the Togolese Coast
 Source: EIES, 2012

6. Oil and gas extraction companies in Togo

To date, Togo has not yet officially started any oil or gas extraction activity on its soil, maritime coast and water bodies, despite the existence of offshore oil. The Italian company Eni-Togo was the company authorized to operate in the two blocks of oil wells, and this since January 2013, but due to the lack of agreement with the Togolese state, the exploitation could not take place.

It should be noted that the State of Togo encourages any activity that is conducive to the growth and development of the country. Consequently, the government is working hard to attract the necessary foreign investment. One reason that motivated the signing of the sharing and production contract in 2010 with the Italian company Eni-Togo for the exploitation of the deposit. With the new National Development Plan (NDP: 2018-2022), there is no guarantee that the country will decide not to seek investment to start the project, which is currently on 'stand-by'. The NDP requires significant fund raising for its implementation and success. Aiming for accelerated growth, the country has focused its development on the extractive industry (Axis 1 of the NDP). Could this not (probably) lead to a recourse to oil extraction if the investment opportunity arose?

It is hard to find the different parties involved in oil joint ventures since the oil is not yet exploited there. However, marketing companies for imported petroleum products are legion in the country with joint

ventures between the State and local and/or foreign private international actors. These include, among others Shell (now Togo Oil Company), Total, MRS, Sanol, Oando, Energium, etc.

7. The impacts of Oil/Gas facilities

Although benefits have surfaced with the West Africa Gas Pipeline (through WAPCO), the majority of the impacts are negative and can be summarized as follows:

- The majority of respondents stated that they had to be relocated for the construction of the WAPCO plant and for certain pipeline facilities. This resulted in relocation to other sites, making their daily lives even more difficult, as some were relocated away from their work environment;
- The presence of the forbidden zones around the pipeline installations (on a minimum radius of 1 km) at sea has restricted fishing areas (zones which were previously accessible to them and which allowed them to make good catches);
- The decrease in catches has resulted in lower incomes for fishermen and women fish processors.
- The tearing and sometimes complete destruction of nets by the bolts of the gas pipeline when fishing;
- Houses and gardens of communities are taken over and/or destroyed.

Health impacts

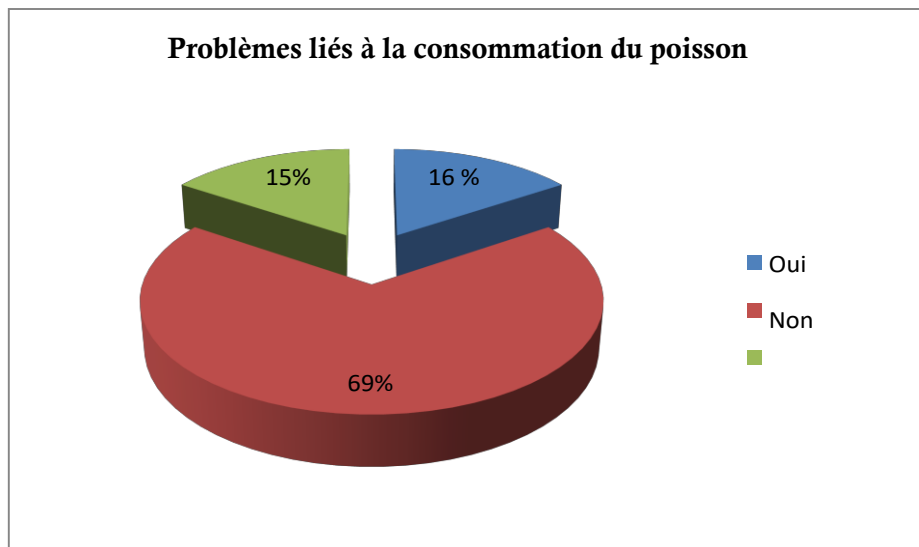


Figure 26: Problems related to fish consumption

Nature of the health problem following fish consumption

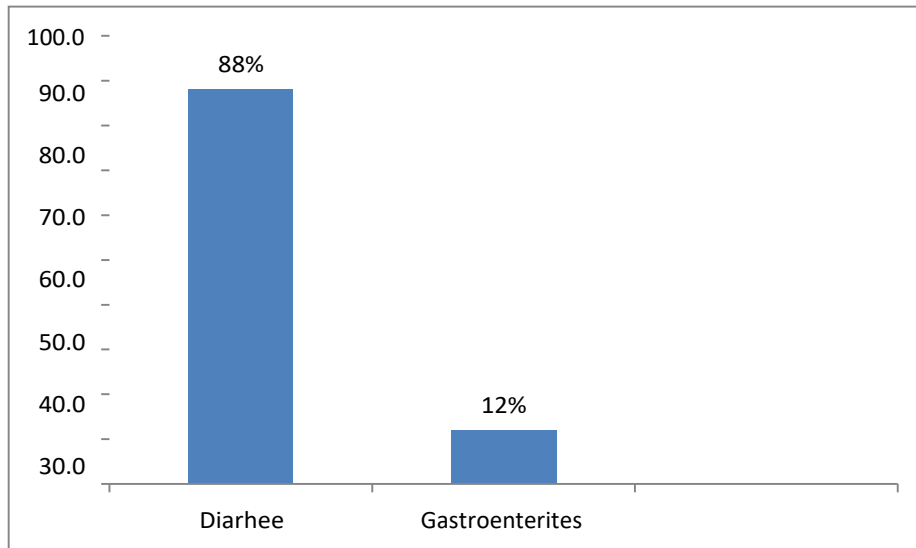


Figure 27: Health issues recorded among consumers

The problems related to fish consumption noted by the respondents are of two (02) types: diarrhea (88%) and gastroenteritis (12%). These health problems were identified by the respondents as the most recurrent in the area. This is justified by the quality of the food consumed and the lack of hygiene that prevails in these localities and especially the illegal practices of catching fish (with the use of chemical products such as carbide) and not least of all the leaks and intentional or involuntary spills from ships transporting petroleum products into the sea. Respondents stated that fish caught using carbide or smelling of oil is different from fish caught in a normal fishery. Also, this fish tastes different and decomposes quickly. This information was consolidated during our interview with the people in charge of the health facilities in Gbétsoygbé and Katanga. Indeed, the information collected from these institutions proves that the above-mentioned diseases are common in these coastal communities.

Furthermore, on the basis of the information collected at the health centers of the riparian communities, the following health impacts were identified. These are: respiratory infections such as pneumonia, bronchitis, flu, rhinitis, digestive infections, gastroenteritis, conjunctivitis which are probably related to the release of smoke and gas from the plants.

Reproductive health issues

In relation to the reproductive health problem, health officials do not know whether populations have experienced reproductive health problems or not. Nevertheless, interviews with a woman in Gbétchogbé indicated an increase in cases of miscarriage in recent years. A situation she linked to pollution from gas and smoke released in the industrial zone (heavy industrial activities and road traffic) where their communities live. Indeed, according to scientists, air pollution also has effects on the reproduction and development of the foetus. Air pollution has different consequences on our health depending on whether we are already in poor health : children and the elderly, who are more fragile, will be more sensitive. The effects of air quality also depend on the quantity and duration of the pollutants we come into contact with. Impacts caused by toxins and other pollution from the oil production process (Table 15).

Table 14: Impacts of petroleum toxics on health/environment

Chemical substances	Part of the oil production process	Impacts on health/environment
Benzene	Produced water	<p>Carcinogenic, toxic to reproduction and development (ICRC, 2008).</p> <p>Benzene fumes and vapours can cause neurological disorders (headache, dizziness, agitation, irritability, drowsiness, convulsions, drunkenness),</p> <ul style="list-style-type: none"> - Gastrointestinal disorders accompanied by repeated vomiting, - anemia due to toxicity to blood cells and bone marrow (benzolism), - affections of the upper and lower respiratory tracts : acute manifestations such as pulmonary and laryngopharyngeal irritations, or chronic respiratory manifestations (bronchitis, emphysema). - eye (conjunctivitis) and skin irritations.
Toluene	Produced water	Toxic for development
Mercury	Produced water and drilling fluids (mud)	Toxic for development, endocrine disruptor, neurotoxic, toxic for reproduction
Zinc	Produced water and drilling fluids (mud)	Suspected hematotoxic, developmental toxicity and reproductive toxicity
Lead	Produced water and drilling fluids (mud)	Carcinogenic, toxic to reproduction and development (e.g. lead and certain glycol ethers are likely to affect human fertility (INRS, 2018).
Sodium	Produced water	Contaminates the soil, and

		renders the development of vegetation unfit for habitation.
Hydrogen sulphide	Gas Extraction	Suspected hematotoxic, nemotoxic and toxic to reproduction
Sulphur dioxide	Gas flaring	Mainly responsible for acid rain.

Source : Adapted from Paul Epstein and Jesse Selber (2002) ; citd in Zirimwabagabo (2010) consulted on https://www.memoireonline.com/02/12/5405/m_Problematique-de-l-exploitation-petrolier-sur-la-destruction-de-l-environnement-dans-le-territoire12.html

The results of the survey show that the majority (69%) have had no problems (in the last 10 years) related to fish consumption. However, 16% of the respondents say they have had problems related to fish consumption and 15% have no idea whether or not fish consumption has caused them health problems.

Impacts on fishing

The likely impacts of oil and gas facilities identified by communities are, in order of importance, other impacts (57%) followed by physical impacts such as :

- damage to fishing tools (19%);
- the presence of wrecked drilling equipment buried in marine sand (13%);
- olfactory nuisance (9%) and ;
- the increase in diseases (3%).

Environmental and Climate Change impacts of the commercialization of petroleum products

With the proliferation of actors involved in the marketing of petroleum products in Togo, there are risks of pollution, particularly leaks during the transport of petroleum products, which have impacts on the soil, water and air, and fishery resources (in the case of transport by sea). Decreases in catches may be recorded in the event of an oil leak or spill leading to a loss of income for fishing communities and food poisoning sometimes due to the consumption of oil derivatives contained in fish, for example. The economic operators, which are the service stations in their operation, encourage the consumption of fossil products by the populations, and consequently contribute to the effects of climate change.

Difference in income between men and women due to gas exploitation

Change in fishing income observed by communities

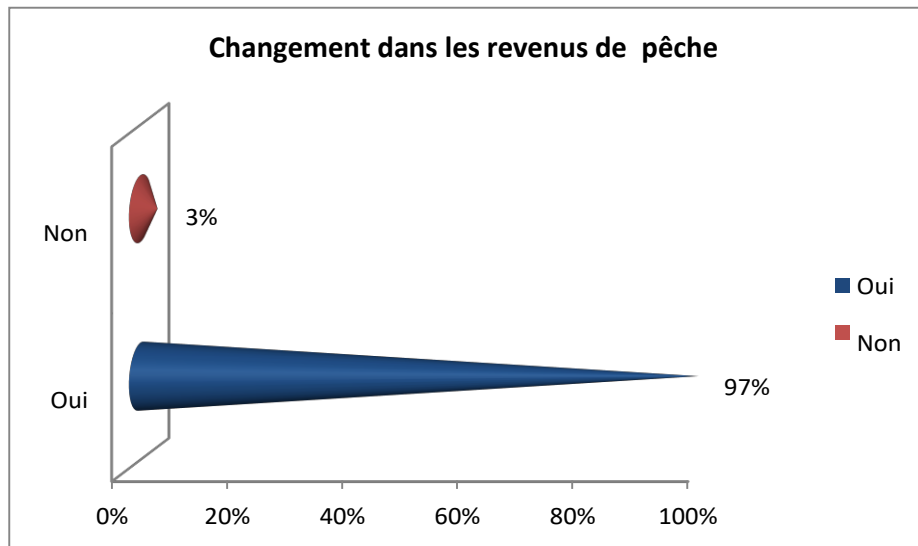


Figure 28 : Change in fishing income

Almost all respondents recognize a change in their income. In general, the fisheries practised by men and the processing which is the preserve of women have recorded a change in income. 97% said that there has been a change in income from their activities (fishing and fish processing) over the last 10 years. At the same time, a very small proportion of 3% agreed that there has been no change in income from their fishing activities.

It would be important to know what kind of change the actors (fishermen and women fish processors) have experienced in their income.

Type of change in fishing income

Fishermen and processors unanimously agreed that there was no increase in their incomes. As a result, all men and women have experienced a decrease in their incomes over the past 10 years (Figure 29).

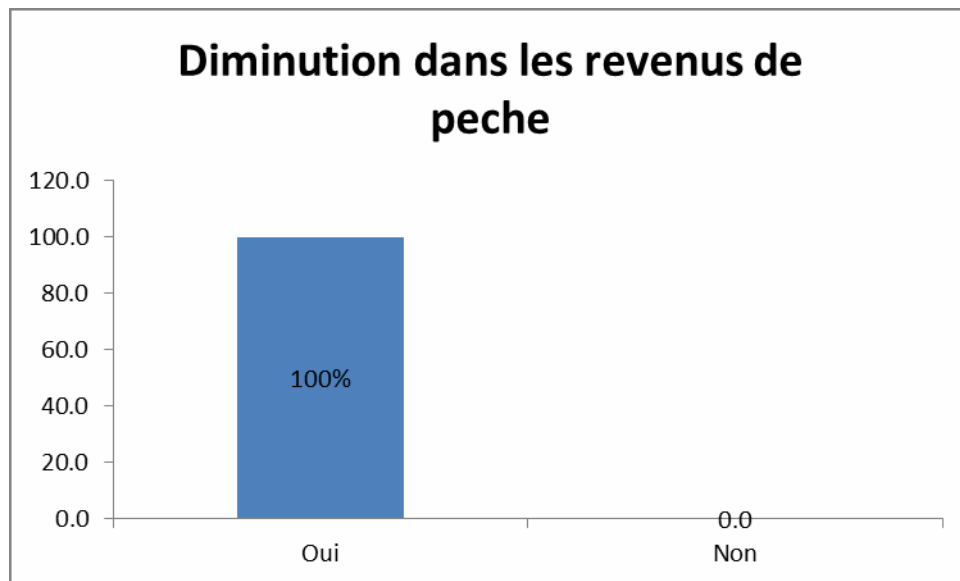


Figure 29 : Type of change in fishing income

From all of the above, the fishing industry acknowledges a decrease in catches as well as in their income. This could worsen their socio-economic situation if no action is taken. It would therefore be interesting to analyse how the sector is experiencing a decrease in fishing income.

Indeed, the gas pipeline installations have restricted fishing areas, thus reducing catches and, by ricochet, have a negative impact on the communities' revenues, especially those of fishers and processors. This was verified with the respondents who confirmed the restriction of fishing within a radius of 1 km due to the gas pipeline installations in the sea.

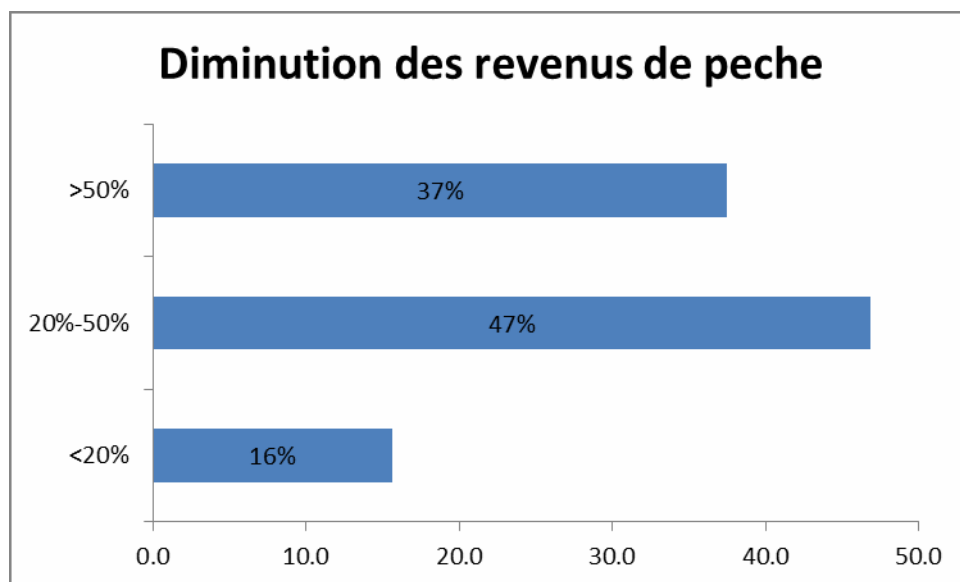


Figure 30 : Percentage of decrease in fishing income

To corroborate this fact, it would be interesting to see how this decrease is presented in the communities. Thus, Figure 29 (below) shows the percentage decrease in income over the last 10 years. Over the last 10 years, incomes have generally declined at all levels (women and men). The majority of respondents (47%) experienced a decrease in the order of 20-50%, while 37% experienced a decrease of more than 50% and 16% experienced a decrease of less than 20%. The reasons or factors behind the decrease in respondents' income are summarized. (See Figure below). The reasons for the decrease in the incomes of the fishing communities are explained by :

- - Illegal fishing practices (85%)
- - The presence of pipeline facilities (9%)
- - Oil exploitation (6%)

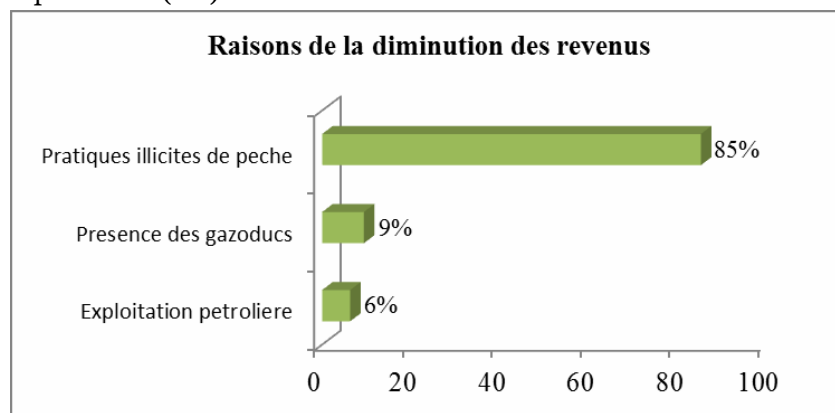


Figure 211 : Reasons for the decrease in income of fishing communities in Togo

In the focus groups, illegal fishing practices emerged as a major cause of the decline in fishing income. The following bad practices are taken into account:

- Over-capture;
- the use of very fine-mesh nets (not conducive to the presence and development of fry on which large fish feed);
- The use of carbide (a chemical used by fishermen, which has the property of either weakening or killing the fish in order to facilitate their capture);
- The projection of light (used to attract fish by light jets).

8. Potential/future impacts of oil exploitation

In the event of oil exploitation, the following impacts could occur:

Economy : reduced income for fishers and fish processors

Health : Contamination of fish by oil spills/leakage or transport results in reduced catches and revenues ; this could lead to protein deficiency in the feed ration, cases of diarrhoea, gastroenteritis, reduced reproductive capacity and increased disease due to chronic malnutrition.

The combustion of oil during flaring releases volatile chemical compounds (benzene, acid emissions, GHGs that have dangerous impacts on health and the environment). A study by Bamali & Tchiunguilo (2012) in Togo's industrial zone revealed that greenhouse gases generate sulphur and nitrogen oxides and volatile compounds that are dangerous to human health.

For example, following a 2006 spill of 528 t of toxic petroleum waste in Abidjan, Côte d'Ivoire, a study described the following clinical manifestations in people exposed to this waste (Kouassi et al., 2015) :

- Respiratory and pulmonary disorders (74.5% of cases), with disorders of the ENT sphere (31.0%), cough (48.8%), chest pain (37.9%), dyspnea (9.5%) and a few cases of haemoptysis; other works have shown that even the ingestion of oil leads to pneumopathies (Muganga et al., 1986) ;
- Digestive disorders, with abdominal pain (36.2%), diarrhoea (23.0%), abdominal bloating (19.9%) and even vomiting (9.9%) ;
- Neurological impairment (vagal discomfort ;
- Skin disorders;
- Ophthalmological disorders;
- Cardiovascular disorders;
- Gynaecological problems.

Environment : the depletion of fish stocks, the destruction of marine and aquatic flora and fauna resulting from the deposition of oil in the respiratory organs of animals and plants, the destruction of rich mangrove and thicket ecosystems in the biosphere reserves in the south of the country.

9. Mapping Oil risks

- Risks of continuous or recurrent discharges, oil spills ;
- Risks of accumulation of impacts already generated (air pollution, diseases and respiratory infections) ;
- Risks of reproductive health problems ;
- Risks of water pollution (sea water, related water bodies such as the Mono, Haho and Lake Togo rivers, the Lomé lagoon, etc.) ;
- Destruction of fragile coastal ecosystems (e.g. mangroves) ;
- Contamination of fisheries resources ;
- Destruction of fisheries livelihoods ;
- Increased health risks with the release of dangerous gas and dust from flaring;
- Risks of production and proliferation of plastic bags as petroleum-based products.

Comparison Fisheries/Oil

Table 15: Comparative Table Fisheries/ Possible Oil Exploitation in Togo

Fisheries	Oil
Practiced	Not produced
- Contributes 4% to the primary sector with a value of 5 billion CFA francs (US\$ 13 000 000) and 10 billion CFA francs (US\$ 13 000 000) with the value chain (US\$ 26,000,000) (FAO, 2007)	No idea what his contribution will be, but might benefit a minority based on other countries' experiences.
Feeds 22,000 people directly and 150,000 peoples directly A source of income, employment and food for millions of people.	High probability of feeding a small portion of the population
Ensures food security	Decreases communities' food security
Illegal practices destroy fishing potential	Impoverishes communities
Revenue capable of supporting the sustainability of ecosystems and the well-being of communities	Enormous health and environmental damage/Local development leaves behind
Women are very active	Enormous but not equitably distributed income /risk of human right violence and gender inequality
	Legislative and regulatory framework lacking with risk of corruption and lack of transparency

11. Recommendations

1. Establish a permanent framework for consultation and dialogue between those involved in the fisheries sector and other players who share the sea as an area of intervention;
2. To apply effectively the environmental and social management plans for infrastructures and projects in the intervention zone of the Togolese coast;
3. To carry out regular health examinations of the communities living along the Togolese coast;
4. To undertake a strategic environmental assessment study of the entire Togolese coast;
5. To restructure, reorganize, professionalize, intensify information and sensitization of the fishing communities on the companies operating on the territory and the impacts and risks associated with the exploitation of hydrocarbons;
6. Ensure compliance with legal fishing practices.

More specifically:

To Civil society

7. Build capacity and support fishing and fish-processing communities to form organized groups to claim their rights;

8. Assist communities living along the coasts and water bodies in the implementation of the measures that they themselves may have advocated;
9. Advocate for a redefinition of the mining policy in Togo, which prohibits the exploitation of fossil fuels such as oil, which is known to be dangerous for the environment;
10. Advocate for a transition of the country's current energy policy towards a green economy based on renewable energies.

To policymakers

11. Set up a multi-stakeholder committee for consultation and implementation of measures relating to the potential impacts and risks of oil exploitation in Togo.
12. To improve basic essential services and the conditions for financing loans to fish processors' and fishermen's associations for the financing and professionalization of their income-generating activities;
13. Promote renewable energies by encouraging petroleum product marketing operators to invest in the just energy transition.
14. Set up a community compensation fund.

To operators involved in the marketing of petroleum products

15. Divestment in petrol stations to invest in renewable energies by financing alternatives to fossil fuels (solar, wind, etc.).
16. Promote fairer and more equitable corporate social responsibility.

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CROSS-COUNTRY COMPARISON

OIL AND GAS PRODUCING COUNTRIES

Policy, Institutional and Regulatory Frameworks in the Oil and Gas Sector

The study shows that oil and gas producing countries have established structures and institutional frameworks regulating the oil, gas and fisheries sectors. In addition, there are policies to regulate and control the exploitation of oil and gas. However, much of the institutional arrangements are weakened, as is the effective implementation of the duties and responsibilities of these institutions. Furthermore, there is a certain lack of control and monitoring of the performance of these institutions. Also, concerns about transparency and corruption around the oil industry are highlighted in the producing countries.

Today, there are several laws and policies that, if properly implemented, can help solve the environmental problems of oil spills and gas flaring. In Nigeria (Africa's largest oil producer), for example, these laws exist but suffer from enforcement by the state and by the companies holding concessions for oil and gas exploitation sites. Examples include: the Environmental Impact Assessment Act, the Environmental Directive and Standard for the Petroleum Industry in Nigeria (EGASPIN) of 1991 (amended in 2002), and the National Environmental Policy Act, the Oil Spill Detection and Response Agency (Rim-Rukeh, 2015). The result is the elevation of oil money above environmental interests. In Ghana, a law provides for provisions and allows communities to benefit from oil and gas revenues through district and traditional leaders, but does not provide for substantial benefits to local communities. On the other hand, a draft oil revenue management bill has been proposed by the government in this country that provides for a certain fund for future generations and a short-term fund for national development but it has been slow to become a law of the republic.

Furthermore, in all producing countries, none of these laws specifically address the concerns of fishing communities in terms of livelihoods and their rights as populations directly affected by the offshore oil industry. In general, the sustainability of community livelihoods in oil exploitation processes appears to be absent in the oil and gas economy.

➤ **The particular case of Nigeria**

With a few exceptions, it must be said that in countries like Nigeria (the second largest gas flaring country in the world) where exploitation began in colonial times, there were no laws and policies to control oil pollution (the Petroleum Act 1969 did not address the environmental protection aspect, including gas flaring and other oil spills). Under the Petroleum Act, only activities such as "drilling" and "production" are concerned and the Minister in charge of oil is only entitled to request a feasibility study on the use of gas five years after a company starts production; this is contrary to the principles of rational environmental management. It goes without saying that pollution was allowed during the first five years of gas production before the possibility of a feasibility study was even initiated. Gas flaring was banned in 1984.

Moreover, inequalities seem to have persisted for several decades despite the significant revenues received by the State from production quotas, block allocation bonuses, taxes on oil companies and the flow of FDI (Foreign Direct Investment) from these companies. We are also witnessing a "crumbling of the national cake" as a result of an inefficient redistribution policy and a legal framework for oil activities that introduces inequalities. There is a dichotomy between the host communities that benefit from the financial spin-offs and those that are excluded from them. Dissension also exists within these host communities because of the capture of financial resources by the elites. We then speak of geographical rents that contribute to the unequal development of the territory.

Companies involved in oil and gas extraction

They are virtually the same in countries that exploit oil and gas, with some differences. They are multinationals from the USA, Canada, Europe, Asia and Latin America and some African and national companies. They include Shell, Exxon-Mobil, Chevron, Agip, Texaco, Tullow Oil & Gas, Kosmos Energy, Anadarko Petroleum Corporation, Sabre Oil & Gas, EO Group, Petro SA, CNR INTERNATIONAL (a subsidiary of Canadian Natural Resources Limited), FOXTROT INTERNATIONAL LDC, STRATIC, VANCO Côte d'Ivoire LTD, TALVERAS ENERGY RESOURCES Ltd, EDISON INTERNATIONAL SPA, DEVON ENERGY CI Ltd, SINOPEC, OIL INDIAN LTD, YAM'S PETROLEUM, GROUPE AL THUMI, UMIC, Oranto, African Petroleum, Broadway, Repsol, TGS NOPEC, NOCAL (Liberia), Woodside, Core Laboratories, etc.

Some companies are contracted by countries for technical and data organization studies on oil and gas and others for the drilling, exploration, production and marketing of oil and gas.

Nigeria is the leading oil producer in Africa. In Ghana, since 2010, the oil sector in Ghana has generated more than US\$3 billion in revenue and is currently the second most important sector for the economy. On the fishing side, it contributes to 60% of household protein needs and 3-5% to GDP and the agricultural sector. It is, however, facing overexploitation, as illegal fishing methods and poaching, among other factors, have combined to reduce fish catches.

In many of these oil producing countries, local companies have emerged as a result of the local content laws adopted by these countries.

Oil and gas impacts in West Africa

In general, serious pollution incidents are encountered in oil and gas producing countries and particularly in fishing communities. These problems are of a health, social, economic and environmental nature. In the exploitation process (drilling-exploration-transport-production-marketing), there are impacts:

Health impacts : in the case of oil spills, pollution affects fish and other crops, leading to disruption of the diet, the appearance of cases of chronic diseases (eye irritation, respiratory illnesses, cancers, etc.) in the population with the increase in the car fleet due to the fall in oil prices.

Social impacts: they include scarcity of fishing space, abandonment of fishing and agriculture, destruction of livelihoods, depletion of fish stocks, high prices of fish products, disruption of household economies, increased poverty in fishing communities and women fish processors.

Environmental impacts : These are the following impacts : destruction of mangroves, proliferation of phytoplankton, aesthetic pollution of beaches, imbalance of micro-organisms, water pollution, loss of soil productivity, appearance of forms of cancer in aquatic animals, air pollution due to flaring, water pollution due to leaks and spills of petroleum products into the sea.

Economic impacts : There has been a marked increase in government revenue but an increase in vandalism of oil and gas pipelines and infrastructure, on the one hand, with a drop in income among fishermen and women fish processors, on the other hand, linked to the perverse effects of pollution from spills and discharges from the oil and gas industry.

Difference between men and women in the financial impact and loss of revenue due to oil and gas extraction in West Africa

The impacts are strongly felt by fishermen and women fish processors. Both categories of actors are experiencing a decrease in income in their activities and women are experiencing even more. They, who depend on the catches made by men, are forced to sell fish at high prices in order to provide for their families. Most of the time, they come to support the family and even the men, which affects their financial capacity to realize themselves and make the most of their activity. With the insufficient professionalization of this sector and the lack of adequate micro-finance systems, they are more inclined to spend more than to save.

Risks associated with fishers in oil and gas extraction (fishers, women working in fish processing - members of the alliance of fishers' networks) in West Africa.

The risks are enormous and are the multiplication in intensity, extent, duration and accumulation of the actual and potential impacts already identified on behalf of this study.

Comparison of Oil Revenues to Revenues from Fishing Activities in West Africa

It is clear that the oil and gas sector brings in enough revenue for the economies of the producing states on average in the tens of billions of US dollars (US\$19.39 billion in Ghana), while fishing revenues in general are in the order of US\$1-10 billion in this study. However, it is important to recall that with the start of hydrocarbon exploitation, fishing revenues have been declining. Thus, it is 55.25% in Nigeria, which is known for its old and important oil production.

For men and women with no Western education and no skills for employment in a modern work environment (in this case fishermen and women processors), the loss of traditional means of survival has intensified poverty, relegating the prosperity of this important social and economic stratum to the bottom rung of the ladder.

NON OIL AND GAS PRODUCING COUNTRIES

Policy, Institutional and Regulatory Frameworks in the Oil and Gas Sector

The study shows that non-oil and gas producing countries have established structures and institutional frameworks regulating the hydrocarbon and fisheries sectors. Benin, for example, with its short period of oil infrastructure development, has developed oil-related regulatory instruments and institutional frameworks. For Togo, which has not yet had an active field of exploitation, the frameworks that exist

are that of conventional energy, hydrocarbons, and mining, but no framework dedicated to oil exploitation.

The fisheries sector is important in these countries, contributing on average nearly 5% of the primary GDP of the countries with millions of people depending on it for their livelihood.

Companies involved in oil and gas extraction

In all these countries, the State owns the oil and gas deposits through government institutions (State companies and agencies, the Presidency of the Republic and the ministries in charge of oil and gas) which may be formed in consortium with multinational companies that have more financial capacity to develop the exploitation projects. These companies or multinationals are practically the same as in the producer countries concerned by this study. Benin, which had a short production period, has most of them. They are multinationals from the USA, Canada, Europe, Asia and Latin America and some African and national companies. They include, among others: Shell, CGG, Union Oil, Shell, PIVIPOY, SAGA Petroleum, PANOCO, ASHLAND, Atlantic Petroleum Incorporated (API), Trilogy Resource Corporation of Calgary, International Petroleum Limited (IPL), TARPON BENIN S.A., Archean Bénin Energy Sarl, Kerr-McGee Oil & Gas Corporation, TGS-NOPEC, SAPETRO, Compagnie Béninoise des Hydrocarbures, Petrobas, Oranto, MONCRIEF, Signet Petroleum, HUNT OIL COMPANY Benin, Century Oil & Gas, SOBEH, Elephant Oil, NS Oil, Frazoil, Eni, etc., etc., etc. In Togo, only the multinational ENI was co-managing a possible offshore oil exploitation which did not come into being. However, marketing companies exist with known multinationals such as : Shell, Agip, Oando, Total, etc... Some companies are contracted as in Benin for technical and data organization studies on oil and gas and others for the drilling, exploration, exploitation, production and marketing of oil and gas

Oil and gas impacts in West Africa

In general, serious cases of pollution can occur and are of a health, social, economic and environmental nature. These are:

- ***Health impacts:*** in the case of oil spills: the destruction of fish stocks and other crops, and in the case of air pollution, cases of chronic, respiratory diseases and eye irritation in the population.
- ***Social impacts:*** shrinking of fishing grounds due to exploitation facilities, reduction of fish stocks abandonment of fishing and agriculture, destruction of livelihoods, high fish prices, disruption of household economies, increased poverty in fishing communities and women fish processors.
- ***Environmental impacts:*** destruction of mangroves, proliferation of phytoplankton, aesthetic pollution of beaches, imbalance of ecosystems, water pollution, loss of soil productivity, appearance of forms of cancer in aquatic animals, air pollution due to flaring, water pollution due to leaks and spills of petroleum products.
- ***Economic impacts:*** the sharp increase in government revenue, vandalism of pipelines, and declining incomes among fishermen and women fish processors.

Difference between men and women in the financial impact and loss of revenue due to oil and gas extraction in West Africa

This difference in terms of impacts between the two genders is expected to be similar to that in producing countries, particularly the impoverishment of fishermen and women processors, with a major difficulty observed among women, who are the lungs of the household.

Risks associated with fishers in oil and gas extraction (fishers, women working in fish processing - members of the alliance of fishers' networks) in West Africa.

The risks are very enormous and may stem from the increase in intensity, extent, duration and accumulation of the already existing and potential real impacts identified in the producing countries.

Comparison of Oil Revenues to Revenues from Fishing Activities in West Africa.

The oil and gas sector brings in enough revenue for the economies of the producing states on average in the tens of billions of US dollars. Nevertheless, the fisheries sector contributes significantly to the economies of its stakeholders, namely fishermen and women processors. It thus contributes significantly to the primary economy and is a sector that provides employment, income and livelihoods to hundreds of thousands of households. Moreover, revenues from hydrocarbon exploitation do not always reach the communities living along the river in their daily activities and lives, especially the men and women in the fishing sector.

PART C: CONCLUSION

MAJOR FINDINGS

In the context of this study, the analysis of the actual and potential impacts of oil and gas exploitation on the fisheries sector revealed important aspects of the exploitation of these deposits in West African countries. Different situations can be observed with regard to the exploitation of oil, the place of hydrocarbons in the economy or the real risks of environmental degradation, in terms of health and social conditions in the countries.

As far as the producing countries are concerned, the environmental and social impacts and risks are significant and destructive of the economic, social and health fabric of fishing communities, women involved in processing and consumers.

Ecologically, marine and aquatic, terrestrial and wetland ecosystems are negatively impacted, leading to environmental destruction, loss of biodiversity and compromising the survival of species and the livelihoods of communities living along the shoreline of hydrocarbon exploitation sites. As a result, poverty and hardship would be entrenched in the artisanal fisheries sector of these countries, which occupies an important socio-economic stratum contributing to a viable and sustainable local economy.

Non-exploiting countries present the same destructive risks presented in the case of producing countries.

On the other hand, one constant is to be underlined, that of the actors who take part in this extraction. Three types of actors are constantly mobilized, the six major companies (Exxon-Mobil, Shell, BP, Total, Chevron Texaco, ENI), the national companies (e.g. NNPC, GNPC, PETROCI, NACOL), whose management is often controversial, and the smaller independent companies (Tullow Oil, Kosmos Energy, etc.). They form consortia (joint-venture contracts) to maximize profits and minimize drilling and exploitation risks. It is also a way for national companies to develop their reserves without taking on all the risk involved.

Table 16: The majors (Companies) and their oil and gas interests in the two major operators in West Africa

Countries	Mother Companies	Joint-venture Companies	Shareholding composition
Nigeria	Royal Dutch Shell	Shell Petroleum Development Company of Nigeria Limited (SPDC): Shell Nigeria	NNPC: 55% Shell: 30% Total: 10% ENI-Agip: 5%
	Chevron-Texaco	Chevron Texaco Nigeria Limited	NNPC: 60% Chevron-Texaco: 40%
	Exxon-Mobil	Mobil Production Nigeria Unlimited (MPNU)	NNPC: 60% Exxon-Mobil: 40%
	ENI-Agip	Nigerian Agip Oil Company Limited	NNPC: 60% ENI-Agip: 20% Oando: 20%
	Total	Total Petroleum Nigeria Limited (TPNL)	NNPC: 60% Total: 40%
Ghana	Tullow Oil & Gaz	Tullow Ghana Limited	35, 48% in Jubilee Block 25% in Ten Block
	Kosmos Energy	Kosmos Ghana HC	24,8% in Jubilee Block 30,2% in Ten Block
	Anadarko Petroleum Corporation	Anadarko WCTP Company	24,8% dans in Jubilee Block 30,2% in Ten Block
	Petro SA	Petro SA	2,73% in Jubilee Block 1,38% dans le puits Ten
	GNPC (State-owned Company)	GNPC	13,64% dans le puits Jubilee 12,5% dans le puits Ten
	EO Group (National Private Company)	EO Group	1,75% in Jubilee Block and was to Tullow Oil & Gaz

This oil windfall and its use take on different aspects within the different countries, risky in Nigeria, ambitious in Ghana, morose in Côte d'Ivoire and Liberia and full of hope for the countries considering exploitation (Benin and Togo). Thus, it should be noted that the management and redistribution of oil revenues is a key issue in the region, as is its resolution, which still has some way to go.

On the one hand, the oil and gas industry makes a major contribution, in terms of revenue, to the budgets of producer States and to development to some extent. Apart from this positive impact, there are significant negative impacts of this industry, including economic, social, health and environmental impacts in these countries, especially in the coastal communities of fishermen, women processors and consumers. Serious damage is being done to the fishing industry in these West African countries and will continue with new operations if current regulatory frameworks remain ineffective.

Considering global and national efforts to reduce poverty, achieve food security, mitigate climate change and achieve sustainable development objectives, the management of the hydrocarbon economy does not sufficiently benefit the countries concerned by the studies, particularly the riparian communities. They are generally left out of income management and distribution in the case studies covered in this report, and record the bulk of the negative externalities on their livelihoods that fishing represents.

RECOMMENDATIONS

On the basis of the findings of this study, the following recommendations are made:

Oil and gas companies

- Use technologies to reduce oil spills and gas flaring in riverside communities;
- Comply fully with domestic and international environmental policies;
- Clean up all streams and creeks affected by the oil spill in the communities;
- Engage traditional fishermen to understand the dimensions of the impact of oil spills on their socio-economic life;
- Provide affected fishing communities with alternative fishing activities;
- Investing on a large scale in alternative energy production in the interest of the global effort to safeguard the climate and vulnerable indigenous communities whose livelihoods are threatened;
- Establish large-scale fisheries with fishermen affected by oil spills as the majority stakeholders;
- Stop gas flaring and replace all vulnerable and corroded oil pipes in the short term.

Government

- Promote and preserve local fisheries by fully implementing existing environmental protection laws and policies;
- Provide economic and social protection to fishermen and farmers suffering from oil and gas pollution;
- Reduce the emphasis on fossil fuels as a vector of economic growth and promote alternative development models based on science, technology and renewable energy by encouraging oil marketing operators to invest in just energy transition.

- Take fishermen into account in planning for food security development and provide incentives for them to remain in the profession;
- Strengthen multi-stakeholder dialogues and the social innovation platform for host communities;
- Consider long-term environmental planning through Integrated Coastal Zone Management (ICZM);
- Develop consensual conflict management approaches;
- Strengthen the capacity of institutions in charge of the environment, fisheries and hydrocarbons;
- Necessarily adopt a policy to protect existing fishing areas in order to guarantee these women a real source of income and empowerment;
- Adopt a legal and regulatory framework plan that favors the mitigation of harmful consequences;
- Promote local initiatives with CSOs and key stakeholders aimed at capacity building on the risks of oil and gas exploitation;
- Ensure the implementation of measures to mitigate negative impacts;
- Protect natural resources, human rights and sustainable development plans;
- Establish a regional legal framework with neighboring countries for offshore oil and gas exploitation;
- Improve the government's capacity to negotiate and manage oil companies;
- Ensure adequate legal infrastructure for the control of offshore oil operations;
- Require operators to provide the necessary insurance for clean-up and potential compensation;
- Establish a national fund in case of accidents or oil spills;
- Promote and preserve local fisheries by fully implementing existing laws and policies
- Strengthen multi-stakeholder dialogues and the social innovation platform for host communities;
- Consider long-term environmental planning through Integrated Coastal Zone Management (ICZM);
- Establish a national fund in case of accidents or oil spills;
- Fully involve riparian communities in the process of exploration and exploitation of project sites;
- Improve basic essential services as well as the conditions for financing loans to fish processors' and fishermen's associations for the financing and professionalization of their income-generating activities.

Civil Society

- Provide environmental education and promote awareness of the environmental rights of communities;
- Build capacity and support fishing and fish-processing communities to form organized groups to give them a greater voice in claiming their rights;
- Support the empowerment of women to demand environmental justice from oil companies and the government;

- Advocate for the full implementation of relevant environmental laws and policies by the government and oil companies;
- Raise community awareness of the problem of pipeline vandalism and illegal oil refining;
- Advocate for renewable energy;
- Advocate for adequate compensation of fishermen by companies responsible for the pollution of streams, soils, mangroves, rivers and air;
- Ensure strict compliance with the measures proposed in the impact studies;
- To be the voice of fishermen and fish processors;
- To be a control body on the management of hydrocarbons;
- To assist the riparian communities in the implementation of the measures that they themselves would have recommended;
- Advocate for a redefinition of mining policy that prohibits the exploitation of fossil fuels such as oil, which is known to be dangerous for the environment and community livelihoods;
- Advocate for a transition of countries' energy policy towards a carbon-free economy based on renewable energy;
- Undertake campaigns to sensitize decision-makers on fisheries regulatory reforms at the national level.

With regard to operators involved in the marketing / commercialization of petroleum products

- Divestment in petrol stations to invest in renewable energies (solar, wind, etc.);
- Promote fairer and more equitable corporate social responsibility.

Communities

- Refrain from stealing oil and vandalizing pipelines;
- Promote cultural activities that support environmental protection;
- Organize against pollution and destruction of the ecosystem;
- Support initiatives that require government agencies to protect the environment from destructive oil production activities.

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