Real Estate Planning and Geoinformatics

ASSESSING THE SOCIOECONOMIC IMPACTS ARISING FROM OIL POLLUTIONS IN THE NIGER DELTA REGION OF NIGERIA: INCLUDING PROPOSALS FOR SOLUTION.

ENVIRONMENTAL LAW AND MANAGEMENT

CHARLES N. NWOKO

Aalto University

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CHARLES N. NWOKO

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Abstract

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Abstract

The aim of this study was to assess the socioeconomic impacts arising from the oil pollutions in the Niger Delta Region of Nigeria, including a possible solution. Nigeria is a developing country with inherent government failures in legal enforcement, and petroleum companies are unable to comply with pertinent petroleum-related legislation. The study target oil spillage and gas flaring as the principal petroleum-related pollutions, and conducts a field study to determine the pollution impacts on the physical environment. The field study covered two oil and gas-hosting communities and the effects of gas flaring and oil spillage were studied and analysed. Farming and fishery are the main sources of livelihood in the study areas, likewise other oil and gas-hosting communities in the Niger Delta, and impacts on farming and fishery will impact on their livelihood.

The study is multidimensional and therefore leans on scientific, law and social methods to prove to achieve its aim and objectives. It is necessary to investigate through laboratory experiments on how pollutions affect the physical environment before resulting to socioeconomic impacts. The laboratory experiments are justified because they are the only scientific method to know how the pollutions impact on the soil, water and air, which negatively affect agriculture and fishery, and thereby causing socioeconomic impacts. The study in addition conducts a secondary method of data collection through questionnaire technique to sample the opinions of the oil-bearing communities. Both the primary and the secondary data are presented in chapter three and research findings in chapter four. The study presents a legal argument (chapter 4.3.1) to attest community perceptions and claims. The major conclusions are firstly that oil-related environmental problems have socioeconomic impacts. Secondly, that solution can be sought through adequate regulatory measures, such as establishing an independent mediating institution, such as an environmental ombudsman, and creating a specialized environmental court or other adjudications.

Keywords Oil Spillage, Gas Flaring, Multinational Corporations, Nigerian Government, Petroleum Legislation, Technology, Environmental Ombudsman and Environmental Court

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Abbreviations

ACL	Agricultural Credit Loans
ADF	Allocation Derivation Formula
ARCN	Agricultural Research Council of Nigeria
APCA	Air Pollution Control Act (626/1994)
BCPMSP	Barcelona Convention for the Protection of the Mediterranean Sea Against Pollution
BDC	Biological Diversity Protocol
BP	British Petroleum

CBA	Cost Benefit Analysis
CCC	Convention on Climate Change
CDM	Clean Development Mechanism
CEQ	Council of Environmental Quality
CIA	Cumulative Impact Assessment
CITES	Convention on International Trade in Endangered Species
CPA	Corporate Policy Audit
CPI	Corruption Perception Index
CWA	Clean Water Act
DAGM	Digital Automatic Gas Monitor
DCEC	Directive of the Council of the European Communities
DPR	Directorate of Petroleum Resources
DSB	Dispute Settlement Body
DSP	Dispute Settlement Panel
EA	Environmental Auditing
ECA	Export Credit Agencies
EDA	Environmental Disclosure and Auditing
EDR	Environmental Dispute Resolution
EDSM	Environmental Dispute Settlement Mechanism
EIA	Environmental Impact Assessment
ERA	Environmental Rights Action
ERM	Environmental Risk Management
FAO	Food and Agricultural Organisation
FDI	Foreign Direct Investment
FEPA	Federal Environmental Protection Agency
FME	Federal Ministry of Environment
FOEN	Friends of The earth Nigeria
FPZ	Free Processing Zone
FTZ	Free Trade Zone
GATT	General Agreement on Trade
GGFR	Global Gas Flaring Reduction
GHG	Greenhouse Gas

GM	Genetically Modified Food
IFI	International Financial Institutions
IMF	International Monetary Fund
INC	Intergovernmental Negotiating Committee
KP	Kyoto Protocol
LFN	Laws of the Federation of Nigeria
LUA	Land-Use Act
MEA	Multilateral Environmental Agreement
MIC	Methyl Isocyanate Gas
MP	Montreal Protocol
NEAP	National Environmental Action Plan
NEPA	National Environmental Policy Act
NDDC	Niger Delta Development Commission
NGO	Non-Governmental Organisation
NGP	National Gas Policy
NNPC	Nigerian National Petroleum Company
NOIP	Nigerian National Office of Industrial Property
NOSDRA	National Oil Spill Detection Response Agency NOP
NTPR	Nigerian Trade Policy Review
OECD	Organisation for Economic Cooperation and Development
OML	Oil Mining Lease
OPEC	Org. of Petroleum Exporting Countries
OSP	Oslo Sulphur Protocol
OST	Outer Space Treaty
OWS	Oil Well Spacing
PA	Petroleum Act
PB	Performance Bond
PGL	Petroleum Gas Legislation
PPP	Polluter Pays Principle
PIB	Petroleum Industry Bill
PLA	Public Land Acquisition
SEA	Strategic Environmental Assessment
SEIA	Socioeconomic Impact Assessment

SHE	Safety, Health and Environment
SIA	Socioeconomic Impact Assessment
SPDC	Shell Petroleum Development Corporation
SPM	Suspended Particulate Matters
TNCs	Transnational Corporations
TQM	Total Quality Management
TREMS	Trade-Related Environmental Measures
TRIMS	Trade-Related Investment Measures
UCIL	Union Carbide India Limited
UNEP	United Nations Environmental Program
UNFCCC	United Nations Framework Convention On Climate Change
UNCTAD	United Nations Conference on Trade and Development
VAP	Voluntary Action Plan
VC	Voluntary Co-operation
VGS	Vent Gas Scrubber
WTO	World Trade Organisation

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CHAPTER ONE

1. Introduction

1.1. Study Background and Problems of Oil and Gas Production in Nigeria

This study is borne out of concern for the health and sustainable environment of Nigeria's oil and gas-bearing communities. Crude oil extraction has impacted the socioeconomic wellbeing of the surrounding habitats, affecting their major occupation of farming and fishing. The study is necessitated by many years of crude oil extraction, which has witnessed substantial scale of local and international documentations on the levels of environmental negligence, injustice and oversight by both oil companies and the Federal Government of Nigeria. Environmental degradation and socioeconomic impacts are the tangled two sides of a coin, in which one side causes the journey of the other side. The solution therefore hinges on tackling the side that causes the effects, and that would mean tackling the causes of environmental degradation and negligence. Little wonder that environmental degradation arising from oil spillage and gas flaring constitute the known theories in this study, which will lead to solving the problem.

Maintaining a healthy bill of the environment has recently become a global concern, more so, at the wake of the changing climate. Healthy and equitable environment is imperative to promoting the health and wellbeing of mankind. It further guarantees sustainable development, especially in industrial districts, such as those oil and gas-bearing communities in the Niger Delta Region of Nigeria. Improving environmental regulation in the oil and gas sector can help restore confidence in the surrounding habitats, and ideally would lessen the burden of socioeconomic impacts.

The history of oil and gas exploration in Nigeria started in 1956, when crude oil and its associated gas were discovered in large commercial quantities in Oloibiri, a city which is located in the present day Bayelsa State (please see appendix for the map of Nigeria, showing states). Nigerian crude oil occurs alongside natural gas, and Nigeria has more gas reservoirs (gas deposits) than crude oil. This makes the country a gas province. According to the NNPC Publication (2007), gas deposits in Nigeria stand at about 650 trillion cubic feet, the second largest deposit in Africa after Algeria. This means that natural gas, with its air and soil pollutions, will still be explored in the Niger Delta Region for many years to come. It becomes imperative therefore that solution is sought.

As part of the problem, the Nigeria government vested its interests in the oil and gas industry in a joint venture with the Royal Dutch Oil Company-Shell. The joint venture is concluded and signed in partnership between the Nigerian National Petroleum Company (NNPC) and Shell, and known as Shell Petroleum Development Corporation (SPDC). In this upstream joint venture, much reliance is placed on Shell to provide specialized and appropriate technical and engineering services to the upstream operations, including geophysical surveys, drilling and cementing. This joint venture relationship between the Nigerian government and the Royal Dutch Oil Company has been a subject of debate, as it reduces the ability of the Nigerian government to enforce some of the oil and gas-related legislation (Nigerian Weekly Law Report, February 2004). Shell is not the only oil and gas exploring and producing company in Nigeria, but its significance in this study arises from the fact that Shell is the biggest and the earliest oil and gas company in Nigeria. Shell controls 49 percent equity in the joint venture, and the Nigerian government, 51% (NNPC Publications 2005).

The Oil boom of the 70s brought both wealth and problems to Nigeria. It also brought environmental degradation in the form of oil pollution to the oil and gas-bearing communities. Oil pollution and its subsequent impacts constitute the fundamental bases of this study. The environmental problems associated with crude oil extraction have long been acknowledged to arise from gas flaring and oil spills, and these two oil pollutions are areas of investigations and therefore the principal focus of this study, including offerring themselves as the literature review. The study will like to know if these two pollutions are responsible for the environmental degradations that impact on the physical environment that cause the socioeconomic decline in the oil-bearing localities.

Oil pollution is defined as the poisoning of the land, air and sea Ake (1979); Akpambang (2001, 34). Oil pollution is again the introduction of energy into the physical environment which causes hazards and general discomfort to man, plants and animals, and may include violence, as have been witnessed in the Niger Delta Region of Nigeria in recent times (Oyetusi A 2007, 41); (Clarke 1982, 68); (Freestone and Gjerde 1994). Nigerian gas is flared more than anywhere on earth, making Nigeria a major global greenhouse gas emitter (O' Neil 2007, 33-35). Oil spillage and gas flaring arising from crude oil extraction are further known for their environmental degradation and ecological damages, affecting the balance of ecosystem (Stanley W. 1990, 40). These two oil and gas-related environmental problems are huge problems in the Niger Delta Region of Nigeria, and

they impact on the socio-economic life of the people, as the study will soon reveal.

As yet another part of the problem, the federal government of Nigeria has not provided adequate regulatory measures and leadership to control the oil and gas firms operating in the Niger Delta oil fields, and where regulatory instruments exist, enforcement mechanisms lack. The government has in its part been negligence to the environmental problems in the region, and its various agencies have been ineffective and inefficient to regulate or curtail oil and gas-related environmental and ecological damages. Most of these crude oil production-related environmental problems are abatable if there are adequate government intervention measures. Oil spillage arising from pipeline ruptures due to technical failures and spills due to corrosion arising from inadequate maintenance could easily be reduced through regulatory measures. Nigeria has over 450 flaring sites in the Niger Delta Region, with 76% of its natural gas flared (O' Neil 2007). The country has since 1984 enacted gas flaring laws, but enforcement and compliance have not been implemented and therefore lack.

Socioeconomic problems arising from the oil and gas industry are further compounded by forceful expropriation of arable agricultural lands for the purposes of mining crude oil and gas. This land expropriation by the government, arising from the Land-Use Act (1978), brought a shift away from the traditional sustainable practice of agriculture by the locals. The resulting instability in employment and loss of income from the agricultural practice do impact on food security and add to decline in the livelihood of the surrounding habitats (Nwaugo 2005, 37). The adverse impact of oil pollutions on the public health of communities is huge, and the environmental dimensions of oil exploration are a major cause of social dislocation, societal unrest and crises in the Niger Delta Region (O' Neil 2007, 12-14). Hazardous waste, site contamination, including insufficient protection of surface and subsurface water bodies, biodiversity and poor air quality, just to mention a few, are apparent in the surrounding oil fields. Other impacts include ozone depleting substances, such as the components of natural gases emitted in the atmosphere, such as butane, propane, hydro-carbons, carbon dioxide, sulphur oxide and nitrous oxides. All these have endangered the health of the local populations, including impacts on their livelihoods, and on crops and plants (Zuofa, Loganathan and Isirimah, 1985, 23-25).

According to O' Neil (2007), petroleum wastes wash directly into local waterways and the presence of high concentrations of heavy metals and toxic polycyclic aromatic

hydrocarbons are 50 percent higher than international standards for oil discharges to the surface waters. In the Niger Delta Region, oil spillage occurs at an average of two spills a month, ranging from 1600 tons of crude oil to 120.000 tons, and some of the spills are not made known to the public (Akinseye 2000, 45-49); Nwankwo & Okoye 1991). Further impacts of oil and gas exploration in the Niger Delta Region include high poverty rates, poor health, poor educational performance and high rates of child mortality (Eteng 1997, 25). Like oil spills, gas flaring resulting from petroleum extraction has permanently scorched farmlands, destroying food crops and rendering agricultural lands barren. The incomplete combustion of the flares has resulted in acidic rain that in turn damage crops and drinking water, including corrosive impacts on property, such as building roofs.

The country has attempted to harness natural gas through building liquefied natural gas plants (LNG plant) and indeed has established one in Bonny in Rivers State. One liquefied natural gas plant is far from adequate. Considering the huge gas reserves in the country, more liquefied natural gas plants are needed to reduce gas flaring in the Niger Delta Region. This study therefore is aimed at bringing forward some of the factors that contribute to the decline in the livelihood of the oil and gas-bearing communities, judging from the field studies carried out in Izombe and Ogoniland. These two oil and gas-bearing communities represent the other communities in the Niger Delta, where crude oil is explored. This is more so in the sense that what happens to one community is the same that happens to the other petroleum-hosting communities.

The Niger Delta Region comprises of nine oil producing states, and they are: Abia, Akwa Ibom, Bayelsa, Cross River, Delta, Edo, Imo, Ondo and Rivers State. Another state, Anambra State in the eastern part of the country may soon join the Niger Delta Region because of the newly found oil and gas deposits in that state. (Please see map and communities in the Niger Delta in the appendix)

As indicated above, petroleum products affect the health of localities close to oil and gas exploration by polluting the sources of drinking water, destroying the ecosystems, fishery and rendering the practice of agriculture unsustainable and unsuitable for use for many years (Eboe 1994, 27-33); (Human Rights Watch 1999, 2006); (Fairly 1993). This is the situation in most parts of the Niger Delta Region, where oil and gas are exploited.

In addition to the foregoing problems of Nigeria's oil and gas industry, extraction and exports of crude oil have brought about mixed blessings, or what is called, according to the World Bank, "The Dutch Disease." Dutch disease literally means an economic

phenomenon in which a sharp or sudden increase in the output and earnings of one product in an economy (oil and gas, for instance) has disadvantages and repercussions on other sectors of the societal wellbeing and economy. Nigeria presents a classic example of the Dutch Disease in respect to earnings from crude oil extraction. According to World Bank Document (1996), petroleum production consists about 34 percent of the national Gross Domestic Production (GDP) and over 86 percent of foreign earnings through exports, and 80-85 percent of Nigeria's national budget (World Bank Document 1996). The oil boom of 1970s funded massive public investments in infrastructure and human development, but many of the public investments in infrastructure were never completed to date, resulting to what is popularly known today in Nigeria as "Elephant Projects" (that is to say, government projects that were commenced but were never completed). Petroleum production, which is "Easy Money" or the Dutch Disease, undermined the bedrock of Nigeria's traditional economy and non-oil export base in palm oil and kernel, cocoa, cotton and groundnuts, which subsequently undermined the livelihood of the rural communities that depended on these non-oil economies. The oil-bearing communities of the Niger Delta Region yet again suffered this effect, which has come to be known in Nigeria as "The Nigerian Disease." The Nigerian disease is known as a phenomenon, whereby so much unskilled labour were sucked out of the rural areas, and sucked into the urban areas as factory workers and maids, with little wages. Nigerian disease has a double impact on the Niger Delta Region as agriculture and fishery were constrained by the absence of farmers and fishermen from the rural communities. Subsequently, misallocation of agricultural resources, which included the construction of modern outfits, such as dams and other irrigation facilities, consumed massive capital, but hardly completed on schedule, and when completed were poorly managed, apparently resulting in huge wastes. The collapse in oil boom and prices in the late 1980s and early 1990s prompted the Nigerian government to adopt an economic reform, which combined exchange rate and trade policy reforms, aimed at revitalizing the non-oil and gas economy, with stabilization policies designed to restore price stability and balance of payments equilibrium (Eboe 1994, 54-55), World Bank (1996). These reforms emphasized downsizing the public sector and improving the efficiency of public asset management, but expected results were very unsatisfactory (World Bank Document 1996. The Federal Government of Nigeria has not done much in the abatement of crude oil-related pollutions; and both the oil firms and the government are incapable of finding

means to protect the physical environment from oil pollutions (Ofehe 2005, 35).

Even before oil and gas exploration began in the Niger Delta Region in 1956, there were no socioeconomic impact assessments or environmental impact assessments carried out, and none has been carried out since then (Akpanbang K 2001; Nigerian Weekly Law Report 2004, 23-25). Such assessments if they have been carried out could have revealed the potential impending dangers to the communities living close to the exploration sites (Akpambang, 2001). Environmental impact and socioeconomic impact assessments are a matter of necessity because oil and gas exploration and production operations induce economic, social and cultural changes. Land-use patterns, such as fishery and agriculture face direct consequences of environmental degradation arising from oil and gas exploration. Airborne particulates from oil spill- contaminated soils and those of gas flaring, arising from well testing, have all environmental impacts (Nwankwo *et al*, 1991, 45); (Rowell 1977, 30-31).

Field studies carried out by this study in two separate locations in the Niger Delta Region (Izombe and Ogoniland), revealed the impacts of crude oil production on the physical environment, and which further impact the socio-economic life of the people. The Federal Environmental Protection Agency Act (FEPA), which provides nationwide protection of air, water, and land, had no responsibility in regulating crude oil-related pollutions. The only institution charged with the responsibility of crude oil-related pollutions is the Directorate of Petroleum Resources (DPR). This institution had not worked satisfactorily on the regulatory enforcement and compliance obligations bestowed upon it. This is because the Directorate of Petroleum Resources (DPR) is under the Ministry of Petroleum, which itself is responsible for oil and gas exploration and production. The Ministry of Petroleum is a sole property of the Federal Government of Nigeria. In the opinion of the author, it is therefore not right that the DPR, which is part of the Ministry of Petroleum, regulates environmental issues arising from the petroleum industry. It is like a company regulating itself with its own byelaws and rules on what it is accused of. The result of this is that there are no compliances and enforcement of petroleum-related environmental regulation in the oil and gas industry. To the author of this thesis again, ineffective regulatory mechanism, as stated above began the foregoing journey of both environmental negligence and degradation, environmental injustice and human rights violation, and subsequently, the decline in socioeconomic wellbeing in the Niger Delta Region's oil and gas communities.

1.2 Study Aims and Objectives

A critical assessment of the ongoing environmental damages and subsequent decline in the livelihood of Nigeria's oil and gas producing communities, and the foregoing environmental negligence of both the government of Nigeria and the oil companies, perceptions of environmental injustice, human rights abuses and political/economic marginalization, have necessitated the search for appropriate regulatory mechanism to tackle the problems of oil pollution-led socioeconomic decline. There are various employable knowledge-based tools to sought solutions and increase the knowledge of a concern of interest, such as from technology, law, or even sociology, to arrive at a particular research aim and objectives. Though, these tools differ considerably in respect to local conditions, where the solutions or knowledge are expected or desired for. This is a major reason why it is imperative to make appropriate choice of tools that can blend well with the situation on the ground and serve the overall purpose of a study.

The principal message of research aims and objectives in any study is to convey the intentions of the study. The aim or aims express what the study wishes to achieve. Another way of denoting the importance of a study aim or aims in a dissertation is that study aims carry the message of the general purpose and intentions of the study, including the pertinent research questions. While on the other hand, the objectives describe how the aims are going to be achieved. Study objectives can also give critical information on the steps taken to answer pertinent research questions. This study on the Nigeria's oil and gas industry came about after a long look at the environmental problems arising from crude oil extraction in the Niger Delta Region. There is no gainsaying the fact that crude oil extraction-related pollutions exist in the oil and gas-bearing communities in the Niger Delta Region, which pose significant socioeconomic problems. Solutions are therefore imperative to deal with these oil pollutions that impact on the physical environment and give rise to socioeconomic problems. To solve these problems, the study establishes appropriate aim and objectives, which form the main focus of the study. In the light of the general solution of environmental degradations, particularly industrial pollutions, such as oil pollutions, solutions can be sought within the technological and the legal framework, as said earlier in this chapter. But for this study, legal solution in the form of legal development is discussed, and therefore a chosen alternative to technical means. Legal solution can of course impose a technical solution. For example, national legislation can

impose the technical level for water purification that is safe for domestic usage (Simila J. 2007).

In line with the fundamental focus of the study, the under mentioned study aim is of interest. The study assesses the socioeconomic impacts arising from oil and gas extraction pollutions on the oil and gas-bearing communities, with the aim of developing appropriate regulatory mechanism to reduce impacts.

The issue of impacts is approached retrospectively, which means that the impacts already occurred, and finding solutions to abate the sources of socioeconomic problems is imperative. It is necessary therefore, to focus on the preposition that environmental problems can grow worse from the national aspects, such as ineffective environmental legislation and its enforcement mechanisms, including the attitude of the government towards environmental degradation.

In order to actualize the study aim, the following scientific objectives are formulated.

- To investigate through an empirical study: This comprises laboratory experiments on how oil and gas extraction pollutions impact on the physical environment. The study reasons that without firstly demonstrating how oil pollutions impact the physical environment, it would not be convincing enough to attest to how oil pollutions snowball to socioeconomic impacts. The primary data collection is therefore essential in this study. This view, according to Nwaugo V. *et al* (Effects of Gas Flaring on Soil Microbial Spectrum in Parts of Niger Delta Region (African Journal of Biotechnology, 2005 Vol. 6; Odu C 1996, 43), that oil pollution begins its impacts on the socioeconomic decline by first attacking the physical environment. This therefore is in agreement with earlier studies carried out in the Niger Delta Region.

- To carry out a secondary field study through a questionnaire technique, to be administered to selected respondents, on their opinions of perceived socioeconomic decline and means of livelihood in their communities, arising from oil pollutions. To continue the questionnaire to attest to the claims and perceptions of environmental negligence, environmental injustice, human rights abuses and political/economic

marginalization, which are detrimental to their livelihood decline.

- And finally to analyze and argue how oil pollutions impact on the physical environment, snowballing to decline in livelihood, and draw conclusions on these aforementioned investigations and make suggestions for a possible solution to the oil pollutions that cause the socioeconomic problems. The study reasons that it becomes important to investigate the perceptions and claims of the communities, such as environmental injustice, environmental negligence, economic marginalization and human rights abuses, as such could lead to finding appropriate regulatory mechanism, based on law.

Environmental degradation arising from oil and gas exploration has serious implications for socioeconomic wellbeing of the crude oil-bearing communities, and therefore not a new knowledge. It requires that the country institutes appropriate control measures to curtail the environmental problems arising from this industry. The study has therefore provided these environmental problems for analysis and assessment, and how they impact on other dimensions. The study background gives brief prior information on oil spillage and gas flaring as the two principal environmental degradations associated with crude oil extraction, and therefore the targets of empirical investigations. According to Eteng (1997), these two principal environmental problems are believed to contribute immensely to the worsening physical environment that causes the livelihood and health of the oil and gas-bearing communities to decline.

1.3 Research Question

The principal focus of this study is on the assessment of oil and gas pollutions and subsequent impacts on the socioeconomic wellbeing of Nigeria's oil and gas-bearing communities in the Niger Delta Region, and possible solutions. The study acknowledges the existence of the two principal oil pollutions, oil spillage and gas flaring, and their cumulative impacts on the environment. The study acknowledges further that the aftermath impacts on the environment would snowball to cause socioeconomic decline, affecting the livelihood of the oil and gas surrounding communities. Moving from this perspective, the study addresses the following three research questions.

RQ1: Do oil-related pollutions such as gas flaring and oil spillage impact on the physical environment? Question one will be solved through research approaches. Empirical study will be conducted to answer this question, because such empirical study will prove scientifically that both oil spills and gas flaring emit pollutants into the air, land and water bodies that impact on the physical environment, which in turn impact on farmland, biodiversity, health and the ecosystem. In this case, the laboratory experiments become necessary for this study, because of its scientific investigations that oil pollutions do indeed cause environmental degradations that cause the socioeconomic impacts. This looks very much as if the study leans on the technical perspective to prove how oil spills and gas flaring attack the physical environment, and then invokes the legal dogma to solve the problem, and this agrees with the context that this study is multidiscipline.

RQ2: Is there a link between environmental degradation caused by oil pollutions and the decline in socioeconomic wellbeing of oil-bearing localities? This postulation assumes the presence of socioeconomic decline. The secondary research method through field studies will reveal the extent oil-related environmental degradations have impacted on the livelihood of the crude oil-bearing communities, at least, from the assessments of the inhabitants of the two oil and gas communities studied.

RQ3: Does environmental negligence from both the government and the oil companies amount to environmental injustice? Oil and gas-bearing communities face environmental dilemma from the oil and gas companies, which is backed by a reluctant government that is part of the mining company. Answering question three will support the study that environmental negligence is the causation of the continued oil pollution and subsequent socioeconomic decline in the Niger Delta Region.

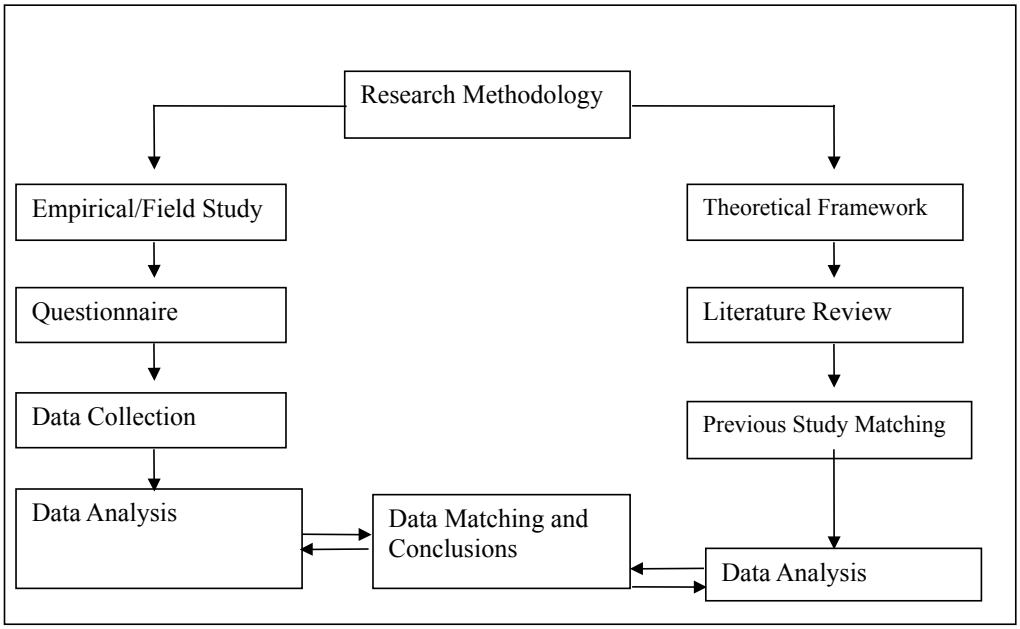
RQ4: Can legal development as a regulatory toolkit reduce oil pollution and environmental injustice to enhance socioeconomic wellbeing? Reducing the socio-economic impacts caused by crude oil extraction on the surrounding habitats will require an effective and efficient approach, such as the application of legal regulation in the form of legal development, as technological solutions are perceived to feed on corporate profits. Legal literature reviews, particularly those concerned with environmental regulations in the Nigeria's oil and gas industry, such as the Petroleum Act, Gas Re-Injection Act (1984), the Federal Environmental Protection Act (FEPA Act 1997) and the Land-Use Act (LUA 1978), have not been enforced or complied with because of government failures. In view of government failings, therefore, enforcement and

compliancy inadequacies call for a different legal approach that does not depend solely on the federal government to intervene.

1.4 Research Approach and Methodology

Research methodology has been defined as a general approach employed in studying research topics. Therefore the choice of method and its design and processes ought to reflect the overall research strategy and how the methodology is applied to solve the particular problem (Silverman 2000, 88); (Anyamele 2004, 35) and (Osuala 2005, 32). In this study, for example, the figure below (figure 1) shows how the research method was designed and processed, as to collect sufficient data to aid the study. A study like this, which claims that oil and gas pollutions impact on both the physical environment and the socioeconomic wellbeing of the surrounding habitat, will normally involve multiple research methods. Multiple research approaches like this would certainly attempt to prove beyond reasonable doubts to answer each of the four questions posed by the study. Of a particular interest is to attest to the relationship or the link between environmental injustice and human rights abuse, that one is the cause, and the other the effect. This will certainly require a convincing approach that the communities of the surrounding habitats are a group of marginalized people, where the inhabitants are united by some form of modes of socioeconomic endeavours, geared towards reaching common ends, values, interests and other life support initiatives: And proving further that the Federal Government of Nigeria has not actualized its environmental liabilities. That what is noticeable is rather a catalogue of state environmental negligence and oversight, lack of legal enforcement, economic and political marginalization, which together manifest in human rights violation.

Figure 1: Research Process Methodology



As can be observed from the above figure, the research is designed in two phases to collect sufficient data: - empirical/field study (primary) and Theoretical Framework (secondary method). The primary data was obtained from empirical studies in Izombe and Ogoniland (two oil and gas-bearing communities in the Niger Delta Region, selected by the study to represent other oil and gas-bearing communities in the region), and further analyzed in the laboratory, and then compared with various media, such as the WHO and the national standards, as stipulated by the Federal Environmental Protection Agency (FEPA). The empirical part entailed sampling of soil, water and air quality and conducting laboratory analysis to assess the levels of soil contamination arising from oil spillage and the levels of air quality, soil and water qualities, including pH values in respect to acidic rain, arising from gas flaring. Because gas flaring has both global and domestic impacts, primary research of this project devotes more experiments on it (soil, water and air) than in oil spillage. Though, the problem of empirical study may be that the pertinent data available is hardly sufficient to establish tight links between causes and consequences in respect to the study of socio-economic impacts. The experimental and laboratory analysis of the study may give relatively acceptable scientific information on the two principal oil and gas-related environmental problems, while the issue of sampling

technique may be defective due to human factors. The second source of data of the study was a sampling technique, based on a written questionnaire format. The written questionnaire was designed to collect sufficient information from the inhabitants affected by oil spillage and gas flaring. The questionnaire format was constructed on the basis of objective facts and administered to the respondents in Ogoniland and Izombe, on the issues of gas flaring and oil spillage. Based on the fact that a questionnaire research tool is suitable for this study, at least to assess what the people know about the environmental impacts on their livelihood, the format followed a well defined step in planning and executing the questionnaire research format, which included recruiting the respondents, distributing the questionnaire format, monitoring the responses and data entry and analysis. In addition, there was data collected from interviews conducted alongside with the questionnaire, because some of respondents in the communities could not read or write well enough. Face-to-face interviews therefore were applied to explain the details of the contents of the questionnaire without bias. There was in addition direct observation of the environment, as to assess the conditions of the vegetations in the farming areas close to the oil rigs.

The secondary data, along with the questionnaire were obtained from existing knowledge on oil spillage and gas flaring, through related literature review and known theoretical knowledge on the subjects of crude oil-related environmental and ecological damages. The secondary data included collection of legal materials and published works obtained from universities and government establishments. The respective data obtained from both primary and secondary sources were analyzed, matched and presented for pertinent assessment. These experimental and laboratory analysis, including responses of the questionnaire are available in chapter four. The relationship between environmental injustice and human rights violation in the Niger Delta Region was approached through the method of logical reasoning and analysis of the primary and secondary investigations.

1.5 Relevance of Study

There is no gainsaying the fact that oil spillage and gas flaring arising from crude oil and gas production in the Niger Delta Region have drastically impacted the socio-economic wellbeing of the surrounding habitats. These environmentally-related problems have affected agricultural production through soil contamination. Agricultural practice and

fishery are the traditional economy of many of the oil and gas-bearing communities. Oil spillage on both land and sea has both contaminated the water bodies and farmland, affecting fishery and crop production. In the Niger Delta, particularly in Bayelsa, Imo and Rivers states, river banks and coast lines are constantly polluted and eroded due to oil spillage. This has resulted to severe loss of fishing activities, including loss of biodiversity and ecological degradation. Gas flaring has equally impacted agricultural production, which subsequently has socio-economic impacts. Gas flaring causes acidic rain which impact agriculture. Thermal and noise pollution associated with gas flaring have health implications for those living close to flare sites.

This research is inevitable, as it brings forward the overall implications of continued environmental degradations arising from crude oil production, and how these oil and gas-related environmental problems have impacted the life-styles and income of the oil and gas-bearing communities. An understanding of the environmental problems and impacts on socio-economics of the area should give an insight to both the Federal Government of Nigeria and the respective oil firms to seek solutions. Research findings and suggestions arising from this study should present future policy framework, promote legal development in the form of legal enactment, aimed at mediating and intervening to mitigate oil and gas-related pollutions that cause the socioeconomic decline.

1.6 Structure of Study

The study is divided into five chapters. Chapter one begins with the introductory study background, origin of oil and gas industry in Nigeria and the associated problems. Other sub-chapters of chapter one include: aim and objectives of the study, research questions, research approach and methodology and relevance of the study. In chapter two, the following topics are discussed: concepts, institutional framework, and the subtopics include socioeconomic assessment impact, environmental impact assessment, environmental injustice and human rights violation. Other inclusions in chapter two are: theoretical framework, development of oil and gas legislation and related literature reviews. Chapter three is concerned with the study materials and methods, including the description of the study areas (Izombe and Ogoniland). The principal elements of chapter three are the empirical and secondary studies conducted in the various study areas. Chapter four hereto deals with the data presentation and research findings. Chapter five is

the concluding and summary of the study. Bibliography and appendices are included.

CHAPTER TWO

2.1 Introduction

As noted, the Nigerian oil and gas industry dominates this study, so also the socio-economic impacts arising from oil pollutions. Environmental degradation caused by the oil and gas industry has recently become an international concern and attention. It has equally attracted the attention of scholars representing variety of disciplines such as environmental science, law, economics and sociology. It has similarly attracted many authors from both inside and outside Nigeria, including many scholars writing their academic thesis, articles, workshops and seminars on the impacts of oil-related pollutions. Environmental equity and environmental negligence and injustice have remarkably influenced this study on the socio-economic and environmental impacts.

In the foregoing, some researchers would prefer to write from the aspects of national legislation and regulatory mechanisms, including failures in legal enforcement and compliance. While other scholars would prefer to speak about economic wellbeing and livelihood of communities living close to oil and gas fields, as this present work is inclined to, and all these present a variety of literature on the subject of socioeconomic impacts. In respect to carrying out researches on this foregoing area, multidisciplinary approaches and research methodologies have all been varied, using sociological approaches and scientific models, where appropriate and applicable, to find possible solutions. In this study, related literature reviews, related concepts and institutional framework enable us to have insight into the environmental damages associated with oil and gas extraction, while on the other hand, the theoretical framework avails us of the various regulatory options, of which the related knowledge on the issue is apparent.

Environmental problems arising from natural resource exploration constitute the primary sources of socioeconomic decline in the Niger Delta, and have sparked off political unrest in that region of Nigeria. This chapter in addition introduces the Nigerian oil and gas, the operators, the apparent laws, political and economic marginalization, and particularly how they relate to environmental degradations, environmental injustice and abuse of human rights. The first question of the oil spills and gas flaring in the Niger Delta Region

of Nigeria may start by asking if it is necessary to conduct environmental audits or environmental impact assessment or socioeconomic impact assessment for particularly polluting oil and gas industries or other installation projects. Nigerian law makes it mandatory for environmental impact assessment and environmental audits to be carried out by polluting industries (Makinde S. and Adeyoke J. 2007, 65). The practice is that an environmental impact assessment report must be prepared in respect to all major projects and approved by the Federal Ministry of Environment (FME) and the environmental agency of the state in Nigeria in which the project is situated. This Federal Ministry of Environmental (FME) has now been replaced by the Federal Environmental Protection Agency (FEPA), which is now known and referred to as FEPA Act. The second question to ask concerns enforcement authorities to the various environmental regulators in respect to violation of permits. In accordance with the Nigerian environmental law, the FEPA Act gives the environmental regulators and authorized officers of the Federal Ministry of Environmental powers to enter and search any land, building, vehicle, vessel, tent, floating craft or any inland water in respect to protecting the environment (Ezejiofor K 2006, 54). This Act empowers the authorities to arrest any person or group of persons whom they have reasons to believe have committed an offence against the Act or any regulation made hereunder, and to seize any item or substance which they have reasons to believe has been used in the commission of such offence or in respect of which the offence has been committed (Omorogbe I 2001, 65). The argument is that no records of such intervention by FEPA on those involved in oil pollutions have so far been made public (Nigerian Weekly Law Reports 2005, 56). The next concerns are the types of liabilities that can arise where there are breaches of environmental laws or violation of environmental permits. In this respect, FEPA Act provides that a person or a legal entity found to breach the provisions of the Act has committed an offence and shall on conviction be liable to a fine or imprisonment, or both. This means that such an offense could establish both civil and criminal litigations. FEPA Act also provides that where there has been discharge, the entity or person responsible for such discharge will bear the liability for the costs of removal and clean up. In addition, there are questions about directors, officers and shareholders of a corporation, if they would attract personal liabilities for environmental wrongdoing. Here, FEPA Act provides that in certain circumstances, corporate directors and officers may attract personal liabilities, if the directors and officers are responsible for the conduct of the company businesses at the

time of the environmental wrongdoing. A good example of such is the law suit by Saro Wiwa family and the Earth Right International (Saro Wiwa Vs Anderson, of no. Civ 1909, (1996)), litigated under the U.S Alien Tort Statute against Shell's Nigerian subsidiary CEO, Mr. Anderson). Shareholders of a company are not liable because of the doctrine of limited liability, which the author of this work does not agree with. The author has the opinion that shareholders should be made answerable to issues of environmental pollutions caused by the companies they finance and benefit from. The author believes that in the absence of capable CEOs or managing directors, courts should go for capable shareholders. However, a shareholder may attract personal liability for breaches of environmental degradation caused by his company, if the shareholder is in charge of or was for the conduct of the company's business. Shareholders finance, benefit, control and indirectly or directly manage the affairs of their company, the author sees no reason why shareholders should be spared from environmental wrongdoings of their firms, which they benefit from.

Theoretically speaking, Nigerian environmental law is not silent on what extent financiers and lenders, such as banks and insurance firms could be charged for liability: such as in the case of environmental wrongdoing, in terms of remediation costs. The Act says that the lenders are not liable for environmental wrongdoing of their clients, insofar there are pertinent protective clauses enshrined in the relevant financing agreements, but can be held liable if and only when the lenders have exercised any step-in-rights pursuant to the financing document or when the lenders are in effective occupation of the polluting facility, and will therefore partake in the remediation costs, under the doctrine of occupier's/owner's liability (Nigerian Weekly Law Report 2005, 47-49). With the relevant legal provisions in respect to the above, the conclusion to make here is that these legal provisions are right in their own accord. But the issue is that there are no effective compliance and enforcement mechanisms in place, and secondly that there is also massive bribery and corruption in the petroleum industry, and these therefore make the laws ineffective (Makinde and Adeyoke 2007, 41). Particularly, corruption in the oil and gas industry is high and has impact on the enforcement mechanism, which has serious implications to the rule of law. Not only its impact on the socioeconomic and environmental consequences, oil spills and gas flaring in the Niger Delta Region brings dishonour to the oil and gas corporations operating in that area (O'Neil 2007, 19-21). There are constitutional failures in various aspects of regulating the environment. For

example, the FEPA Act by its constitutional provision is empowered to examine any licence or permit given to any legal entity for the purposes of extractive operations. It is further empowered to search and prosecute anyone whom they believe violates any environmental regulation as provided in the constitution, under the act establishing it. But FEPA is not empowered to exercise the same authority in the oil and gas industry, where most of the environmental problems arise (Omorogbe 2001, 48). The Petroleum Act which is under the Directorate of Petroleum Resources is responsible for environmental matters arising from the oil and gas industry. Placing oil and gas-related environmental problems under the Directorate of Petroleum Resources, which in itself is under the Ministry of Petroleum begins the journey of uncontrolled and unregulated oil pollution in the Niger Delta Region. Furthermore, the Petroleum Ministry controls the affairs of the Nigerian National Petroleum Corporation (NNPC), which is the beneficiary of the joint venture between the Federal Government of Nigeria and the Royal Dutch Oil Company, Shell. This is like an entity making laws for self. The implication therefore is weak enforcement. This political arrangement becomes difficult to enforce standards, more so that there is wide spread corruption in the petroleum industry, and its abatement is farfetched.

Pursuant to the role of the Directorate of Petroleum Resources, the Environmental Impact Assessment Act, which gives permits for projects, does not grant any permit to the oil and gas industry (Nigerian Weekly Law Reports 2006). The negative impacts of failures in the legal enforcement and institutional failures are that industries do not comply with environmental regulations, including complying with environmental accountability and environmental standards. In the Niger Delta Region, there are no formal corporate environmental codes of conduct. Corruption in the oil and gas industry and political corruption are problems when there are environmental regulation breaches. The same corruption problems exist in the judicial system as well. Some of the best known litigations against environmental negligence, environmental injustice and subsequent human rights violation, arising from the oil and gas companies have often taken place outside Nigeria. This is because of the indifference of the Nigerian government and its courts. For example, the Saro Wiwa litigation against the Dutch Royal Oil Company mentioned above. Another example is the most recent litigation between four Nigerian farmers and the Shell, instituted in the Netherlands (2013). In respect to government and constitutional failures, corporate environmental negligence and accountability remain a

problem, and environmental consequences in the Niger Delta Region remain unsolved. However, there are a number of law-based regulatory instruments available for the control of oil and gas-related environmental degradations. These regulatory instruments are provided as operational framework for all purposes of oil and gas exploration. It is, however, difficult to assess which of these laws are enforced and complied with. These instruments include as follows: Oil in navigable Waters Act (1968). This law provides for the eventual prosecution of offenders who pollute such waters, directly or indirectly. Tankers of crude oil and bunkering firms, including onshore or deep sea oil and gas mining are targeted by this law. Petroleum Act (1969): This legislation is provided for the regulation of the activities of the petroleum industry, such as prevention of pollution (on water, land and air). But this act has given way to the Directorate of the Petroleum Resources (DPR) to be the dominant institution in the environmental affairs of Nigeria's oil and gas industry. Petroleum Drilling and Exploration Regulation Act (1969): The Act provides that the licenses or leases shall adopt practicable precautions to prevent the pollution of inland waters, seas, water courses, rivers and the territorial waters of Nigeria that might contaminate the water banks or shoreline (Nigerian Weekly Law Reports 2005, 27-30). Regulation 36 of the 1996/1999 Constitution provides that all practicable precautions, including the provision of appropriate and up-to-date equipment, which must be approved by the appropriate authority be employed in preventing pollution of water ways, land, river, sea and territorial waters of Nigeria by crude oil or other oil-related liquids or waste. But this law has not been enforced or complied with, inasmuch as most of the oil spills arise from faulty equipments and obsolete technical instruments. The Pipeline Act (1958), which makes it mandatory for a holder of such license to pay compensation to any person who suffers damages as a result of installation or operational activities of the licensee. In the same way, Pipeline Act has not been complied with, and damages caused by crisscrossing pipelines that very often rapture and burst into flames have not been compensated (Akaolisa and Okeke 2004, 20-23).

2.2 Environment Impact Assessment (EIA) as a State Toolkit

Environmental Impact Assessment (EIA) is a new government environmental policy tool in Nigeria. It was only enacted as part of Nigeria's environmental protection and conservation law in 1994, pursuant to the Rio Earth's Summit of 1992 (Anago 2002, 9-11). According to Anago (2002), Abdulkareem (2005, Environmental Impact assessment

is defined as a concept or as a government toolkit, which refers to any development, physical, economic or both which result in the changes of an existing conditions of a locality or place, following an industrial or project exposure.

In line with the International Association for Impact Assessment (IAIA), environmental impact assessment can be defined as a document of assessment of possible negative and positive impacts of a proposed project, such as mining, oil refinery or any other industrial project, and in line with identifying, predicting and technical evaluation of subsequent abatement of arising impacts, such as economic, social or health of the surrounding habitats (Anago 2002, 14), (Nzeakah 2000, 32). Furthermore, according to Kankaanpää (Finnish Ministry of Environment, in the Guidelines for Environmental Impact Assessment in the Arctic Environmental Protection and Strategy), that the target of environmental impact assessment is to attach pertinent significances to the already predicted impacts and then determine how to avoid such impacts, and also the issue of possible compensations. Environment impact assessment therefore becomes a necessary toolkit for the decision makers if a proposed project can go ahead in the face of pertinent assessments. In most national legislations, the environmental impact assessment details one or more options that may be taken instead of the statements listed in the impact assessment. Impact assessment should cover most of the following decision-making areas: land-use, social, economy, aquatic ecology, noise, visibility, water resources, ecology, cultural heritage, flora and fauna etc (Anago 2002), (O'Neil 2007, 19). Environmental impact assessment should be carried out on time and prior to the commissioning of a proposed project, and should act as an enforcement mechanism, as detailed out by the national environmental policy and legislation. EIA should include public participation in respect to culture and socioeconomic aspects of the host, so they can influence in decision making processes, monitoring and assessment. This is important as their means of livelihood are going to be impacted by the envisioned project. In addition to community participation, EIA should recognise the importance of baseline information such as traditional knowledge of the host in respect to means of livelihood. In Nigeria, it is the Federal Environmental Protection Agency (FEPA) that is responsible for enforcing environmental impact assessment. But projects involving the national petroleum industry in respect to oil and gas extraction are exception to this government toolkit (Anago 2002). According to the Nigerian Weekly Law Report (2007) none of the Nigerian's oil and gas locations has witnessed any form of environmental impact

assessment prior to going into operation. And there is no form of socioeconomic impact assessment conducted on any of them, either, let alone community participation and baseline information.

2.3. Cumulative Impact Assessment (CIA) and EIA

Cumulative impact Assessment is part of the environmental impact assessment. CIA refers to the accumulation of changes to the environment caused by human activities (Adeniye E. 1983, 45-46). Included are also such activities for which an environmental impact assessment is conducted. These forms of changes do occur over space and time. A good example is oil spills and gas flaring, which do impact on the physical environment and snowball to other impacts. Cumulative impact can bring about serious problems to the physical environment, and occur when the effects of an action are added to or interact with other effects in a given location and within a time frame (Bedford, L and M, Preston 1988). A good example is oil spills interacting with gas flares and impacting the physical environment.

In comparison with the traditional Environmental Impact Assessment (EIA), Cumulative Impact Assessment (CIA) goes further to assessing and analysing the cumulative effects of land-use changes due to mining, or other forms of extractive operations, such as agricultural activities. The application of CIA in concert with EIA is appropriate for Nigeria's oil and gas industry (Muoghalu 2004, 21-23). Cumulative Impact Assessment specifically can change storm-water runoff and base-flow contributions to a river basin, lakes or even canals. Drainage of wetlands through constructions of ditches, oil wells and canal ways, including other water-based constructions can affect surface water storage and runoff patterns, and these factors can contribute changes in hydrology and ecology, offsetting the ecological balance (Tietenberg 1992, 368-374). In the opinion of the author, the Nigerian government can address the underlying problems of pollutant industries, such as crude oil mining through cumulative impact assessment to form the basis for preparation of a resource extraction and management, in concert with environmental impact assessment and socioeconomic impact assessment. This will in turn identify the regulatory and control mechanisms to minimise future environmental consequences and impacts that might occur. There are insufficient logistical resources in Nigeria when it is about environmental abatement measures, and also that cumulative impact assessment is

although more complex and more resource-demanding than the traditional environmental impact assessment, apparently one of the few drawbacks. Preferences therefore should not be made in respect to EIA alone because of the foregoing lacks in resources, but ought to be carried out in concert with cumulative impact assessment to minimize adverse impacts and maximize tight abatement measures. The principal law governing land, including tenure in Nigeria is the Land Use Act (LUA) Decree No. 6 of 1978, promulgated by the military dictators in 1978 (now Cap 202 of the Laws of the Federal Republic of Nigeria – LFN 2004). In respect to tenure, a historical development of the assessment of compensation in Nigeria dates back to the Public Lands Acquisition Act of 1917 (now Cap 167 of 1958: Laws of the Federal Republic of Nigeria and Lagos. This Act was followed by the Oil Pipelines Act of 1956 (amended in 1965, which is now Cap 07 LFN 2004, and the Public Acquisition (Miscellaneous Provisions) Act: Decree 33 of 1976. In respect to the oil and gas explorations and extraction, the laws specifically addressing land acquisition and compensation in oil and gas-related acquisitions are the Land Use Act (LUA) and the Oil Pipelines Act; the Nigerian National Petroleum Corporation (NNPC) Act (now Cap 320 of LFN-1990); the Petroleum Act (Cap 350 LFN of 1990 (now Cap P10 LFN 2004) and the Mineral Resource Act (now Cap 226 LFN 1990)). These petroleum-related laws are hardly complied with or enforced by the Nigerian government or its environmental agencies (Nzeakah 2000, 68-72). Inadequate resources and other supportive programmes of the government, which are needed to enlighten the interested public and pertinent agencies, including other environmental stakeholders in matters concerning these areas remain unfulfilled (Muoghalu 2004, 67). Environmental issues are global. It has become mandatory for the international institutions, especially those in the mainstream of environmental aspects, as well as the pertinent international environmental NGOs, to intervene and be pro-active in strengthening developing countries that lack resources, such as Nigeria. More can be achieved in the cumulative impact and environmental impact assessments by inculcating them into projects in various regions, including strategic environmental assessment (SEA). It can be extended to biodiversity, social and economic impacts, including global environmental effects, for example, the trans-boundary effects (Muoghalu 2004); (Ogus 1994).

2.4 Concept of Socioeconomic Impact Assessment (SIA)

There is a growing awareness and literature on the importance of Socioeconomic Impact Assessment (SIA) prior to the commencement of an industrial activity. Within this large empirical literature and awareness, principal questions to ask in respect to socioeconomic impact assessment are: Why is socioeconomic impact assessment necessary? What are the requirements? And what is socioeconomic impact assessment? The concept of socioeconomic impact assessment can be defined as a process of evaluating, assessing, monitoring and managing expected or unexpected social and economic consequences of a proposed project in a surrounding habitat (Kirkpatrick 1997, Duruigbo 2003, 71-74). Its corresponding assessment requires both qualitative and quantitative measurements of the expected and unexpected impacts (Howitt. R 2001, Leistritz F. and Murdock S. 1981). These expected and unexpected consequences can be negative or positive, and its impact on the surrounding habitat must be quantitatively evaluated. Because of the imminent consequences of these expectations, such as impact on farmland, impact on health and safety, impact on general livelihood, it has become necessary that socioeconomic impacts assessment be carried out in line with environmental impact assessment, and must be quantified in respect to national cumulative impact assessment. Importantly in line with these assessments, community participation and perception are necessary requirements that are undeniable. This is because such participation provides the framework for assessing the cumulative impacts of development and changes on the community's socioeconomic wellbeing, including depletion of their endowed natural resources (Amund 1987, 32); Abdulkareem 2005, 19). Socioeconomic impact can be negative if it brings about environmental degradation, food insecurity, health problems and decline in livelihood. It can be positive if the proposed project brings about employment opportunities, improved services, new development agendas, roads and increase in livelihood of the surrounding habitat, particularly where there are inclusive business programs by the investing organisation or organisations (FEPA Document 1995, 17-21). According to the author, conducting a socioeconomic impact assessment and its corresponding environmental impact assessment should not be a hidden agenda from the participation of the surrounding habitats, as such have been the characteristic trends in the Niger Delta Region. SIA informs the surrounding habitat the magnitude and nature of impacts to expect, particularly its negative socioeconomic impacts. At least, disclosure of

what to expect can enable the community re-negotiate their priorities, make demands to offset the negative outcomes, and all these should be integrated into the proposed project decision-making.

Sequel to the foregoing, the primary aim of any socioeconomic impact assessment is to bring forward a more equitable, justifiable and sustainable ecosystem, biophysical and human environment (Abdulkareem 2005, 32). Socioeconomic impact assessment arise from environmental impact assessment, which in itself, is a way of assessing the environmental impacts of a project before such project is begun. Both cases (socioeconomic impact and environmental impact assessments) are essential; so as to know beforehand the impacts the proposed project will have on the surrounding habitat in both short and long terms. Socioeconomic impact assessment can be a stand-alone assessment or can be a carried out along side environmental impact assessment. It is imperative that socioeconomic impact assessment is carried out in the light of quantitative and qualitative measurements, such that impacts like, on the level of employment, public services, public health, traditional way of life, livelihood and physical environment of the surrounding habitat be measured and scaled. Affective socioeconomic impact assessment requires that the feelings and perceptions of the citizenry of the surrounding habitat is taken into considerations, more so, as it relates to preserving their traditions, possible demographic changes, changes in farming culture and collective community characteristics and values. This is because, the primary focus of socioeconomic impact assessment is to analyze and estimate the possible impacts of a proposed project on the surrounding habitat, in respect to their social, economic, traditions and health factors (FEPA Document 1995).

In Nigeria, literature on socioeconomic impact and environmental impact assessments on oil and gas fields are unavailable, and where they exist, contain scanty information. A number of studies have claimed that there have been a number of environmental impact and socioeconomic impact assessments in other forms of mining in the country, but not on the oil and gas surrounding environment (Akaolisa 2004, 42); Akpambang 2001, 19). According to such studies, it is claimed that mining areas other than the oil and gas fields, where such impact assessments were carried out prior to commissioning, performed well with less environmental degradations, less citizenry complaints and less decline in livelihood (Akaolisa 2004). In respect to the foregoing discussion, since enactment of environmental impact assessment in1994, neither environmental impact assessment nor

socioeconomic impact assessment has been conducted in any of the oil fields in the Niger Delta Region, and if such existed, they have not been made public for assessment. In the author's opinion, the Nigerian government and its environmental agencies, including its policy-makers need to develop a better understanding of the importance of socioeconomic impact assessment on the oil and gas surrounding habitats, more so now that more oil fields and wells are being discovered.

2.5 Concept of Environmental Injustice

The concept of environmental injustice evidently exists when members of a disadvantaged community or minority suffer unjustly at the state and federal levels from man-made environmental risks, degradations and pollutions, or suffer undue violations of fundamental human rights, arising from environmental negligence from both the state and those responsible for the environmental pollution (Akpofure A. 2000, 31; Akanimo 2005, 55). Furthermore, environmental injustice very often involve denial of access to environmental equity and justice, information on the environmental status of the surrounding habitat or investment, and denied access to participate in decision-making in matters relating to environmental issues, including denied participation in environmental impact and socioeconomic impact assessments when and if carried out. This is because justice is about individual and community recognition, participation and functioning (Schlosberg D 2007, viii). According to (Akpofure A. 2000, 43), such a situation brings about negative impacts such as decline in socioeconomic wellbeing and human rights abuse, as is the case in the Niger Delta Region. The principle of environmental justice, on the other hand, denotes that all humans, race, region or socioeconomic status, notwithstanding, should be accorded with substantial levels of environmental protection and conservation (Checker M 2005, 82). According to (Akpofure 2000); Akanimo C. 2005), communities faced with environmental injustice are often identified as those communities where the citizens are regarded as minorities or politically disadvantaged and marginalized, and often excluded from the radar of national environmental policy; or where national environmental laws are disregarded, not enforced and complied with. The oil and gas surrounding communities of the Niger Delta Region share the same commonalities of a disadvantaged part of Nigeria, as indicated above. It is not in doubt, therefore, that the Niger Delta Region of Nigeria has witnessed immense environmental

injustice and has become the environmental sacrificial region of Nigeria's oil wealth. This is chiefly that Nigeria is a fledgling democracy with weak legal, unbalanced political and economic foundations. These unbalanced political, economic and legal foundations are compounded by corruption in the petroleum industry, including disregard for the rule of law, delayed oil pollution-related litigations, denial of justice in the criminal and civil justice when it is oil-related environmental pollution litigation, denial of compensation and reparations of damages caused by oil spills and gas flaring, which together amount to gross failures in the state environmental liability (Nigerian Weekly Law Reports 2004, 43). Government intimidations, particularly during the military regime (Military has ruled Nigeria for over 36 years against civilian regime of only 16 years since Nigeria obtained independence from Britain in 1960), has been instrumental to both environmental injustice and violation of the principles of the Universal Declaration on Human Rights, which Nigeria is a member state (Nigerian Weekly Law Report 2004, 44-46). Perception and participation of the oil and gas-producing communities are usually out of question in policies of environmental and socioeconomic impact assessment. Mining projects in other parts of Nigeria where surrounding communities are consulted to participate in impact assessment perform better with cordial relationship between miners and the local population (Odu 2003, 17). In the opinion of the author, when appropriate steps are taken to involve the local interests, and in the presence of effective national environmental policy, the choice of appropriate technology that will curtail both gas flaring and oil spills would present no difficulties.

2.6 Environmental Injustice and Human Rights Violation in the Niger Delta Region

The discovery and exploitation of crude oil in the Niger Delta Region and the end of the Nigerian civil war in 1970 paved the way for most of the environmental injustices in that region of Nigeria, and which appeared to have equally turned to human rights violations (Ezejiofor N 2006; Amund 1987, 76). Much of the environmental injustices come from the environmental negligence arising from both oil and gas firms and the Nigerian government reluctance to enforce the pertinent petroleum laws. The Federal Government of Nigeria has not honored its human rights obligation in respect to environmental justice (Odu, 2003, 21). Claims of human rights violation in the Niger Delta Region is a direct spillover of decades of political injustice, economic injustice, which has now manifested to decades of environmental injustice, barreling down to socioeconomic decline.

Scattered political and sociological studies on Nigeria claim that political injustice was planted during the civil war (1966-1970), because nearly or large section of the Niger Delta Region were sucked into the war. Furtherance to this, allegations of cummulative marginaization is made on the Niger Delta Region. This is in the sense that the Nigerian government copied the United States brand of democracy and pasted same on the Nigerian political space, in which it created a partial regime and favouritism. For example, the oil fields of Texas in the United States are mined by individuals who pay taxes to the American government, and the American government is not involved in the mining. They alleged again that the natural endowments in the northern states, such as tin, zinc, silver and gold deposits are allowed by the same government of Nigeria for individual mining, provided taxes are paid to the Nigerian government, and the Nigerian government is not involved in the mining. But the oil and gas deposits of the Niger Delta Region are the only natural endowments in Nigeria where the government of Nigeria is involved in the mining - with only thirteen percent derivation paid to the petroleum-bearing states. According to the author, if and when injustice is planted in any part of a country, it quickly turns to economic injustice, political marginalization, social injustice, environmental injustice and abuse of human rights. According to the International Human Rights Law, which exist as treaties and designed to promote and protect human rights, such as land inheritance, right to safety and right to livelihood, and which Nigeria is a Member-State, has not been enforced and complied with. Article 25 of the International Human Rights Law stipulates that everyone has the right to a standard of living, adequate for the health and wellbeing of himself and family, including food, housing and social services, while Article 27 provides that everyone has the right freely to participate in the cultural life of his or her community (Lundy C 2004, 201, 205-207). From all indications, oil and gas communities in the Niger Delta have their wellbeing impacted by crude oil-led pollutions, which have affected their farming and fishery, including their health, which apparently is a violation of both Article 25 and 27 of the International Human Rights Law. Rather what is invoked in Nigeria is the Customary International Law, which cocoons the government to act out that what it does to replace the International Human Rights Law with its Customary International law, is for economic purposes of the entire country (Ezejiofor 2006; Nigerian Weekly Law Reports 2005, 32, 41-44). Before now, landownership and landholding in most part of Niger Delta is a community property, and land tenure is based on customary laws (Ezejiofor 2006, 2). Customary Laws in the

context of the Nigerian Legal System, pursuant to the Common Law principle, is defined as those laws that govern traditional and customary life of the local communities in Nigeria, of which the Niger Delta is inclusive (Okonkwo 1980, 41). By stipulation, the Niger Delta Customary Laws exist to regulate the use, protection, preservation and conservation of lands and forest, including natural resources. The application of customary laws in that region, in terms of landholding and ownership changed with the enactment of Land-Use Act 1978 (recently Cap 201 LFN 1990) (Ezejiofor 2006, 56). Land-use Decree (1978) has authorized the public collection of land rents, which means that earnings from royalties arising from oil and gas extractions no longer go to the local communities in the Niger Delta Region. It instead stipulates that earnings arising from royalties should go to the Central government of the Federal Republic of Nigeria. With this, Land-use Decree began the journey of resource dispossession, corruption and environmental negligence as seen today in the Nigerian Petroleum Industry (Nigerian Weekly Law Reports 2005, 8). The main implication of the Land-Use Act to the Niger Delta Region is that all land in the territory except land vested in the federal government or its agencies, of which those located in the oil exploring sites are included, are vested on the State Governor. The State Governor is therefore authorized to hold such land on trust for the citizens of the state, and be responsible for allocation of said land in all urban areas (Ezejiofor, 2006). The legal issue arising from this is that the contentious Land-Use Act has opened the process of land tenure by the state governor to invoke Section 28(2) of the Act, which totally means that the state governor can lawfully revoke the right of occupancy of the land belonging to the locals for the federal government (Nigerian Weekly Law Report 2005); (Ezejiofor 2006, 64). It further revokes the Customary Law regime, and the new Land-Use Decree is targeted at dispossessing the locals of their natural land (Nigeria Weekly Law Report 2005, 35-38). Before the enactment of Land-Use Decree of 1978, the local communities of the Niger Delta had direct dealings with the foreign oil companies over land acquisition despite mining rights were the preserve of the federal government to grant (Ezejiofor 2006, 4). Under Section 16 of the interpretation of erstwhile Land-use Act of 1964, mineral oil and petroleum resources were excluded from land, which meant that though petroleum resources were vested in the state, the land supporting the mineral deposits remained vested in the communities and their families (Ezejiofor 2006, 42-44). Such has seized to exist under the new Land-Use Act (1978). Sequel to this, there is emergence of a Petroleum Industry Bill (PIB)

which has been long debated in both the House of Representatives and the Senate, and no enactment into law had been made yet. A look at the PIB shows that the bill will ensure more transparency in the petroleum industry, and that Nigerians can own equity in the new national oil and gas company, because the existing NNPC will be liquidated if the proposed PIB is enacted (Nigerian Weekly Law Report). The PIB advocates reversal of provisions of prior contracts and agreements in the existing petroleum laws, and introduces new fiscal regimes. The bill intends to repeal the existing 16 petroleum Acts that are never enforced, and replaces them with all encompassing law that provides better regulatory mechanisms in the oil and gas industry. By so doing, the bill aims at bringing and harmonizing under one law the various legislation; instruments and institutions, including conflicting policies that have characterized and dogged the petroleum industry, and thereby repealing the present NNPC that has been at the epicentre of bribery and corruption. More importantly, the proposed PIB provides the interests of the oil and gas-bearing communities. PIB compels the oil and gas firms to plough back 10% of their net profit towards the development of the surrounding communities in the form of inclusive business, or better known as "10% Host Community Fund" In the opinion of the author, the 10% Host Community Fund, if the bill is enacted into law and enforced, would certainly reduce the injustices, economic marginalization and human rights abuses in the oil and gas-producing communities.

Aside this, the Nigerian government generally has applicable environmental laws on paper, enforcement and compliance have broken down and become weak during the decades of oil and gas extraction. Because of domestic law failures to control environmental injustice-related human right violations, aggravated oil producing communities have often taken their cases to foreign courts because they would not get fair hearing in the Nigerian traditional courts. Examples of such offshore litigations include as follows:

SERAP v. Nigeria ECW/CCJ/APP/08/09 *(Socioeconomic Rights and Accountability Project (SERAP). (This litigation was lodged at the ECOWAS Court of Justice. The court unanimously found the Nigerian Government for abuses by the oil and gas companies, and ruled that the government must hold the oil firms to account. The Court found that the government of Nigeria violated article 21 (the right to wealth and natural resources) and article 24 (right to a satisfactory environment.. of the African Charter of Human and*

People's Rights, by failing to protect the Niger Delta Region and its citizen, and that Nigeria should enact effective laws or other adjudicative means: ECOWAS (Economic Community of West African States) This litigation was carried out in a court outside Nigeria (2010) Nigeria is a Member-state of ECOWAS.

4 Nigerian farmers v. Shell 12/08 *(Four Nigerian farmers from the Niger Delta Region sued Shell in a court in Holland, that the Royal Dutch Oil Company is responsible for the massive oil spills in their farms from 2004-2007. But the Dutch Court ruled that the SPDC (Joint Venture Company between Nigerian government and Shell), which is the Nigerian subsidy, is responsible for the oil pollutions and therefore should pay for damages (Credit, Reuters, 2013)*

Wiwa v. Royal Dutch Petroleum 226F 3d 88 (2000)(No. 96Civ. 8386*) One of the three litigations of Ken Saro Wiwa's family against the Royal Dutch Shell under the United States Alien Tort Statute (the torture victim Act of 1992) Ken Saro Wiwa, an environmentalist was hanged by the Nigerian military government, and Shell settled the case out of court with a compensation of USD 15, 5 million.*

Wiwa v. Anderson 01 Civ. 1909 (1996). *Another law suit by Saro Wiwa family and the Earth Right International, under the U.S Alien Tort Statute against Shell's Nigerian subsidiary CEO, Mr. Anderson.*

In the opinion of the author, these aforementioned litigations were all lodged in foreign countries because the litigants would not get fair trials and justice from the Nigerian courts, or justice from other state adjudication mechanism in Nigeria. This is evident that the failures of domestic laws in Nigeria to curtail the causation of human rights violation has prompted affected communities and individuals in the Niger Delta Region to seek justice in foreign courts.

Most of the failures can be attributed to Nigeria's joint venture agreement with the Dutch Oil Company – Shell, where Nigeria has 51% equity under the NNPC and Shell 49%, to form the Shell Petroleum Development Consortium (SPDC). For a very long time, the foregoing negligence and failures in Nigeria's environmental liability has left many communities unaware of their environmental rights and therefore vulnerable to the negative effects of crude oil exploitation. This can be traced to the fact that there had been no instances of environmental and socioeconomic impact assessments in their localities, where their participation and perceptions were required and assessed. Failures

of this, including the massive corruption in the petroleum industry, therefore undoubtedly impacted negatively on their socioeconomic wellbeing. It is the opinion of this author that the surrounding communities be provided with legal empowerment, which should be aimed at assisting them to understand their rights, and be able to defend their rights in the course of dispute. Along this legal empowerment, there should be an independent middleman between the government and the oil and gas firms, on the one hand, and the affected citizens, of the other hand. The communities must be provided with all pertinent knowledge of the effects of oil spill and gas flaring, as part of corporate environmental disclosure of risks, as well as the state's environmental liability to intervene. It is the opinion of the author again, that, to strengthen the obligations and responsibilities of the independent middleman, it is imperative that the affected communities be human rights advocates, and be engaged in monitoring, educating, coordinating and documentation of cases of environmental degradations and injustice as they relate to human rights violation, as observed in their respective domains. Furthermore, the community ought to be aware of the relevant and existing national and state environmental laws, and lobby for additional regulatory mechanisms, such as the enactment of the proposed position of an independent middleman. The imperative of the independent middleman arise from the fact that the ongoing proposal for the Petroleum Industry Bill is a long way to actualize; the Nigerian government environmental negligence attitude will take a long way to change; the joint venture agreement between the Nigerian government and the Royal Dutch Shell will retard every effort to sustain the government's environmental liability; crude oil and gas reserves in the Niger Delta Region can last up to another 110 years (according to the Nigerian National Petroleum Company-2006).

2.7 Related Regulatory Concepts and Applications

According to Clarke (1982), industry-related environmental degradations can find solutions in technology or in law. This study however, is interested in the legal means as a choice option. Technical solution could have been as well an appropriate choice, as said earlier in this chapter, save for the fact that the Shell Petroleum Development Consortium (SPDC), the Joint Venture Agreement between the Nigerian National Petroleum Company (NNPC) and the Royal Dutch Oil Company Shell, is of the view that high costs of technical solution feeds on corporate profits. A good example of this is the proposal

made in the 80s on abating gas flaring in Nigeria's oil and gas fields. This proposal calls for Gas Re-injection technology (pumping natural gas back to the gas well/reservoir prior to extraction of crude oil). This proposal has not been achieved since the 80s when it was first proposed. Funds have been expressed as the main prevailing burden to achieve Gas Re-injection project. On the other hand, legal means of abating oil pollution or other forms of environmental degradation is quite appropriate in this study. According to Simila (2007), legal regulation can promote technical solutions by imposing certain technologies for corporate bodies to adopt. Achieving technical solution through legal imposition can be demonstrated by means of standard-setting. Economists, for example, have argued that the law should limit itself to setting standards, which are based on technical solutions. While also traditional regulation employs standards directed towards individual activities or products, including the kind of sanctions used, which are mainly administrative and criminal. It is pertinent to say that the concept of standard-setting has several meanings. It can be understood to refer to something found in legislation, which is meant to guide future decision-making of administrative rules and bodies. As Kuusiniemi in 1995 put it, that standards can be referred to as substantial requirements faced by those regulated. In this case, the substantial requirements can be imposed by administrative bodies and rules, while standards may also be adopted through a legislative act.

The concept of regulation in the foregoing discussions relates to the aims and objectives of a government to correct failures in other to meet the expectations of the public. It can also refer to an attempt by a public authority to alter or maintain the behaviour of others in order to protect the environment and reduce environmental degradations or socioeconomic decline. This can further be postulated as part of government/state environmental liability. In this study therefore, legal regulation has been given more weight and preferred to non-legal regulation. Certainly, technical solutions or technological applications can be used to abate environmental problems at the sources, such as appropriate technologies to re-inject natural gas back to the reservoirs instead of flaring. Legal regulation of the environment can also impose specific technical solutions, such as the gas re-injection approach mentioned above. This happens when a government makes it obligatory for manufacturers and other business operators to embark on specific production processes or puts emphasis on the use of certain raw materials in order to protect the environment. In the case of gas flaring, a government can impose a technical requirement that all intending oil and gas explorers should re-inject certain percentage of

the natural gas back to the reservoirs instead of flaring. This technical-based law requirement can decrease gas flaring considerably (Nigeria flares about 75 percent of its natural gas to the atmosphere). The option of technological application is part of the government environmental liability; to impose technical solutions, where it considers such as an appropriate and effective environmental solution. Apparently, the application of legal regulation of the environment, especially in the case of Nigeria's oil and gas industry should promote efficiency and effectiveness more than any other non-legal regulatory mechanisms. Another form of non-legal environmental regulatory mechanism evaluated by this study is the Voluntary Cooperation Agreement (VCA). This is a regulatory concept whereby firms arrange voluntary cooperation agreements between them and local authorities on how to deal with environmental problems that might arise in the course of production. Voluntary Cooperation Agreement can equally be applied in the Niger Delta Region, but considering the level of corruption in Nigeria's oil and gas industry, and the fact that there is no history of industry and government cooperation in Nigeria, legal regulation is preferred. National Environmental Action Plan (NEAP) is another regulatory approach. This concept is an undertaking of the government to provide the framework to integrate the environment into the overall socio-economic development through public participation. However, the envisaged problem of the national environmental action plan is the likelihood of inadequate funding and presence of weak Non-Governmental Organisations in the country. Cumulative Impact Assessment is another non-legal regulation. From the foregoing discussions, both technology and legal instruments can be applied to abate oil pollutions in the Niger Delta Region. But in view of the financial reasons given by SPDC as the prevailing burden to achieve abatement of gas flares and oil spills through technology, legal means has been adopted as the appropriate option in this study.

2.7.1 Regulation as a Legal Instrument

Environmental management and regulation have nowadays become part of the societal life and a dominant issue for every sector of the economy (Driesen 2003, 167). Environmental degradations arising from crude oil has adversely affected the physical environment, agriculture, fishery and health of the oil and gas-bearing communities. Because of the self-interest of the Federal Government of Nigeria in the oil and gas

industry, it is the opinion of the author that regulating petroleum-related environmental problems in the country should involve an independent opinion from a third party and an independent mediating body. This is because there is widespread environmental injustice and human rights violation in the oil and gas industry. There is also injustice in the judiciary and the civil service.

Pursuant to the above, development of legal framework embodies two regulatory approaches. The first enacts the formal legal instrument, for example, Acts, Ordinance or Decree. The second approach consists of developing the regulatory measures such as Bylaws, Rules and Orders (Akinseye 2000, 45-49). The subsequent development of these legal instruments entails the determination and acceptance of environmental standards considered acceptable for the health and protection of humans, animals, plants and the entire environment. Changes to these legal instruments can be affected through replacement or updating of existing laws by amending the respective enactment, or by replacement of existing laws by a new form of legislation. If and when law is developed, it can be seen that it serves usually well-defined purposes against the backdrop of value judgements about matters such as credibility and practicability (Hawke 2002, 179-182). Traditional regulatory mechanisms will tend to be preoccupied with adherence to limit values, for example, gas flaring and release of other hazardous materials arising from oil spillage in the Niger Delta Region. It is essential that the development of legal mechanisms to deal with issues of the environment is backed up with all the relevant measures to deal with compliance and enforcement (Hawke 2002). This is because legal mechanism of this nature is hardly the end, particularly where there are no political will and administrative commitments for its enforcement. According to Akinseye (2000), this is true in the Nigerian situation where government negligence and corruption run high in the oil and gas industry. It can be construed that the Nigerian government negligence can be attributable to its equity holding with the Shell Petroleum Development Consortium. Its equity in the oil and gas industry also fuels corruption, environmental injustice and abuse of fundamental rights of the oil-bearing communities.

2.7.2 National Environment Action Plan (NEAP)

As indicated above, National Environmental Action Plan (NEAP) is an undertaking of the government to provide the framework for integrating the environment into the overall socio-economic development for the country through broad public participation. NEAP further creates opportunities to identify and explore environmental problems and seek out possible solutions, by carrying out detailed assessment of the environment in respect to developing abatement measures (Muoghalu 1996, 33-37); (Keohane Nathaniel *et al* 1998). Nigeria, for example, would certainly want to establish and implement effective National Environmental Action Plan, but lack adequate supports in terms of funding, absence of result-driven Ngos, which are needed to carry out effective NEAP programmes, and also inadequate awareness by the various environmental stakeholders (Nzeakah 2000, 33-38). Nigerian government can achieve substantial environmental upgrading aimed at environmental protection, especially in areas of desertification, protection of air and water pollution, land resource management, biodiversity, solid waste management, marine environment and deforestation, only if it embarks upon such environmental-based action plan (Muoghalu 1996, 77). Nigeria can achieve this by mapping out a series of actions based on sustainable objectives, such as documenting and analysing all major environmental issues; promoting sustainable use of natural resources in a more efficient way, and developing an environmental protection and management plan that is within the handling of various stakeholders. Environmental problems arising from the oil and gas could have benefited from NEAP if implemented. NEAP has no place in Nigeria of today, for reasons that the present structure of the petroleum industry has put tremendous environmental oversight and negligence (Nzeakah 2000, 41). In reversing the trend, the Nigerian government must act through the establishment of a National Environmental Action Plan, where all the pertinent stakeholders are involved. It must do so by providing support for the introduction of a participatory and demand-driven environmental planning process, including funds and other resources. The government should target stakeholders such as the universities, for research purposes, including encouragement of NGOs from both local and international (Nzeakah 2000, 52-56). The country needs to develop sound action plans with target objectives.

2.8 Review of Related Literature

This subchapter discusses, presents and defines the basic concepts associated with environmental degradations arising from oil and gas industry. Of course there are various ways the literature review of this study can be tackled, such as from the socioeconomic impact, which is the effect. Or from the oil pollution which is the cause that barrels down to the effect. To achieve a more potent literature review, the study leans on the pollution, which are the oil spills and the gas flaring. However, constructive efforts are made to examine related literatures that are relevant to oil and gas pollution on both soil and air, including the ecology. Oil and gas pollution in Nigeria causes various ecological damages, which contribute to the death of plants, animals and aquatic life. It also impacts the livelihood and health of the surrounding communities (Odu 2003). The presentation helps to understand oil spillage and gas flaring, and how they impact the socio-economic livelihood of the localities where crude oil is extracted. It further presents how oil spillage and gas flaring and their impacts on the surrounding environment are pertinent to this study. At this beginning of the subchapter, it is pertinent to include the works of other scholars, who have earlier studied the environmental impact assessment, or post-impact assessment arising from crude oil production. As stated in chapter 2.2, environmental impact assessment gives information or a baseline data on how these environmental changes, whether beneficial or detrimental are impacted on the locality. Such environmental impact assessments include environmental impacts of gas flaring, environmental impacts of oil spillage, air pollution monitoring, and visibility assessment arising from gas flaring, thermal heat assessment, greenhouse gas accumulation, other climatic effects and acidic rain (Evoh 2002, 31-35). On the other hand, post-impact assessment determines the environmental effects of the spill. The National Oil Spill Detection Response Agency (NOSDRA) has been active in post-impact assessment; but its efforts have not helped to create effective enforcement and compliance mechanisms. Humanity cannot be so myopic as to choose a path which can only lead to the destruction of the society, as can be observed in the oil and gas-bearing communities in the Niger Delta Region. There is a human environment relationship, where the environment provides the economic system with the pertinent raw materials, such as crude oil, which are transformed into consumer products, such as energy, which in turn fuels other transformation (Tietenberg 1992, 18-19).

As said earlier, Nigerian economy for the past four decades has significantly dependent on revenues from the oil and gas industry. Crude oil is a mixture of hydrocarbon solids and gases dissolved in liquid with a mixture of derivatives of oxygen, sulphur and nitrogen, including different metals, such as cobalt, calcium, sodium, copper and silicon. It is further accompanied by ranging qualities of extraneous compounds, for example, organic materials (Tietenberg 1992). Generally speaking, crude oil is inflammable at ambient conditions, and odorous. It can exist as light crude or heavy crude. Nigerian crude oil is mainly light crude with less sulphur. Heavy crude is associated with heavier sulphur contents than the light crude. Crude oil extraction has brought foreign earnings to Nigeria, but has at the same time brought down the livelihood of those communities where the crude oil and its associated natural gases are extracted (Akanimo 1995, 40-43); Akpambang 2001, 76) and Adenuga 1999, 56). Oil spillage and gas flaring are the most outstanding environmental degradation arising from crude oil and gas extractive operations, and they have degraded the physical environment and impacted the socio-economic life of those oil and gas-bearing communities (Akpmbang 2001, 78); Akanimo 1995, 43). The target of this related literature review is on oil spillage and gas flaring because of the reasons mentioned above.

Having to present the basic facts on both oil spillage and gas flaring, on how they impact the socio-economic and health, including agriculture; it is important to present some earlier researches on the effects of oil and gas extraction impacts on the surrounding environment. Nwaugo (2005) wrote on the microbiological effects of oil pollution, where toxicity of petroleum hydrocarbon impacts and recovery processes and their effects on aquatic organisms. Other studies carried out in 2008 in some states of the Niger Delta Region presented the effects on crop yields and other agricultural productivity, and how both oil spillage and gas flaring impacted the socio-economic wellbeing of the local environment. Ekeh (2006) researched and identified major and minor components of crude oil, and their effects on the global atmosphere, including microclimate effects on the surrounding environment, especially on health of the citizens. Similar researches carried out by Chokor (2003, 32-34) in the Niger Delta Region presented some trace heavy metals and how they affect agricultural productivity and drinking water. From these aforementioned researches, oil spillage and gas flaring can be concluded as environmental degradation that are capable of affecting the socio-economic and health of localities that lie in close proximity to oil and gas rigs. It is remarkable to note that these

earlier studies present basic information on the chemical components of crude oil, including possibilities to impact on the physical environment, but come short of recommending or suggesting appropriate and effective mechanism to abate environmental degradation arising from oil and gas extraction. This present study therefore has added the dimension of applying appropriate legal instruments to deal with environmental negligence that cause both physical degradation and socioeconomic impacts.

2.8.1 Oil Spillage as a Source of Socioeconomic Impact

According to Burger K. (1997, 31-34), Chokor C (2003, 33-36), oil spillage can be defined as an intentional or unintentional release of crude oil in the form of hydrocarbon compounds into the environment, either on the land or on water bodies, as a result of human activity. Oil spillage can also occur through natural geologic seeps on the seafloor along the coastline, but such a spill is on a minimum level (Chokor 2003, 36). Oil spill presents a serious environmental disaster, leading to significant long term impacts on the environment, affecting sustainable development and the ecosystem, and resulting to loss of biological diversity and impacting the socio-economic livelihood of the surrounding localities (Ahiarakwe 2003, 55-56). Petroleum producing firms are engaged in the exploitation and exploration of crude oil. They are also engaged in the transportation of this commodity to various destinations, both in Nigeria and overseas. Oil spill impacts have provided us with the useful means for estimating crude oil extraction effects on the oil and gas-bearing communities. However, it ought to be said that it is difficult to assign a monetary value to the ecological damage sustained as the consequences of oil spillage. Mindless discharges on water and soil constitute the major part of oil spillage. Spillage on land is also very significant in many crude oil producing communities. In the case of discharge on water, spillage pollution problems arise from well heads, landing and discharge from ships and sometimes from both legal and illegal bunkering, including vandalism, such as in the Niger Delta Region of Nigeria (Chokor 2003). It may also arise in the course of crude oil transportation through pipelines or tankers. In addition, oil spills can happen when inappropriate or not-well maintained pipelines rapture, underground storage tank leaks, exploration of oil on the land and oil well blow out (Chokor 2003). Oil

spillage is classified according to a combination of factors, such as magnitude (small, medium and large), potential impact on the environment and the type of technology employed for the cleanup operations. Two aspects of oil spills are of interests in this study: Land Spills and Marine Spills. It ought to be mentioned hereto that only land spills will be investigated and discussed in full in this study because of its impact on agriculture. While on the other hand, marine spills will only be mentioned to the extent of its impact on fishery and biodiversity.

Land spill here refers to oil spills arising from oil drills due to mal-functioning equipment, sabotage, and negligence, mindlessness of the oil and gas operators. It is recognised that despite best management practices the potential exists for accidental release of oil discharges to occur during operations, and there is possibility also that areas near the drilling operations, including underground tanks and pipelines could be affected. In respect to marine spills, oil wastes that enter the ocean come from various sources. Like the land spill, some marine spills are accidental or leaks from ocean-moving vessels. Some result from chronic mindless and careless habits of the oil and gas operators (NNPC Publication 2009, Vol. 7. 38; Nigerian Weekly Law Report 2007). There are cases of marine spills arising from bunkering operations, especially illegal bunkering, where there are inadequate precautionary measures in place. Marine spill, like the land spill, has disastrous effects on the environment. It is also lethal to wildlife, including tarring of the coastlines, coastal erosions and sea shores, dead or injured flora and fauna, and contaminated water body. With the passage of time, marine spills that are not cleaned can ultimately destroy the surrounding ecosystem (Chokor 2003, 44-47). In addition, when oil is spilled in the ocean or on any water body, it initially spreads on the surface of the water body, depending on its relative density and composition. The oil slick formed thereinafter may remain cohesive, or may equally breakup owing to sea waves, tides, water current and wind, which may cause the oil slick to drift over large areas, impacting on the open sea, coastal areas and terrestrial habitats along the paths of the drift (Burger 1997); (Cahill 1990, 9-14). Floating oil may contaminate mammals, sea birds and sea turtles that swim or through the surface of the water. If fishing activities take place in the immediate surroundings of the spill, fish catch is likely to be affected and contaminated as a result of contact with the floating oil (Ahiarakwem 2005). Crude oil does spill whether it is on sea or on land; the most important considerations therefore are the availabilities of legal measures to mitigate oil spills. Environmental negligence and

environmental injustice are about the principal causes of the Niger Delta environmental degradation. It is essential therefore to establish appropriate legal solution. The Niger Delta Region has a mixture of swam, rainforest, mangrove and wetland vegetation, which present special complexities. It is on this note that oil and gas operators take into account the special circumstances of the vegetation, by developing appropriate technologies and management skills in respect to carrying out effective cleanup and recovery operations. In addition, oil spill countermeasures for cleanup, remediation and removal of the oil are selected and applied in respect to several interrelated factors, including ecological protection, socioeconomic impacts and health factors. It is advisable therefore to put in place contingency plans as to deploy pollution control equipment and skilled manpower effectively.

Oil spill can result from pipeline blow outs due to formation of pressure during drilling operations in the rig (NNPC Publication 2009, Vol. 7. 32-35). Such incident can be grouped under equipment failure, though; some can be due to inadequate maintenance, such as corrosion of pipelines, over flow tanks, hose failures and valve failures. These technical failures can be stopped by the oil firms if they are regulated according to existing petroleum industry-related standards and laws. According to Nigerian Weekly Law Report (2006, 31) equipment failures due to negligence are prevalent in oil rigs in Rivers State, Delta State, Abia State, Imo State and Bayelsa State, including other states in the Niger Delta Region where crude oil is extracted. In Nigeria, for example, studies estimate that about 22.2% of oil spills in these states are as a result of technical failures. While, on the other hand, sabotage or vandalism is the highest source of oil spillage in the Niger Delta Region (Okonta L, Douglas O. 2001, 19-22). According to recent researches on oil spillage in the Niger Delta, sabotage and vandalism, which involve intentional puncturing of oil pipelines to steal crude oil or in most cases out of protest, is very high. According to NNPC Publication (2007), pipeline sabotage accounts to about 59.7% of oil spills in the Niger Delta Region. Pipeline sabotage resulting from grievances by the local inhabitants have been re-enforced by factors of perceived abuse of human rights, economic and political marginalization, acute socio-economic problems and subsequent decline in livelihood of the oil and gas-bearing communities (Nigerian Weekly Law Report 2006, 13-15).

Table 1: Trends of Pipeline Raptures from Vandalism/Sabotage

Area	2000	2001	2002	2003	2004	2005
Rivers	355	730	381	444	608	396
Warri	78	215	56	26	90	241
Bayelsa	550	325	448	323	445	580
Mosimi	50	36	29	40	70	147
Ogoni	450	355	270	554	330	520
Total	**1483**	**1661**	**1184**	**1387**	**1543**	**1884**

Source: NNPC 2006

According to NNPC (2008), oil spills have been on the increase since 1987. This can be observed from the available recorded oil spills (1998-2007), as depicted in the table below.

Table 2: Showing three principal Sources of Oil Spill (1998-2007)

Year	Equipment Failure	Human Error	Sabotage	Total Oil Spills Recorded
1998	28	12	65	105
1999	19	28	55	102
2000	34	39	40	113
2001	46	15	64	125
2002	39	20	67	126
2003	41	53	63	157
2004	38	32	96	166
2005	49	27	127	203
2006	37	39	187	263
2007	31	29	209	269
Total	362	294	973	1629
Percentage	22.2%	18.1%	59.7%	100%

Source: Policy and Practice *Collective Response to Oil Spill

NNPC Publication 2009

As can be observed from the table above, oil spills resulting from sabotage accounted for the greater percentage of all spills in the recorded years; with 59.7% out of the 1629 spills recorded from 1998-2007. According to the author, this high occurrence of pipeline sabotage can be reduced if factors of human rights abuses, environmental injustice and economic marginalization are reduced. It can be noted that the consequences of NNPC pipeline vandalism or sabotage are horrible and unnecessary, which in most cases had caused explosions and fire, resulting to loss of lives and property. Many oil and gas companies very often shut down their activities owing to local pipeline sabotage. For example, an Italian oil and gas company, the ENI, attributed the frequent oil spills and

theft to the activities of local youths and therefore decided to shut down its operations in the swampy oil fields in Bayelsa state, to prevent further damages to the environment (for further reading, please see: http://odili.net/news/2013/may/11/337.htlm (visited May 3, 2007. According to the Nigerian Weekly Law Reports, the present and existing regulatory system is not working. According to the author, therefore, there is no better alternative to this than the intervention of an independent mediator that would earn the respect and confidence of the locales. Environmental injustice and decline in livelihood have been behind the unrest and crises in the Niger Delta Region of Nigeria (O' Neil 2007, 8). These factors have attracted international attention, and stoppages in crude oil production in the Niger Delta Region have in some cases pushed up global crude oil prices (Chokor 2003). Pipelines have limited lifespan, and where they are not replaced after specified period of time, they will start to leak. They can also rapture from internal pressure (Awobayo 1981, 56-60). Crude oil is corrosive to metals and might affect metallic pipelines amid high temperature and high humidity, which both are apparent in Nigeria. Besides thermal heat from gas flares, acidic rain coming from gas flare stacks also affect pipeline lifespan. This means that a culture of regular maintenance and periodic replacement should be adopted as a regulatory measure. Oil spillage increases toxic elements in the soil to the detriment of the host plants. Certain nutrients and minerals required for proper growth of plants and crops are paralyzed, resulting to poor agricultural production and subsequent food insecurity (Ahiarakwem and Onwuka A. 2005, 9-12). Based on the chemical components contained, heavily polluted soil remains infertile for many years (Odu 1998, 54); (Vander, Summer and Cabrera 1994, 198-203); (Chaney, Ryan 1993, 457). Large amount of oil spillage has occurred covering land and creek in swamp and mangrove vegetations in most part of oil and gas locations in the Niger Delta. Applications of inadequate soil remediation technologies, such as bioremediation, gelling, chemical dispersions and in-situ and ex-situ solutions have not worked well in the cleanup of contaminated soil because of inadequate funding (Odu 1998, 35); (Zuofa, Isirimah 1985, 57). Furthermore, crude oil deposited on plant leaves penetrates into the leaves and thereby reducing transpiration and photosynthesis (Zuofa *et al,* 1985, 60). Heavy pollution causes yellowing and complete shedding of plant leaves, impacting on agricultural productivity. Spilled crude oil on permeable soils will penetrate porous soils and move downwards under the influence of capillary and gravitational actions to affect agricultural productivity. Most of Niger Delta Region vegetation is mainly swampy, rainforest and

mangrove. The effects of oil spills on aquatic organisms are so diverse and complex on water surface. Hydrocarbon components in crude oil will limit oxygen supplies, affecting aquatic organisms, such as fish (Ozumba K. 1997). Fishery is the second source of livelihood in most part of Niger Delta. Loss of fishery impacts the socio-economic fabric of those localities where crude oil is extracted. Improved cleanup technology of contaminated crude oil on water body (marine oil recovery technology) or Thermal Desorption (TDU) technologies for soil contamination are not frequently used in Nigeria. Skimmers and oil booms, which are used when oil spills, especially in deepwater spills are not used by the oil companies (Ozumba 1997; Nigerian Weekly Law Reports 2006, 13-15). This means that there are no specific legal requirements on the use of such technologies on deepwater or soil contamination cleanups.

In the field study on oil spillage, as contained in chapter three (Methodology and Materials), investigations on the effects of oil spillage had been discussed, particularly how it impacts on the wellbeing of the community. Socio-cultural and economic life of the study area have commonality with most of the various communities that constitute the Niger Delta Region. This means that the tradition of the people and the terrain of the place unveil the activities that are pertinent in the Niger Delta Region. Farming and fishing are the common means of livelihood of the study areas. Apart from oil and gas-induced ecological disaster, air pollution, effluent discharges, erosion and flood arising from crude oil extraction are other environmental problems of oil and gas-bearing communities (O' Neil 2007, 14). It is against these backdrops that this study becomes an inevitable tool in understanding the socioeconomic wellbeing of the oil and gas-bearing communities. It is noticeable that the oil industry in the Niger Delta Region of Nigeria has brought impoverishment, conflicts, human rights abuses, health problems and food insecurity. This can be demonstrated by the high percentage of pipeline sabotage by the angry locales, as shown in table 2, with 59.7% of the total pipeline rapture, causing oil spills.

2.8.2 Classification of Oils Spills

Oil spillage can exist in liquid, gaseous and solid forms, and spilled on the land and on water bodies (Eboe, 2001, 63; Hutchfall 1994, 32-40). Oil spills are classified according to volume as to be able to know which cleanup method or methods are appropriate to be applied, including associated clean up costs.

Classifications include as follows:

Minor oil spill: This refers to a spill or crude oil discharge less than 25 barrels in island water, or less than 250 barrels on land, offshore or coastal waters that do not bring about an environmental threat to the public or to the ecosystem (Hutchfall 1994, 47).

Medium Spill: This spill is considered medium when the discharge or spill is over 25 to 250 barrels into the water body or 250 to 2,500 barrels on land or offshore and coastal lines.

Major Spill: Major oil spill refers to any discharge that is over 350 barrels in island waters or over 4,500 barrels on offshore and coastal line. Subsequently, regardless whether it is minor, medium or major spill, any measurable quantity of oil discharge pose substantial environmental threat to the public, more so, to the practice of agriculture and fishery, thus threatening food security and subsequent impact on the socioeconomic wellbeing, as several scattered researches have proved.

2.8.3 Oil Spill Cases in Nigeria

Over ninety-five percentage of Nigeria's oil and gas production comes from the Niger Delta Region (Chokor 2003, 110). Niger Delta Region covers about 10,800 square kilometres, consisting of the largest mangrove, rainforest and swamp vegetation in Africa and one of the largest wetlands and fragile ecosystem in the world (Eboe 2001, 64-65). Niger Delta Region's topology includes rivers, streams, islands, creeks and swamps. The upstream activities, that is to say, oil and gas extractive operations in the Niger Delta involve about 2, 300 oil wells, several production facilities and 14 export terminals. This, by no means, is a complex network of production pipelines crisscrossing the entire region (Chokor 2003). Oil spill is the commonest oil and gas extractive problem in the Niger Delta Region, and has been very frequent in occurrence, impacting negatively on the socioeconomic lives of the oil-bearing communities, such as Izombe in Imo State, Elele

in River State, Ogoniland in the Rivers State, Imirigi in Bayelsa State, Joinkrama in River State and other communities in the Niger Delta Region (Okojie 1996); (Ozumba 1997), Awabayo 1981), Amund 1987).

Table 3 List of Some Major Recorded Oil Spills in Nigeria (1978 – 2008)

Year of Occurrence	Location of Occurrence	Qty Discharged in Tons
2008	Forcados Terminal	250, 000
2008	Izombe	312, 000
2002	Ibaa	39, 000
2000	Imirigi	300, 000
1991	Jones Creek	26, 000
1990	Jones Creek	33, 782
1989	Idolo	40, 000
1988	Ibaa	500, 000
1987	Ibaa	500, 000
1982	Abudu Pipeline	188, 180
1980	Oyakama	230, 000
1980	Euniwa Oil Wells	400, 000
1980	Offshore	200, 000
1978	Forcados Terminal	580, 000
1978	Gocows Escravos	300, 000

***Source:* Nwilo and Badego, 2008**

Table 4: Some Recorded Spill Cases involving SPDC in the Niger Delta Region

Sources/Field	Date Recorded	Quantity/barrels	Action Taken	Remarks
SPDC, Awoba Flow Station	20/01/1997	Est. 150, 000	No Cleanup	No compensation
Well 9 Awoba	10/01/1998	Est. 100, 500	Cleanup done	No details
Well-10 Awoba	29/5/1998	Est. 125, 000	Cleanup done	Compensated
Well 13 Awoba	27/08/	Est. 80, 000	No details	No details
Awoba Mainfld	10/01/1999	Est. 175, 000	Cleanup done	Compensated
Well 12 Awoba	15/11/99	No details	Community Cleanup	No compensation
Well 17 Awoba	25/07/2001	75, 000	No cleanup	No details
SPDC Barale P/L	06/06/2001	No details	No cleanup	Not compensated
Ogbodo P/L	24/06/2001	Est. 195, 000	No details	No details

***Source:* Environmental Rights Action & Terisa Turner (2002)**

Table 4 above is important in the sense that it reveals the attitude of the Shell Petroleum Development Consortium (SPDC). (SPDC is the joint venture entity between NNPC and the Dutch Oil Company. NNPC is under the Federal Ministry of Petroleum Resources, and owned wholly by the Federal Government of Nigeria, and has been described as the epicentre of Bribery and corruption in the oil and gas industry).

Image 1

Picture of Oil Spill in the Niger Delta: Source, NNPC (2008)

.8.4 Recorded Oil Spills in the World

For the sake of comparative analysis, table 5 below shows major oil spillage around the world. Crude oil is one the world's main sources of energy, and has to be transported by ships across oceans and by pipelines across lands. The comparative analysis becomes important to this study, as it gives insight on the environmental negligence of the oil and gas companies operating in the Niger Delta Region, including legal failures, manifesting in lack of enforcement and compliance mechanisms in the oil and gas-related legislation. From the table, it can be observed that the Gulf War in 1991 has a record of the world's largest oil spillage, of about 240 millions of gallons of discharged crude oil into the

Persian Gulf. The Gulf war impact on the discharge of this huge oil spills is understandable, but a quick look at the recorded oil spills in Nigeria reveals that Nigerian oil spills, as recorded in the Niger Delta Region in tables three and four, are by far larger both in size and volume than total oil spilled during the Gulf war. Back in 1981, Awobayo conducted an analysis of oil spills in Nigeria from 1976 to 1980, and found the results of the analysis rather huge, and since 1980, the trends in oil spills, particularly spills arising from pipeline raptures have been on the increase, as can be shown on table one.

Table 5: Recorded Oil Spills around the World

Sources of Spill	**Location of Spills**	**Year of Spill**	**Spills in Tonnage**
Gulf war Oil Spill	Persian gulf	1991	5, 000, 000
1xton-1	Gulf of Mexico	1979	450, 000
1xton-1 Oil Well	Trinidad & Tobago	1979	287, 000
Aegeantic	Uzbekistan	1992	285, 000
Fergana Valley	Persian Gulf	1982	260, 000
Nowruz Oil Fields	Miles off Angola	1991	260, 000
ABT Summer	Saldanha Bay Brithany	1993 1978	252, 000 223, 000
Odyssey	Scotia, Canada	1967	80, 000
Odyssey	Gulf of Oman	1967	100, 000

2.9 Gas Flaring as Source of Socioeconomic Impact

Natural gas is a gaseous phase of crude oil, and occurs in underground reservoirs and sometimes in association with crude oil (Tiratsoo, 1979). Natural gas flaring is an uncontrolled burning that is associated with crude oil production (Chokor 2003, 29). Flaring of natural gas is a huge environmental problem in the Niger Delta Region, causing socio-economic decline, health and environmental problems. Its environmental impacts are not only felt in communities with close proximity with the flare stacks, but also outside, through trans-boundary effects. It constitutes to global warming by accumulating greenhouse gas emissions in the atmosphere.

Two types of natural gas reserves in the Nigerian oil fields are introduced here, and they are Dry Gas and Wet Gas. According to Gudmundson (1998), Dry Gas is often referred to as Non-associated natural gas. It comes from the underground gas reservoir and has oil-gas ratio (OGR) greater than 100, 000 units. Unlike wet gas, it occurs when natural gas is not dissolved in crude oil but exists on its own, and that is why it is also referred to

as Free Gas. Whereas, on the other hand, Wet or associated gas is dissolved in crude oil in the underground reservoir, and that is why it is referred to as associated gas. Wet gas is particularly flared in the Niger Delta oil fields, and constitutes the principal environmental degradation as far as gas flaring impact on the area is concerned. It is termed wet gas because it is dissolved in crude oil and has an oil-gas ratio less than 100, 000 units (Gudmundson, 1998, 21).

In respect to gas flaring as an environmental degradation, gas flaring can be defined as a process employed to consume waste gas by combustion in an open flame, which includes the emission of gases that are harmful to life and environment. It can equally be defined as a practice of burning unwanted gas during oil mining (Whitehead 1983); (Chokor 2003, 29); (Amund 1987, 32). Natural gas which is flared in the process of extraction is very commonly found in close association with crude petroleum. Natural gas is so close to liquid petroleum that for most practical and legal reasons, is considered to be the gaseous phase of crude oil (Gudmundson 1998, 44); (Ramasami 1989, 54-55), (Akpe 1998, 73). Gas flaring and venting is a global problem that are associated with oil and gas mining (Whitehead 1983), (Uzukwu 1989 and 2001). With an elevated flare the combustion is carried out through the top of a pipe or stack where the burner is located. According to Orubu, (2008, 55), on the basis of its impacts, associated gas should be stopped in Nigeria by the end of 2009. But legislation and other legal framework to reduce gas flaring has not been enforced and has not been complied with, either by both the Nigerian regulatory authorities and the oil and gas firms, even though such laws do exist on paper. Gas flaring can be abated through Gas-reinjection technology, whereby the gas is re-injected back into the reservoir where it comes from, and then tapped through pipelines and distributed as cooking and industrial gases (Gas and Energy Journal 2001, 32-36). Both the federal government of Nigeria and the oil firms have not implemented this method of abating gas flaring (Chokor 2003); Idoniboyle (1991, 1994; Isiche (2002, 180-187). Utilization of gas for domestic use is not developed. This involves the development of national gas pipelines, and if properly packaged by the federal government of Nigeria, could attract foreign investment, through the provisions of the Kyoto Protocols Clean Development Mechanism (CDM) (Nwoko 2013, 301-302). Excuses have been given as the reasons behind continuous flaring of natural gases. These reasons are as follows: Lack of storage facilities (in the opinion of the author, abandoned gas reservoirs/wells exist for gas-reinjection purposes); lack of adequate gas gathering

and treatment facilities (revenues from oil and gas sales could be used for facilities for gas gathering and treatment, if not for corruption); distance of consumer industries and underdeveloped domestic markets for gas consumption (Nigeria has a population of about 150 million inhabitants that are capable of consuming domestic and industrial gases if the market in terms of availability is developed).

Another problem facing gas flaring in Nigeria is inability to provide sufficient Liquefied Natural Gas (LNG) plants in the country. There is only one liquefied natural gas plant for export that is operational. The country needs more liquefied natural gas plants as the country is ranked the tenth gas reserves in the world (Orubu 2008, 76). These given reasons are the causes of continued gas flaring in Nigeria. Thermal pollution arising from gas flares affects the surrounding microclimate. Thermal heat has health implications on the surrounding environment. This is because gas flaring generates tremendous heat, causing thermal pollution, affecting crops and human health. It leads to dehydration of the vegetation, humans and animals, including the ecosystem and the food chain, as well as flora and fauna (Chokor 2003, 65); (Isiche et al. 2002; Munashighe M 1993).

Chemical components of natural gas, which are flared into the atmosphere, contain paraffin hydrocarbons, such as methane, ethane, propane, butane, hexane, including aromatic hydrocarbons. These are directly dangerous to the physical environment, endangering the health and wellbeing of the inhabitants, including impacts on global warming. Noise pollution arising from gas flares has effects on hearing capacity due to excessive roaring noise from the flares. There is also the problem of acidic rain resulting from the combustion of nitrogen dioxide and sulphur dioxide with moisture (water vapour) in the atmosphere. Nitrogen dioxide and sulphur dioxide are non-hydrocarbon components of flared natural gases.

Table 6: Flaring of Gas in Some Oil and Gas Producing Countries

Position	Country	% of Gas Flared
1st	Nigeria	76
2nd	Libya	21
3rd	Saudi Arabia	20
4th	Iran	19
5th	Mexico	5
6th	Britain	4.3
7th	USA	4

Source: Moffat and Linden 1995

Image 2 Picture of Gas Flaring in a Location in the Niger Delta Region

Source: NNPC Publication 2002

Table 7: Chemical Composition of Natural Gas

Category	Component	Amount
Paraffin Hydrocarbon	Methane CH_4	70-98%
	Ethane C_2H_6	1-10%
	Propane C_3H_8	Trace-5%
	Butane C_4H_{10}	Trace-2%
	Pentane C_5H_{12}	Trace-1%
	Hexane C_6H_{14}	Trace-0.5%
Cyclic Hydrocarbons	Cyclopropane C_3H_6	Traces
	Cyclohexane C_6H_{12}	Traces
Aromatic Hydrocarbons	Benzene C_6H_6	Traces
	Others	Traces
Non-Hydrocarbons	Nitrogen N_2	Trace-15%
	Carbon dioxide CO_2	Trace-1%
	Hydrogen Sulphide H_2S	Trace-1%
	Water Vapour	Trace-5%

Modified after McCain 1974

Included in the composition of associated natural gas are the main pollutants, such as

oxides of nitrogen, oxides of sulphur and particulate maters. These gases are dangerous to health. Sulphur oxides can cause temporary or permanent respiratory ailment and sulphur oxides smog can affect plants and crops adversely. Particulate matters pose a serious health effects on humans, such as respiratory problems and can lead to the development of lung cancer (Isiche *et al,* 2002). Oxides of nitrogen (nitric oxide, nitrous oxide and nitrogen oxide) have toxic effects on plants, animals and humans, and thereby affecting the practice of agriculture and impacting on the socio-economics of the surrounding environment, including impacts on properties (Oduchi G 1992); (Akujuru V 1992);Amakiri 1997). Oxides of nitrogen equally contribute to greenhouse gas emissions. Oxides of sulphur are lethal in the presence of particulate matters and dangerous to plants and humans, and can cause acidic rain (Gwyneth 1990, 44-46). (According to Asthana and Asthana (2005) plants exposed to oxides of sulphur suffer from Necrosis (loss of protoplasm in plants). Gas flaring causes acidic rain, which impact on agricultural productivity and the general ecology (Amadi A 1990, 55-57)

Table 8: Hydrocarbon Composition of Dry and Wet Natural Gas

Hydrocarbon Composition	**Wet/Associated Gas (%)**	**Dry/Non-Associated Gas (%)**
Propane	6.50	1.37
Methane	70.52	91.25
Ethane	22.03	3.60
Iso Butane	0.06	0.30
Normal Butane	0.40	0.44
Iso Pentane	0.20	0.16
Normal Pentane	0.62	0.34
Heavier Hydrocarbon	0.03	0.02

Source: NNPC Data Resource 1998

In the course of petroleum mining operations, flaring occur during "Well Destiny" and production operations (Walmsley 1966, 62); (Comerit 1997, 16). It is not necessarily an ecological or a social crime to flare gases in the course of extracting oil from rigs. But if it gets very high, like the case of Nigeria, where natural gas is flared at very high level (76% flared: about one of the highest among global oil and gas producers (see Table 6 above), it is then an environmental concern. Global consensus to abate gas flaring and venting is gaining wide acceptance because of the recognition of the dangers of the changing climate, including health and socio-economics of the surrounding environment.

In Nigeria, there are over 450 gas-flaring locations in the Niger Delta Region that are considered above industry standard (Dara 1998, 23), (Nigerian Gas Company Limited 1999). The resultant effect of flaring natural gas is the damage to the environment as well as human health and these impacts add to socio-economic wellbeing. Flaring natural gas as it is done presently in the Niger Delta Region is equally an economic waste; inasmuch as the technology to collect and re-inject the gas into its original reservoir is presently available in the world, save for the political will to do so in Nigeria.

There have been research-based articles on natural gas flaring; reasons for continuous gas flaring; medical implications of gas flaring and chemical composition of natural gas. Gas flaring has socio-economic implications as it affects agricultural productivity through acidic rain. Carbon dioxide arising from gas flares causes water borne diseases and combines with haemoglobin pigment in the blood to form carboxyhemoglobin (COHB), and thereby displacing oxygen. This has the potentials of over-working the heart and respiratory mechanism which may lead to heart attack (Nigerian Quarterly Journal of Medicine 2005, 35). In addition, photochemical reaction rates among chemical pollutants in the atmosphere arising from gas flares can increase the oxidation levels, which can affect human health and negatively change the water quality, thereby making portable drinking water hard to obtain. Thermal heat of over 55 degrees Celsius and high luminosity, which are twenty-four hours daily have health problems in communities close to flare stacks. Gas flaring has left a devastating effect on the surrounding environment, and some of its impacts are here below.

2.9.1 Impact on Global Warming

It is estimated that about half of the temperature change over the last climate circle may be attributed to the contribution of CO_2 and Ch_4 from combustion of fusil fuel and natural gas (Ashtana *et al.*2005, 61-62). This will contribute to ozone layer depletion, contributing to greenhouse gas emission and subsequent climate change. According to Comerit (1997) draught is another effect arising from natural gas flaring. It is estimated that a temperature rise of 3 degrees Celsius will be accompanied by a 10 degrees Celsius in precipitation increase in evaporation, and subsequently an equivalent of water shortage. This has subsequent impact on the practice of agriculture.

2.9.2 Acidic Rain

Acid rain occurs because of the dissolution of certain gases, which are compositions of petroleum that are flared into the atmosphere. When the atmosphere is acidic, it leads to rain with pH value of 5 (Normal or neutral pH value is 7). pH is a measure of the acidity or alkalinity of water, and it is expressed in terms of its concentration of hydrogen ions. pH scale ranges from 0 – 14. A pH of 7 is considered to be neutral. pH value of water less than 7 is acidic and above 7 is basic, that is to say, alkalinity (Orubu 2008, 77)

The principal components arising from combustion that constitute to acidic rain are: Sulphur (iv) Oxide (SO_2); Nitrogen (iv) Oxides (NO_2) and Nitrous Oxide. Gas flaring and other human activities give rise to the formation of acidic oxides of carbon, sulphur, particulate matter, hydrocarbon and nitrogen into the atmosphere. These chemicals react with atmospheric water to cause acidic rain (Walmsley 1966, 68).

Reaction Equation that leads to acid rain

$CO_2 + H_2O = H_2CO_3$ ***(Trioxocarbonate (iv) acidic***

$2SO_2 + H_2O = H_2SO_3$ ***(Sulfurous acid) acidic***

$SO_3 + H_2O = H_2SO_4$ ***(Tetraoxosulphate (iv) acidic***

$2NO_2 + 2H_2O = 2HNO_3 + H_2$ ***(Trioxonitrate) acidic***

From the reaction equation above, it can be observed that all the end-products are acidic. Acidic rain, which are hitherto formed causes corrosion of metallic roof-tops, decolouration of paints on buildings, premature rusting of metallic objects when exposed to atmospheric air, damaging of fauna and flora, acidification of fresh water, which has deleterious effects on the microbes activities, including plants, threat to forest plants and bleaching or fading of clothing and textile materials if exposed (Comerit 1997); Orubu 2008, 79); Asthana *et al*, 2005). In addition, acidic rain constitutes a variety of environmental problems, which include destruction of forests and plants. A pH value below 4.50 will kill fishes from lakes and rivers, causing more economic difficulties to the oil and gas-bearing communities (Amadi 1990, 66). A pH value of 6.00 will certainly destroy freshwater shrimps. In the author's opinion, the problems associated with acidic rain needs adequate protective strategy of air, water and soil, as to achieve mitigation of acidic rain in the gas flaring locations, and the best way to achieve this is through gas

flaring reduction through gas re-injection. Developing appropriate gas re-injection technology to re-inject the natural gas back to its reservoir for industrial and domestic applications is essential. Investment on natural gas re-injection technology and subsequent utilization of the gas calls for Clean Development Mechanism (CDM) intervention, if the Nigerian government and the oil and gas firms could not shoulder it.

2.9.3 Impact on Visibility

Gas flaring causes reduction on visibility. Poor visibility is a known problem in areas close to flare stacks (Adeniye 1983, 35). Visibility reduction occurs in the course of scattering of light rays from the surface of airborne particles. This phenomenon is the result of primary pollutants, such as smoke from gas flare stacks coming in contact with secondary pollutants (Dosumuu 1996, 32).

2.9.4 Impact on Heat Generation

According to Ikoro (2003, 32), the combustion of gaseous hydrocarbons contained in the natural gas is an exothermic process, which arise from the evolution of heat (thermal heat) to the atmosphere. According to Oyenkunle (1999); Ukaegbu *et al.* 1987), about 100% loss of crop yields have been observed from farmlands 450 meters away from flare stacks and 50% loss in yields of crops 1000 meters away from flare stacks. This means that the high temperature and radiation intensity features of the farmlands that have close proximity with the flare stacks account for the loss of farm yield in nearly all the oil and gas-bearing communities. In the course of direct observations at the oil rigs during the field study, it was observed that the vegetation around flare locations are suffering from lack of basic nutrients, including weaknesses in growth, dryness and stunted growth.

2.10 National Response to Gas Flaring and Government Policy

Gas flaring started with oil and gas production in Nigeria. As said earlier, it began as far back as 1956, when the first oil and gas exploration began in Olibiri in the present day Bayelsa state in the eastern part of Nigeria. Natural gas which is flared can be defined as the gaseous phase of crude oil. It occurs in underground reservoirs. Crude oil is a natural occurring mixture of liquids and gases, and they are hydrocarbon. Gas flaring is an uncontrolled burning of natural gases associated with crude oil extraction. If there were

storage facilities to capture and store these gases in respect to mitigation, there would not have been much gas flaring as it is today (Dara 1998), (Evoh 2002), (Ishishone 2005) and (Ibikunle 2006). This is the practice of many oil and gas producing countries, where gas flaring has been reduced. Even though Nigeria has enacted Gas-Reinjection Act (1980), which is a legal provision to inject back the associated gas into the reservoir or into other constructed storage facilities, but re-injection of associated gas has not been implemented since 1980, when the Gas-Reinjection Legislation was promulgated (Ikoro 2003, 19). However, flaring gas into the atmosphere is valueless, but could have been valuable source of income if harnessed and utilized.

Consistent flaring of gas in Nigeria has left devastating effects on the surrounding environment of the Niger Delta Region of Nigeria. Gas flaring has been reduced in other parts of the world through the process of re-injection of surplus gas back to the reservoirs. Gas flaring is an environmental problem because methane and its combustion products, arising from flares contribute to global warming and subsequent climate change scenario (Ikelegbe 1993, 43); (Nwoko 2013). As a result of its damaging impacts on the environment, including impacts on socio-economic and health, the federal government of Nigeria did respond with legal solution. The first regulatory measure was in 1984, by enacting a legislation to abate gas flaring. But gas is flared almost nonstop in all the oil and gas rigs in the Niger Delta Region (Odu 1996, 46). The Nigerian government invoked some requirements that oil companies set up facilities to use the natural gas within a stipulated time period (five years) of the commencement of crude oil production following license issuance. Instead, so many reasons have been given to justify gas flaring, and paramount among them include: Lack of gas utilization infrastructure, which means that the associated gas, which is produced at low pressure must be compressed and treated in facilities, which are specifically constructed for such purpose. Such facility requires complex and costly network of compression and pipelines to link the scattered oil fields around the crude oil producing areas. Excuse of expensive construction is not justified, inasmuch as there is marketing channels for proceeds from the sale of gas if harnessed and distributed to the end users. The second reason is that of lack of ready market for the associated gas, which makes Gas-Reinjection back to the reservoir risky. Yet again, this reason is not justified because there is already existing gas market in Nigeria and other West African countries, where wood fuel and coal are predominant household energy sources. Gas utilization is developed in the Federal Republic of Russia

and there are customers in Europe that purchase the Russian gas. Same could work for Nigeria if there is political will to do so.

Considerable researches have been carried out by different institutions, including relevant government agencies on the impact of continuous gas flaring on the environment. The primary objectives of these studies have been to reduce flaring to the barest minimum. But such objectives have been on the drawing board for more than three decades (Ikoro 2003, 54). According to Ikoro (2003) gas flaring has socioeconomic implications that are negative. That utilization of natural gas can empower the people living in close proximity to the location where oil and gas are exploited. Watts (2000) supported this by arguing that gas flaring could also lead to a massive social problem of marginalization and neglect of the communities, if not harnessed to the benefits of the society. This is the situation in the Niger Delta Region of Nigeria, especially those oil and gas-bearing communities. Adelakun (2008, 23) examined the dangers inherent in gas flaring on human health, which is believed to have resulted in deaths among children, including respiratory diseases and cancer. Evoh (2002) identified that continuous gas flaring has also political implications. This view led to the re-examination of the various government policies and oil and gas legislation to end gas flaring by the multinational corporation operating in the area. The result of the re-examination revealed non-compliance and non-enforcement of the existing legislation. While the weakness of the legal enforcement lies on the joint venture between the Nigerian government and the Royal Dutch Oil Company. As said earlier, another interest in abating gas flares is through functional utilization or through gas re-injection process or through Liquefied Natural Gas projects. But there is only one functioning Liquefied Natural Gas Plant available. The Nigerian government has proposed more Liquefied Natural Gas plants, but the proposal is yet to be implemented.

In respect to the government environmental responsibility, the Nigerian policy thrust for efficient regulation of air quality and natural gas conservation is contained in the national policy on the environment. In respect to the National Gas Policy (NGP), which was first reviewed in 1995, provides that oil and gas firms should include gas utilization clauses in the oil and gas exploration agreements (Nigerian Weekly Law Report 2005, 115-118).

In respect to statutory provision, the two main statutes regulating the Nigerian Petroleum exploration are the Petroleum (PA) Act and the Petroleum Drilling and Production (PDP) Act. The Petroleum Act (PA) does not contain any provisions on gas utilization, likewise the PDP Act. These laws serve no purposes in respect to gas flaring and its stoppage. A

subsequent legislation in 1980, known and referred to as the Associated Gas Re-Injection Act, was promulgated to fill the gaps created by both PDP and PA Acts. The Act set a limit of October 1980 for oil and gas firms to develop gas utilization projects and stop gas flaring by 1984. There was yet again Associated Gas Re-Injection (amended) Act of 2004, requiring all oil and gas firms operating in Nigeria to submit detailed plans for gas utilization. There were court decisions arising from litigations, which prohibit gas flaring without a written permission of the Minister of Petroleum Resources. Negligence and weak enforcement mechanisms have not stopped oil and gas companies from flaring gas (Odu 1996, 21-23). In the opinion of the author, there is urgent need for a third and independent middleman to arbitrate between the federal government and the oil and gas firms, on the one hand, and the oil and gas-bearing communities, of the other hand. And because of the corruption in the Nigerian judiciary, there is as well the need to establish a special court to handle all litigations arising from crude oil-related environmental cases. The independent middleman and the special court can work in concert to achieve a substantial abatement of socioeconomic impact in the Niger Delta Region.

2.10.1 The Federal Environmental Protection Agency and Gas Flaring

The Federal Environmental Protection Agency (FEPA), enacted as FEPA Act 1988/92, which established the Federal Environmental Protection Agency and its functions and obligations, is the principal public authority for environmental control, protection and management in Nigeria, (Abudulkaren 2005, 40; Nigerian Weekly Law Report 2003). This Act incorporates most of the Nigerian national commitments on environmental issues, under the United Nations Framework Convention on Climate Change (UNFCCC), which Nigeria has accepted and ratified. Section 17(1) of the FEPA Act empowers the ministry of environment to establish more guidelines, specifications and standards to protect and enhance the national quality of air and to promote public health. The provision seeks to establish and regulate the minimum air quality standards for humans, animals and plants, but its compliance and enforcement remained unfulfilled in the oil and gas industry, simply because the Directorate of Petroleum Resources is officially responsible for all environmental issues arising from the petroleum industry (Abdulkareem 2005, 44-46).

The analysis of data in the course of the field work, as to determine the concentration of

nitrous oxide, sulphur dioxide and hydrogen sulphide (three of the main gas flaring pollutants), indicates high levels of these gases, which are detrimental to health, agriculture, including contributing to greenhouse gas emission. Four sample tests were experimented and their recordings were compared with the standard set by the Federal Environmental Protection Agency (FEPA).

Table 9: Comparison of Four Sample Results with FEPA Standard

Sample Points	**NO_2 (PPM)**	**SO_2 (PPM)**	**H_2S (PPM)**
Sample point 1	0.25	0.10	0.16
Sample Point II	0.20	0.10	0.25
Sample Point III	0.15	0.13	0.15
Sample Point 1V	0.10	0.10	0.20
FEPA Standard	**0.060**	**0.010**	**0.008**

Source: FEPA 2008

From the table above, it can be observed that the concentration levels of the three gases, nitrous oxide (NO_2), sulphur dioxide (SO_2) and hydrogen sulphide (H_2S) in each sample point, when compared with FEPA standards, were above national limits of tolerance. The result equally shows the level of ecological problems in the area.

2.11 Nigeria and Institutional Framework

2.11.1 Introduction

This subchapter discusses the Nigerian perspectives, and the analysis of its environmental liability in respect to pertinent legislation, particularly in the oil and gas industry. It includes the legal and political foundations of Nigeria and its 36 states including the Federal Capital Territory, Abuja. Nigeria is divided along six political zones, though the Constitution is silent on the structure and political and legal responsibilities of the six zones. It serves no apparent function other than the 36 states are located in the six zones, as can be shown in table 10 below.

2.11.2 Political Administration in Nigeria

It is important to start early in this subchapter with the Nigerian political administration before Nigeria's legal system. This is because majority of Nigeria's legislation arise from the political foundation and considerations. Table 10 below is a brief survey of Nigeria's political history to date.

Table 10: Brief Survey of Nigeria's Political History (1960 – 2011)

Month	**Year**	**Event**
October	1960	Attainment of Independence from Britain
October	1963	Adoption of Republican Constitution
January	1966	Coup d'état and Overthrow of First Civilan Government
July	1966	Second Coup d'état in revenge of January 1966 Coup d'état
May	1967	Civil War (Biafra and Nigeria)
January	1970	Civil War ends
July	1975	Third Coup d'état
February	1976	Attempted Coup d'état
October	1979	Civilian Government based on U.S Presidential System
December	1983	Coup d'état
August	1985	Coup d'état
May	1999	Civilian Government (Third Republic)
May	2007	Civilian Government (Forth Republic)
May	2011	Civilian Government (Fifth Republic)

The political framework of Nigeria is a federal presidential representative and democratic republic, with a multi-party system – copied from the American system and pasted on the Nigerian political space. The Nigerian Constitution (1999) provides a federal system of governance with separation of powers (Nigerian Weekly Law Reports 2004, 108). The executive power is vested on the presidency, and the legislative power is vested on the two chambers of the National Assembly, which are the Senate (the upper house) and the House of Representatives (the lower house). As a federation, Nigeria is divided into 36 politically self-governing states and the Federal Capital Territory (FCT) Abuja. The states are grouped in a non-political and non-legal six geopolitical zones. Nigeria's capital, Abuja was officially moved from Lagos in 1991. A reference to the appendices is however necessary to have some knowledge of Nigeria, especially the Fact Sheet on Nigeria, map of Nigeria showing the various states, including the map featuring the administrative boundaries. As can be seen in table 11 below, only South East zone has five states, instead of six or seven. Ironically, this can be construed as the result of the

federal government marginalization of the eastern part of the country. Such shortage in the number of states in the south east zone has obvious implication in the balance of power between the south and north of Nigeria - so much that any federal voting has always impacted negatively on the south; because of the number of law makers in both the house of representative and the senate, which are more in the northern part.

Table 11: Nigeria's Pol-Geopolitical Zones with States

South-South	North West	North East	North Central	South East	South West	S
Akwa Ibom	Jigawa	Adamawa	Benue	Abia	Ekiti	A
Bayelsa	Kaduna	Bauchi	Kogi	Anambra	Lagos	B
Cross R	Kano	Borno	Kwara	Ebonyi	Ogun	C
Delta	Katsina	Gombe	Nassarawa	Enugu	Ondo	D
Edo	Kebbi	Taraba	Niger	Imo	Osun	E
Rivers	Sokoto	Yobe	Plateau		oyo	R
	Zamfara					

Each state is established with complete administrative branches without financial independence, as they get funding from the federal government to carry out state responsibilities. States hold a 4-year term election where they elect the administrative head called the governor. Each state is further divided into local government areas, headed by an elected local government chairman. There are 774 local government areas in Nigeria presently. The local government areas replace the colonial districts under the British administration (National Assembly Publication of the Federal Republic of Nigeria 2006, 43-45).

Since its independence in 1960, Nigeria has struggled to build a democratic society because of her cultural and religious diversities, but had not worked as proposed. It had instead been largely governed by the military dictatorship since it gained independence. Nigeria has had about 12 years of democracy, which can be called a new republic, starting from 1999, when this new democratic government took effect. The present democratic government was elected in 2007, with Musa Yaradua as the president, and Dr. Goodluck Jonathan as the deputy president. There was another general election in 2011, and the presidency was won by Dr. Goodluck Jonathan (former vice president, former governor and former university lecturer).

There are three ties of governance in Nigeria, namely: the executive, comprising of the presidency. The second is the legislature, which comprises of the Senate and the House of Representative. The third is the judiciary. There is no independent entity to supervise environmental problems in the country, such as the environmental ombudsman. Environmental ombudsman position, as a middleman between the Nigerian government and the Nigerian public, in respect to mediating, identifying and acting as an advisory body, could be explored as part of solution to environmental matters, particularly in the oil and gas industry. There are no specialized courts to handle environmental-related litigations in the country. Nigeria has in 2011 established an Industrial Court through legislation. This means that constitutionally, there is provision for specialized courts in Nigeria.

2.11.3 The Nigerian Legal System

Nigeria is a Common Law country. By virtue of colonization, Nigeria's legal system is based on the English Common Law tradition. The current constitution was adopted in 1999. English law has much influence on the Nigerian legal development. In the present legal foundation in the country, the legislature (National Assembly), which is the lower house, is presided over by the Speaker of the House of Representatives and members are elected from the local government areas. And it is a 4-year term before further elections are carried out. The upper house is presided over by the Senate President. The senate has 109 members and elected from the 36-federating states. Each state is made up of three zones and each zone elects its own senator for a 4-year single term. Nigeria is a developing country in terms of economy, polity and legal development. The nation's present laws are amended from the 1999 Constitution. The laws are further sourced from the legislation enacted by both the upper and lower houses. Others are sourced from the judicial precedent and from the customary and Islamic laws. Other laws are sourced from international treaties and convention, such as the environmental laws. Each state runs a legislative House of Assembly, and has also a 4-year electable duration. The state House of Assembly makes laws for the state of its origin.

For dispensation of justice, the highest court in Nigeria is the Supreme Court, followed in the order of superiority by the Federal Court of Appeal, including State Court of Appeal; the Federal High Court, the State High Courts, the Magistrate Courts, including the

Customary and Islamic Courts. Litigations involving environmental issues linger indefinitely in the Nigerian traditional courts because of judicial corruption and political inter-play. As said earlier in this chapter, there is no specialized environmental court in Nigeria. Special environmental court is necessary in Nigeria because of endless delays when it is environmental litigations. For example, there is an environmental court in Venezuela to administer environmentally-related litigations and such should be explored for Nigeria. Nigeria as a developing country needs such courts, and when and if established, will go a long way to giving justice in matters arising from environmentally-related disputes, particularly in the oil and gas industry. In addition to sources of law mentioned above, legal information can be obtained from the Supreme Court Reports and other High courts, from the Nigerian Weekly Law Reports and from the Nigerian Commercial Law Cases. It is not possible to cover all the legal rules that are concerned with the environmental consequences arising from the oil and gas-related environmental matters. This study is interested in some of the enactments it considers relevant, and not all the enactments listed below will be analyzed. Only the following are considered very significant: Petroleum Act (1969), Gas Re-Injection Act (1969), Land-Use Act (1978), Corrupt Practices Act (2005), Gas Flaring Act (1984); Federal Environmental Protect Agency Act (1995); EIA Act (1994) and NNPC Act (1990). Legislation in the agricultural sector is also essential, because agriculture plays significant role in the socioeconomic dimensions in the Niger Delta Region, and it is the worst affected by both oil spillage and gas flaring.

2.11.4 Legal development of Nigeria's Oil and Gas Industry and Legal Framework for Case Law Regime

Theoretical speaking, the Nigerian petroleum industry is highly regulated, and its legal regime is a specialized area of law, regulating the exploration, production and transportation of crude oil and natural gas, including the supply, distribution, storage and marketing of petroleum products, as well as liquefied natural gas. As diverse as the area of coverage so diverse is the legal regime governing same in the form of statutes, cases, subsidiary legislations and regulations (Omorogbe 2001, 32-36).The nature of operations in the oil and gas industry is such that one of the direct consequences of Petroleum activities is usually environmental degradations, which manifest in the generation of oil

spillage, gas flaring and other waste and hazardous materials (Omorogbe 2001, 39). These environmental consequences in the course of petroleum exploration and exploitation are also transported from the point of production to other points. The interplay of these environmental degradations with the physical environment must be regulated in order to prevent avoidable calamities on the human population, more so, to the communities close to the oil rigs. Nigerian petroleum legislation evolves through regulation and guidelines to protect and/or restore the environment to as near perfect as possible, and the actual results remain unfortunately laws in the textbooks and not in the courtrooms. The philosophy behind the Nigerian oil and gas-related legislation is that the licensee/Lessee or Operator is expected to be responsible for any form of environmental degradation arising from his or her operations in the course of mining crude oil. In accordance with the existing Petroleum Act (1990), the Minister of Petroleum Resources is empowered to make regulations for the prevention of pollution of water courses and the atmosphere (Petroleum Decree s.9 (1)(b)(iii)). All licensees or lessees are expected to adopt all practicable precautions including the provision of up to date equipment approved by the DPR to prevent pollution in Nigerian waters (Petroleum Drilling and Production) Regulations 1969.

The Petroleum Act (Cap 350 LFN 1990) is by far the most outstanding oil and gas-related law, which touches on many aspects of the petroleum industry, and would therefore be given more explanations more than other laws in the industry. Under this law, ownership and control of all petroleum resources are vested in the state, and under this law, only Nigerians or firms incorporated in Nigeria may be granted the rights as follows:

I. Oil Exploration License, which must not exceed twelve thousand, nine hundred and fifty kilometers of area
II. A license to prospect for petroleum and this license must not exceed two thousand, five hundred and ninety square kilometers in area.
III. A lease to be known as a Oil Mining Lease (OML), to search for, win, work, carry away and dispose of petroleum, covering area of two hundred and ninety five kilometers.

Four types of legal relationship exist in the Nigeria's oil industry, and there are as follows:

I. Concession (Oil Lease as stated in OML pursuant to the Petroleum Act 1990) In this legal relationship, a prospecting company bears all the costs of exploration, development and production, and Concession contract is awarded to only indigenous contractors
II. Joint Venture: This is defined not only by OML, but also by three other agreements, which are Participation Agreement; Operating Agreement and a Memorandum Of Understanding (MOU)
III. Production Sharing , and
IV. Service Contract Arrangement.

In addition to the Petroleum Act (1990) as stated above, there are other related statutes, such as Oil in Navigable Waters (Cap 337 LFN 1990); Oil Pipeline Act (Cap 358 LFN 1990) and Territorial Waters Act (Cap 428 LFN 1990). These statutes will not be discussed here, for the simple reason that there is a new petroleum bill (PIB) awaiting enactment, if it will. In accordance with the existing Petroleum Act (1990), the Minister of Petroleum Resources is empowered to make regulations for the prevention of pollution of water courses and the atmosphere (Petroleum Decree s.9 (1)(b)(iii)). All licensees or lessees are expected to adopt all practicable precautions including the provision of up to date equipment approved by the DPR, to prevent pollution in Nigerian waters (Petroleum (Drilling and Production) Regulations 1969.

Pursuant to the above is the new Petroleum Industry Bill (PIB). This bill which is presently being debated upon is aimed at establishing the legal and regulatory framework for institutions and regulatory authorities for the Nigerian petroleum industry, as to establish the guidelines for the operation of the upstream and downstream sectors, and for purposes connected with the same in respect to the following fundamental five objectives as proposed by the new Petroleum Industry Bill:

Vesting of Petroleum and Natural Gas: Property and sovereign ownership of petroleum within Nigeria, its territorial waters, the continental shelf, the Exclusive Economic Zone and the extended continental shelf shall vest in the sovereign state

of Nigeria for and on behalf of the people of Nigeria.

Community Development: The Federal Government shall, in co-operation with the state and local governments and communities, encourage and ensure the peace and development of the petroleum producing areas of the Federation through the implementation of specific projects aimed at ameliorating the negative impacts of petroleum activities. In the opinion of the author, this brings about inclusive business plan for oil and gas-bearing communities. Such has the potentials to reduce economic marginalization and reduce human rights abuses.

Nigerian Content: The Federal Government shall at all times promote the involvement of indigenous companies and manpower and the use of locally produced goods and services in all areas of the petroleum industry in accordance with existing laws and policies. (2) Where any contract for work or services is considered to be within the capabilities of Nigerian companies, in accordance with any law relating to Nigerian content, the tender list shall be restricted to Nigerian companies. (3) All companies involved in any area of the upstream or downstream petroleum industry shall, as a condition of their license, lease, contract or permit, as the case may be, comply with the terms and conditions of any law relating to the Nigerian content law in force at the time. (4) Failure to comply with the terms of any local content law as determined by the Inspectorate shall be a ground for revocation of a license, lease, contract or permit that may have been previously granted to the company that failed to comply with the said terms. The PIB, if enacted will include the above-mentioned "Nigerian Content Law" as an encompassing single law.

Government Participation: (1) The Minister shall grant licenses and leases on the recommendation of the Director General of the Institutions and in accordance with guidelines, impose special terms and conditions that are not inconsistent with the provisions of this Act on any license or lease to which this Act applies, including terms and conditions as to: (a) participation by the Federal Government in the venture to which the license or lease relates, on terms to be negotiated between the Minister and the applicant for the license or lease; and (b) exploitation of any natural gas discovered. (2) Subsection (1) of this section shall

not apply to any indigenous company operating in the upstream sector whose aggregate production is less than or equal to fifty thousand barrels per day of crude oil or natural gas equivalent. In achieving their functions and objectives under this Act, the Institutions and the National Oil Company shall be guided by principles of the Nigerian Extractive Industries Transparency Initiative Act of 2007.

Environment and Air Quality Emission (Oil Spillage and Gas Flaring)

The Federal Government shall, to the extent practicable, honor international environmental obligations and shall promote energy efficiency, the provision of reliable energy, and a taxation policy that encourages fuel efficiency by producers and consumers. (2) In accordance with the provisions of subsection (1) of this section, the Federal Government shall introduce and enforce integrated health, safety and environmental quality management systems with specific quality, effluent and emission targets for oil and gas related pollutants, without regard for fuel type such as gas, liquid or solid, in order to ensure compliance with international standards. In the author's reasoned opinion, the above does not differ from the existing environmental laws, and does not specify if its enforcement rests on the DPR, under the Ministry of Petroleum, in which case, it would amount to business as usual. The best option still remains an independent mediation that does not rely on the federal government to intervene.

In respect to the legal framework for case law regime and the Nigerian Courts and administration of justice, the determination of the Supreme Court of Nigeria was whether any government agency has the right to endanger the life of a citizen without the latter's consent. The foregoing constitution promulgated on May 29, 1999 provide for an independent judiciary. In practice, the judiciary is subject to executive and legislative branch pressure, influence by political leaders at both the state and federal levels, and suffers from corruption and inefficiency, thus creating rooms for non-compliancy and non-enforcement of laws

Under the 1999 constitution, as said earlier, the regular court system comprises federal and state trial courts, state appeals courts, the Federal Court of Appeal, the Federal

Supreme Court, and Sharia (Islamic) and customary (traditional) for each state and for the federal capital territory of Abuja. Courts of the first instance include magistrate or district courts, customary or traditional courts, Sharia courts, and for some specified cases, the state high courts. In principle, customary and Sharia courts have jurisdiction only if both the plaintiff and defendant agree, but fear of legal costs, delays, and distance to alternative venues encourage many litigants to choose these courts. In addition to these courts, there is in existence the establishment of specialized Industrial Court in 2007. This, hitherto, creates the awareness for the establishment of other specialized courts in Nigeria, such as the Environmental Courts, as proposed by this study. Below are some well known court cases in the oil and gas industry that involved the federal government's right of ownership of the petroleum resources with a state government and other federal agencies:

I. The Attorney General of the Federal Government versus the Attorney General of Abia State (No. 2, 2002) 6 N.W.L.R. In respect to the legal framework for Federal Government ownership of oil and gas resources, the Supreme Court (highest Court in Nigeria) discusses the judicial interpretation of the Federal Government of Nigeria's ownership in the debate of "Resource Control". Abia State is one of the 36 states of the Federal Government and an oil and gas producing state. "Resource Control" is a well known debate arising from the nine oil producing states in Nigeria to control the petroleum resources in their respective lands. This litigation has been postponed several times, and still remained undecided to date (Nigerian Weekly Law Reports 2008, 52).
II. Known Court Cases on Petroleum Profits Taxation (Petroleum Tax Act is different from national corporate Income Tax Act 1969): SPDC v Federal Board of Internal Revenue (FBIR)1996 8 N.W.L.R; Gulf Oil Company Ltd v Federal Board of Internal Revenue (FBIR)1997: 7 N.W.L.R and the Texaco Overseas Nigeria Ltd v FBIR. These three court cases were discussed and decided by the Supreme Court.

2.11.5 Problems of Petroleum Industry and Related Legislation

In introducing this subchapter, there is no gainsaying the fact that while the amount of oil and gas-related environmental degradation has increased, and had continued to impact the socio-economy of the communities located at the mining sites, diversity and regulatory strategies and techniques to control the subsequent environmental impacts have not increased proportionally. Failures in these regulatory instruments and strategies have inspired many scholars from different disciplines to contribute to the understanding of these environmental regulatory techniques and strategies. A good example of this is this present dissertation on the socio-economic impacts of environmentally-related problems in the oil and gas industry in the Niger Delta Region, citing two oil and gas-producing communities. There is urgent need for the environmental consequences of mining crude petroleum to be minimized. There is a need for the government and the various institutions to address the issue of oil and gas-related environmental problems in the Niger Delta Region. There is also need for the oil and gas firms operating in the area to comply with both national and international environmental laws and industry standards, such as environmental accountability (Akpofure 2000, 34). It is on the basis of minimizing the environmental consequences of the oil and gas industry that this study calls for a new approach in regulating oil pollution that is different from what is presently available. The concept of regulation can be government or non-governmental; can be law and non-legal (Simila 2007, 36). As said earlier, the Directorate of Petroleum Resources is a regulatory entity under the Ministry of Petroleum and Environment, and its legal status as well as its political affiliation does not permit thorough regulatory mechanisms. In terms of legal regulation through legislation, there are enactments that are meant to address environmental protection and the petroleum industry. The Land-use Act (1978), though served the interests of the central government in terms of resource control and revenue, but has at the same time pioneered the course of corruption and environmental negligence in the petroleum industry. Land-Use Act has been accused of dispossession of the Niger Delta Region of their natural endowment, inasmuch as most of the communities in the region are about the least developed in Nigeria in terms of federal establishments. It has been said that because of the government negligence and also on the basis of low allocation derivation formula apportioned to the oil and gas bearing communities, Land-Use Act further impacted negatively on the Niger Delta Region by exposing the region as

solely the property of the federal government (Ezejiofor 2006); (Akinseye 2000, 61). The Environmental Impact Assessment Act No. 86 of 1992 makes it mandatory for any major development project likely to have adverse impact on the environment to act in accordance with the legal stipulations provided by the EIA Act. It prescribes the procedure for conducting, reporting and auditing, and since its enactment, several oil blocks have been licensed to local and foreign companies for petroleum exploration and exploitation without proper application of environmental impact assessment or socioeconomic impact assessment (Ezejiofor 2006, 45-47). Surface laid petroleum pipelines are still crisscrossing habitable communities, bypassing homes and public places. Oil spills are unchecked (O'Neil 2007, 32). Liability for environmental damage is not effective. Nigerian traditional tort law in respect to damages caused by oil and gas exploration is not effective and legal compliance is not observed. Verdicts and court decisions are hard to get in Nigerian traditional law courts, particularly on matters concerning crude oil extraction-environmentally-related litigations (Nigerian Weekly Law Report 2007, 19). Individual and group litigations on cases of oil spillage and other related oil pollution are lodged in foreign courts.

In respect to the ineffective application of traditional tort law, there ought to be Environmental Damage Compensation legislation. For example, in Finland, there is Environmental Damage Compensation Act (737/1994), which was enacted in 1994 for the purposes of damage caused by pollution from industry, and it is enforced with compliance (Simila 2007, 112). In Nigeria, there is such damage compensation Act and it is never enforced or complied with in the cause of oil spills or other environmental degradation that affect the livelihood and food security of the Niger Delta localities. The Oil Pipeline Act, Section 24 provides for licences to be granted for the establishment and maintenance of pipelines incidental and supplemental to oil fields and petroleum exploitation. It places obligation on the holder of such licence, for which payment of compensation for economic crops and property damaged, including surveying fees are all stipulated. But the law never specified aspects of construction in relation to surveying and its environmental impact assessment, for which EIA Act (Environmental Impact Assessment Act) was enacted. Most of the oil pipelines in the Delta Region are surface-laid and crisscrossing out to where people live, and this is not in line with both the provisions of the Oil Pipeline Act and Environmental Impact Assessment Act (Nigerian Weekly Law Reports 2004, 132). The PDP Act 1970 (Petroleum Drilling and Production),

which was amended in 1973 has not specified oil well regulations in its provision, and it is the only body in Nigeria to have provided effective oil well spacing standards (Ezejiofor 2006, 19). In addition, the PTDF Act of 1973 (Petroleum Technology Development Fund) legislation was aimed at working along with the NNPC in terms of technology transfer and technical acquisition. Its funds have faced massive misuse by various governments and political leaders. Little or no attention has been paid to the issue of technical acquisition (Akinseye 2000, 72). Technically speaking and in respect to the PTDF Act, transfer of technology from the foreign oil and gas companies has been affected and had not been implemented because the funds budgeted for its purposes have been misused: only a fraction of the budget has been dispensed (Nigerian Weekly Law Reports, 2006). In the views of the author, this practice creates apparent defeat to the concept of technology transfer to Nigeria, at least in the oil and gas industry. It is equally a defeat to technology-based foreign investment, especially in the oil and gas industry. There is no known Nigerian-owned oil and gas company that operates with Nigerian-developed technology, despite the fact that Nigerian government controls 51% of the oil and gas mining rights. Scattered studies on Nigeria's ability to acquire and diffuse foreign technologies indicate that Nigerian-owned oil and gas companies operate under joint venture agreements with foreign companies. This is further supported by the Trade and Technology Policy of the Federal Republic of Nigeria (2004, 19-23), indicating that the aim of PTDF has not been implemented fully and that there is no apparent benefits arising from it. Late enactment of Petroleum Resource Regulation impacts on the environmental consequences in the Niger Delta Region (Makinde and Adeyoke 2007, 34-37). In respect to the above statement, the Environmental Impact Assessment Act (1994) with its provisions, and when compared to the Oil Pipeline Act (1965), which stipulates the main provisions for pipeline construction and maintenance, and when compared further with the PDP Act (1970), in respect to Well Spacing Regulations, arise questions of misplacement, as to which law should precede first. Against the backdrop that there is no legal information stating the availability of other regulatory mechanisms applied before EIA Act of 1994, and in the view of the author, the EIA Act should have been enacted before the enactment of the Oil Pipeline and the Petroleum Drilling Acts of 1965. This is because projects for construction, such as oil and gas facilities should first be screened and assessed for environmental consequences and socioeconomic impacts before such projects are approved for implementation and subsequent execution.

The only legislation which provides screening of imported technology is Decree 70 (1970). Decree No. 70 was established by the Nigerian National Office of Industrial Property (NOIP) to screen imported technologies. Its screening was principally on technology appropriateness, acquisition costs, maintenance, functionality and diffusion. Section 7 stipulates approval only after screening of the above requirements is completed (Okono 1985 Ge-85-57147). Decree 70 (1970) does not provide screening for environmental appropriateness or any environmental consequences arising from the imported technologies or technological applications. Pursuant to this, the widespread surface-laid pipelines in the Niger Delta Region should not have been approved, if environmental impact assessment has been enacted earlier and effectively carried out. The same applies to the Petroleum Drilling and Production Act, in respect to Well Spacing, which principally was aimed at providing pertinent regulatory measures for industry standards. Such misplacements have potential to encroach on the deforestation of the mangrove and swampland of the Niger Delta, affecting farmland and fishing grounds (Makinde *et al* 2007, 32).

The Nigerian Petroleum Act (1969) and the petroleum Drilling and Production Regulation of 1969 are the two principal laws that regulate the Nigerian petroleum exploration and production operations. Though, there is a new Petroleum Industry Bill (PIB), which is currently in both the houses of the Senate and Representative, and if and when enacted will provide better regulatory measures. The major problem would then be mechanism for enforcement and compliance, which the Nigerian government has not implemented in its earlier oil and gas legislation.

In addition to legal regulation, there are also guidelines to regulate the impact of oil and gas exploration and production operations on the environment. An example of this is the Environmental Guidelines and Standards for the petroleum industry, which was published in 2002 by the Department of Petroleum Resources (DPR). The DPR provides that the director of this directorate issues permits for all aspects of oil and gas-related effluent discharges from point sources, such as gases, liquid and solids, including all oil and gas project development. Though, under the Nigerian law, any aggravated body, including individuals can appeal and seek remedy or bring an action to the Federal High Court against a polluter. Class action against polluters of the environment is recognised by the Nigerian law, but enforcement and compliance remain unfulfilled.

2.11.6. National Environment Liability

Government environmental liability will eventually come down to the enactment of various aspects of environmental regulation and control. National environmental liability therefore discusses the responsibilities of the government in respect to its environmental obligations to the public. This is of the view that government failures in legislation and its enforcement and compliance mechanisms are responsible for the environmental negligence that results to socio-economic impacts in the Niger Delta Region. The study believes that if proper enforceable laws were in place, and subsequently enforced, for which the oil and gas firms will comply with, environmental impacts arising from crude oil production could have been curtailed, and subsequent impacts on the socio-economic wellbeing could also have been reduced. This subchapter therefore focuses on the Nigerian government environmental liability, which is its responsibility to develop appropriate environmental policies and enact laws in respect to the policies, and then develop appropriate enforcement mechanisms for compliance. Such environmental obligation of the government should be targeted at strengthening the corporate environmental liability, support national environmental action plan and other regulatory mechanisms, such as cumulative assessment of the environment.

Here, the study begins by asking what constitutes the basis of Nigerian environmental law and policy, including its legislation, and how environmental policies are based on law. The subchapter includes what agencies are mandated to administer and enforce environmental law. The federal laws concerned with the oil and gas industry have also been discussed. The basis of Nigerian environmental law is provided by the 1999 Constitution of the Federal Republic of Nigeria, pursuant to Section 20. According to the Constitution, the state governments are empowered to protect and improve the environment and safeguard the water bodies, air and land, forest and wildlife (Makinde and Adeyoke 2007, 78-80). Section 2 of the Environmental Impact Assessment (EIA Act) provides that the public or the private sector of the economy shall not undertake or embark on or authorize projects or activities without prior consideration of the effect of such project on the environment (Nigerian Weekly Law Report 2004, 131-135).The Federal Environmental Protection Agency (FEPA Act of 1998) is responsible for the National Environmental Protection for Effluent Limitations. Its regulations include National Environmental Protection of pollution abatement in industries and facilities

generating wastes and national environmental protection of management of solid and hazardous wastes (Makinde *et al*. 2007, 112). As said earlier, FEPA does not handle environmental issues arising from the oil and gas industry. The author of this thesis agrees that this in self is an environmental mistake. It is both legally and politically a bad calculation. According to Black (2002), government regulation comes in the form of law, even though it does not carry out all the functions of law. Regulation can be government or non-governmental. Government regulation is the preferred focus of this subchapter, and is divided into legal and non-legal regulations. Legal regulation is based on specific legislation, whereas non-legal regulation is based on the general competences of government authorities (Similä 2007, 35-37). In Nigeria, most of its environmental policies are based on law, that is to say, by legislation, but they are not enforced and therefore not complied with (Nigerian Weekly Law Report 2006, 35-37). In respect to Nigerian environmental legislation, environmental regulations are found under a variety of national laws, and are included in clauses inserted into the petroleum laws and planning laws, such as the Nigerian Petroleum Act and the Petroleum Drilling and Production Regulation of 1969 (Nigerian Weekly Law Reports, 2006, 24). In others, specific legislation has been developed to deal with such matters as environmental impact assessment (EIA), pollution, water and air quality, urban sprawls, protection of wildlife, waterways and protected areas. Others include nuisance and noise. These specific enactments are mainly textbook laws that have no place in courtrooms (Osunbor 1998, 67-70). Enacting laws for the control of the environment does not only define the responsibilities of industry, but also defines the government's authority to intervene. Since environmental degradation is such a huge problem, the author agrees that effective solution would require a serious government to embark on enacting laws that are enforceable. The primary aim of environmental control is to achieve one final result, such as ensuring that levels of pollution, solid waste generation, noise, water, fumes and gases, including natural resource exploitation, do not exceed specified quantities or limits (Cooperative Environmental Governance, 1998, 67). Addressing the issue of pollution levels would involve the appropriate level of flow of waste, fumes, gases and noise and how they are going to be regulated. It will also involve how the various sources of pollutants should be allocated to those responsible for the pollution (Tietenberg 1992, 360). In the same manner with most developed economies that are faced with new regulatory mechanisms, to deal with the advent of environmental problems, Nigeria like

other developing countries, is facing similar responsibilities to combat environmentally-related problems, especially those coming from the oil and gas industry. Furthermore, recent changes in the mode of governance, such as the recent awareness to include public institutions, public interest groups, universities and other environmental stakeholders, have brought about scenarios where many entities participate. Nigerian government should support this apparent change of mode in governance, which reflects recent societal conditions and awareness about environmental consequences.

According to Sairinen (2000) the objectives of public policy are not easily defined and often subject to revision; societal problems like the environment are to a larger extent resulting from various interacting factors (not from a single factor as believed before) and dispersion of technical and political solutions of problems to many actors (stakeholders). This awareness have brought about a rethink of new environmental regulation from the traditional settings, and much therefore depends largely on how the Nigerian government will implement the new regulatory mechanisms, amid its underdeveloped legal structure, undemocratic politics, insufficient funding and corruption (Ofehe 2005, 27). To achieve efficiency-based environmental thinking, the Nigerian environmental legislation should be targeted at protecting and building upon national framework for environmental laws, such as for Clean Air, Clean Water, Endangered species, Global warming, Agriculture and Land-use. Provision of these issues is vital for effective environmental legislation in Nigeria. This is because when the environmental legislation is not specific, so much depends upon the Environmental Impact Assessment Act (Akinseye 2000, 60). Pursuant to this, the Federal Ministry of Environment of Nigeria administers and enforces environmental law in the country, and has published guidelines for FEPA Act and EIA Act and procedures for evaluating EIA Reports (Akinseye 2000, 65). In accordance with FEPA Act, each state and local government may set up its own environmental body in its own jurisdiction, such as sanitary and other environmental bodies (Environmental Protection Agency), which are mainly engaged in municipal wastes, including household wastes; and hospital wastes, including medical (biomedical) wastes. Such state-owned and operated environmental bodies are in existence in most states in the federation. In Nigeria, there is another environmental regulation and control that is not based on law. It is often an agreement between the oil and gas firms and the oil and gas-bearing communities. It is known as Voluntary Cooperation Agreement (VCA). Voluntary Cooperation Agreement (VCA) is relatively an informal and flexible approach, which

applies self-regulatory approach by encouraging close cooperation between industry and the communities. Some communities in the Niger Delta Region tried VCA, but it had not worked well (Akinseye 2000, 75-80). Legislative method, on the other hand, is a regulatory enactment based on law. It tends to be formal and fixed (can be amended) and plays active role in directing and enforcing laid down environmental regulatory policies (Moe 1993, 82); (Tromans 1994, 20). Of these two approaches, Voluntary Cooperation has the advantages, which includes effective collaboration among participating parties and shared commitments in strengthening measures to protect the environment, but comes short of accountability. The environmental challenge in respect to VCA is that it counts on the "sincerity" of the participating firms. In the context of Nigeria, "sincerity" weighs more on the codes of conduct and the self-regulation of the oil and gas companies. The main problem that weighs against voluntary cooperation agreement in Nigeria is the high level of corruption in the oil and gas industry. In order to avoid such loopholes, as evidenced in voluntary cooperation, though it might work well in domestic settings in the developed economies, legislation therefore in the context of Nigeria proves far more effective to guarantee commitments toward environmental measures. The main preference toward choice of legislative framework stems from the fact that Nigeria does not yet have a cooperative history of government and industry, neither does it have the history of industry compliance in environmental matters, nor exist as a country where there is favourable public attitude towards the environment. The only effective choice to safeguard the environment and reduce the socio-economic impacts of Nigeria's oil and gas industry is through legal regulatory measures that guarantee independence and speciality, and still merit the confidence of the locals.

Legislation on pollution control, particularly on the oil and gas industry, can aim at a particular pollutant, such as gases arising from gas flaring, and the subsequent legislative control of its emission at specified location, such as from the gas pipeline chimney to the atmosphere, as to determine the level of its emission permissible, or in the case of setting of water quality standards permissible, as in the case of oil spills on sea. Nigeria is yet to achieve such specific pollution control by legislation (Anago 2002, 40-47). Much of Nigeria's regulatory mechanisms are centred on the EIA Act and FEPA Act. It further has to be acknowledged that the national constitution of a country determines the permissible areas of legal regulation and assignment of administrative powers and responsibilities (Koning 1987, 43-48); (Hughes 1992). Nigeria operates a democracy with federating

political structures. It therefore must recognize the need to decentralize jurisdictional and operational power and responsibility between the centre and the federating states (Ofehe 2005, 16). Such decentralization has much impact on environmental management (Cole and Grossman 1999, 32). Developing countries that are tied up with federal structures do over-centralize power at the centre. There should be legal integration or decentralized system of managing the environment by the federating regions, where such exists (Rehbinder and Stewart 1985b); (Moltke 1977, 75). Over centralized power at the federal level in Nigeria has always affected the quality of legal regulation and control of the environment. In Nigeria, the federating units, such as the state governments do not have effective legal power to enforce environmental standards in their jurisdictions, particularly as it concerns the oil and gas industry. This is true in the Niger Delta Region of Nigeria, where oil spills and gas flaring have sparked rift between foreign oil companies and the oil producing communities. The communities allege environmental negligence, environmental injustice, human rights violation and non-accountability from the oil and gas firms (Nzeakah 2000, 31-35). It is in view of the rift between oil companies and the locals that necessitates a regulatory system that is independent and specific and one that would have the confidence of the locals.

Furthermore, the subchapter touches on the various national environmental enactments where environmental problems could arise from, such as imports of technology, legislation on agriculture, regulation of thermal pollution, legislation of the petroleum industry. Others are legislation on corruption and free-trade and free-processing zones. From the perspectives of a developing country, environmental challenges are broadly divided into two main categories. The first is environmental degradation arising from industrialisation and urbanisation, such as all aspects of pollution and solid-waste (the so-called brown environmental issues). While the second group of environmental degradation concerns those resulting from resource-based problems such as deforestation, land degradation, and biodiversity loss – particularly concerned with agricultural activities (Dasgupta and Maler 1995, 19-25). Developing countries, such as Nigeria, suffer grossly more than the developed countries in these two categories of environmental degradation, particularly when it concerns controlling the conduct of business activities arising from the operations of the trans-national corporations, and this touches the future role of international environmental law to act on (Morgera 2009, 76). This is mainly that developing countries suffer shortages of skilled labour and other resources to tackle and

address these problems as they are done in the developed countries (Dasgupta *et al* 1995, 26). In addition, developing countries are characterized with low level of mechanization and poor economy. To achieve environmentally conscious design and manufacturing, which suits culture, economy and level of industrial mechanisation, such conscious design should include appropriate environmental regulatory design, to enable it establish significant measures towards environmental protection (Driesen 2003, 193-195). A developing country like Nigeria, amid other problems such as corruption and inadequate rule of law, will in most cases fall inadequately behind these levels: and therefore presents significant environmental challenges (Akinseye 2000, 17). Constraints such as economic dynamics, amid budget and financial constraints will have negative impacts on the economy, and further affect fostering innovation to protect the environmental (Driesen 2003, 73). Level of manpower training, social and religious customs, as well as quality of management do one way or the other find ways to impact negatively on matters capable of sustaining environmental protection measures (Okonkwo 1980, 90-92). Compounded to these problems as mentioned above, is the fact that in most cases, technologies for the export markets, especially to the developing countries, often fail to implement manufacturing-process designs that would satisfy these concerns (Driesen 2003, 86). It is then far from clear that a developing country such as Nigeria can afford to provide inputs at anything resembling the sort of levels existing in the developed countries. Such is not possible without the assistance of the international regulatory bodies, particularly the international environmental law. The international environmental law exist through protocols, treaties and conventions. It further establishes industry standards and corporate accountability, particularly in the oil and gas industry (Nigerian Weekly Law Report 2006, 117-120).

It then becomes necessary to find ways in which Nigeria can have a fair level of leverage from such international environmental law without unduly diverting scarce resources from other pressing development agendas.

On the face of these problems, for example, one can further deduce that there is a connection between the economic aspects of the developing countries and the environment (Akinseye 2000, 55). Each economic development strategy or programme leaves its unique aftermath-footprints on the environment (Okonkwo 1980, 56-61). Needless to say then that environmental degradation arising either from industrialisation or urbanisation or from biodiversity or from other sources, do jeopardise economic

development one way or the other (Dasgupta *et al.* 1995, 31), (Cole and Grossman 2002). Pursuant to this, the economy-environment inter-linkage goes further to the natural resource base of most developing countries, specifically in terms of sustainability (Tietenberg1992, 18-21). According to Okonkwo (1980) poor countries are for the most part biomass-based subsistence economies, insofar that their rural population manage to eke out a living by obtaining directly from plants and animals. Dasgupta *et al.,* 1995 agrees with this. This is true in the Niger Delta Region of Nigeria, where oil exploration has virtually destroyed the environment and traditional means of livelihood. Socio-economic wellbeing has been negatively impacted, food security and health have been threatened (Abdulkareem 2005, 16). As a substitute to the traditional way of life of the people, which are mainly fishing and agriculture, there is now a call by the Niger Delta Development Commission (NDDC) for agricultural investment in the production of cassava and fruits. But such investment in agriculture is hampered by both gas flaring and oil spills, which have affected soil fertility and fishery (O'Neil T 2007, 2-4). To sustain agriculture in view of damaged soils and vegetation, new agricultural technology and a new agricultural law for alternative crops and seeds that are adaptable to the present soil and vegetation is necessary. Natural resource-based extractive activities by both national and foreign operators of such items as the mining of gold, coal, iron ore, bauxite, copper, and exploring of oil and gas, do contribute significantly to national income, and also contribute significantly to environmental degradation (Ofehe 2005, 9); (Amy 1987); (Ashford and Meyers 1985, 73). The peculiar nature of Nigeria, in which poverty, high fertility rates, underdeveloped legal regulatory mechanism and environmental policies, which precipitate to environmental degradation, feed upon each other. This is arguably an environmental challenge. Economically and socially speaking, environmental degradation, whether through mining, deforestation or biodiversity loss, does enhance poverty (Ofehe 2005, 3); (Angelen and Kaimowitz 1998, 25). Nigeria as a developing country should not resort to 'business-as-usual' by neglecting to establish effective environmental abatement mechanisms that are legally enforceable and yet allow mining and industrialization to take place (Okonkwo 1980, 71-73). As said severally in this work, Nigeria should look into other environmental regulatory options, such as independent mediating institutions, for example, the environmental Ombudsman. It should as well look into other areas of dispensing justice, such as specialized courts, for example, the environmental court. Such line of thinking should be explored to tackle environmentally-

related problems in the Niger Delta Region.

In respect to legal and policy reform, the federal framework needs articulated work in many areas. Sectoral policies, particularly in the environmental aspects, are highly centralized at the federal level and also suffer from lack of coordination. There are needs for integrated, multi-sectoral approach to policy development and implementation at both the federal and state levels. In addition, overuse and poor management of existing resources have resulted in enormous difficulties in the country's natural recourses endowment. Public records at both the federal and state levels are in poor conditions, and where they are available, they are out of date. There is need, therefore, for more information availability and appropriate monitoring of environmental change, especially in the oil and gas sector.

2.11.7 International Environmental Liability and Nigeria

International environmental responsibility will largely depend on the various international environmental-based laws, such as treaties, protocols and conventions. There are various ways of assessing internationalization of environmental issues. One of them is the question of international environmental liabilities and policies, including trade-related environmental issues. These international environmental issues portray the responsibilities of the international community. Though, it can be noted that these challenges only partially capture the dynamic relationship between the various international institutions, and its member-states, particularly those members that have accepted and ratified the various environmentally-related conventions and treaties, such as the United Nations Framework on Climate Change Conference or the Vienna Convention on the Protection of Ozone Layers, Climate Change Treaty and the Biodiversity Convention. Internationalization of the environmental challenges is often considered as one of the principal trends in the development of national environmental regulation (Simila 2007, 94-95). This can be acknowledged by the fact that the majority of national environmental laws are sourced from international environmental laws. The levels of internationalizing environmental problems vary from sector to sector and exist mainly in the form of treaties, protocols, and conventions, just to mention a few.

According to Sands (1995), environmental issues pose challenges for the following aspects of existing international legal order. Firstly, they pose challenges for the

legislative, administrative and adjudicative functions of international law. Secondly, for the manner in which the international legal arrangements are currently organized along territorial lines; and thirdly, for the various factors, such as the multinationals that are as well part of the global community and participants in the various processes and practices of the international legal order. Therefore, the ability of the international legal arrangements to take responsibility of the above-mentioned issues, particularly as the present global environment demands, will determine whether or not the international law regime will be able to face these environmental challenges, more so, in the developing nations, where both legal and political foundations are weak, and also be able to tackle the issue of trade-related environmental measures (TREM).

International law and international institutions serve as the principal framework for international cooperation and collaboration between the member-states of the international community, so as to protect the local, region and the global environment (Sands 1995). Similarly, the principles and rules of public international law and international institutions and organisations serve the same purposes, which are to provide the framework within the member-states, so that they may cooperate in various undertakings, and to establish the framework for dispute settlement measures, when need occurs (Sands 1995, 14).

It has been said that national economic development and foreign trade relationship depend largely on the scale of trade, levels of mechanization, educational attainments and skills, legal and administrative potentials to establish and control rules and regulations, as to actualize them (Duruigbo 2003, 57-61); (Sampson 2000, 76). These factors vary from one country to the other. Domestic structures of the technological advanced nations and in some cases the comparative advantages in respect to natural endowment, such as crude oil and gas from less technological developed nations, determine the setting of international trade (Sampson (2001). From the view point of the author, trade is not an island, hence its relationship with other aspects such as trade and economic development, trade and technology-based foreign direct investment, and trade and the environment are all matters of importance as far as global environment is concerned. They fall under the role of international environmental law, with respect to trade-related environmental measures. One substantial interest of this study is on sustainability, which suggests that sustainable economic development and sustainable environment are good for trade for all nations, developed or not developed. According to Sands in Brundtland Report (1995)

sustainable development should meet the needs of the present without compromising the ability of future generations to meet their own needs. Two important aspects emerge from Brundtland report: Firstly, to merge the environment and economics in decision-making, and secondly, reorienting technology and managing risk. Sustainable development is therefore a broad global policy objective, as referenced in the international law, and making the question of sustainability to stand between the international private law and international environmental law. In respect to TREM, there is the tendency that uncontrolled free trade may involve some conflicts with international environmental agreement or environmental protection requirements in domestic environmental law, or other national law, which can restrict trade in certain commodities (Birnie and Boyle 2002, 697). An example in respect to trade and investment restriction on the basis of specific commodities arising from national law and environmental agreement is a possible investment in the manufacture of refrigerants that use Chlorofluorocarbons and hydrochlorofluorocarbons. Such an investment, whether local or foreign is prohibited under international environmental law, and believed to deplete the ozone layer, pursuant to Montreal Protocol (1987). In addition, trade and investment restriction can impact on technology-based investments for Free Trade and Free Processing Zones, if perceived to have potential for environmental consequences (Duruigbo 2003, 78). It ought to be understood that this study, therefore does not prescribe the doctrine of technical barriers to trade agreement, which encourage voluntary standards, or mandatory regulations and national conformity assessment procedures, targeted at creating undue obstacles to the development of international trade. This by implication would affect technology-based investment (Sampson 2001). International Environmental Law is basically part of international law and not a separate and self-contained field of study. It is different from other international laws, such as human rights law, law of the sea, natural resource law or international economic law, but interactions and overlaps do exist between them (Birnie *et a*l. 2002). In respect to sources of international environment law, the sources are basically from the same sources from which other international laws are sourced. This is based on the fact that international environmental law is simply a branch of general international law, which is traditionally sourced from treaties, conventions, protocols and customs. According to Birnie *et al* (2002), treaties are the most frequent method of creating binding international rules relating to the environment. Treaties in international environmental law are binding agreements, but bind only those countries that accept and

ratify them.

Some of the international environmental treaties and conventions relevant to this study and which Nigeria is Member-State are as follows:

Vienna Convention for the protection of the Ozone Layer (No.: 26164, 1985)

Biodiversity Convention (No.: 30619, 1992)

Treaty on Climate Change (No.: 30822, 1997)

United Nations Framework Conference on Carbon Convention (No.: 102.38, 1997)

Pursuant to the international environmental treaties stated above, Nigeria, like other emerging markets is likely to have significant responsibility on environmentally-related roles than other developing economics. This is mainly because of its high rate of flaring natural gas in the course of crude oil extraction. Nigeria should as a result be engaged in issues of environmental liability for environmental damages caused at both national and community levels. Impacts of gas flaring and oil spills are not limited to national levels; there is also international level in respect to trans-boundary effects.

Regulatory control and enforcement is strictly the responsibility of competent national authorities, more so that regulation and control of corporate entities fall under national environmental liability. International requirements are implemented by national authorities through various legislative enactments, such as national environmental legislation or through other regulatory mechanisms (Stewart 1996 and 2001); (Simila 2007).

International regulatory measures include the followings as well:

Ex-ante Regulation (Public Law Regulations), calls for a strict centralized enforcement of a sophisticated net of public law regulations. These command–and-control rules set environmental standards and sanctions if and when necessary on the basis of Cost-Benefits Analysis (CBA). Because public law regulations are offshoots of environmental treaties, they often invade traditional spheres of government activities by requiring states to control the emission of pollutants, establish licensing as an outcome of due environmental impact assessment, monitor such matters as waste disposal, regulate the export and import of endangered species and hazardous products, enact penal legislation, and to enact the necessary legislation and regulatory measures (Andrews (1994); (Armour and Audrey (1990). National law on the other hand, gives leverage to the legal

relationship between enterprises and determines what is compulsory, including making prohibitions if and when required (Anago 2006, 36). In the view of the author, states should be called to answer questions on their home-based corporations that transfer hazardous technologies to other nations. This is simply based on the fact that states have the prerogative to ban or restrict the importation of hazardous technologies into their territory, and therefore obliged to restrict or ban those exported from their jurisdiction to other nations, especially to the developing countries that are characterized with weak legal and economic foundations.

Ex-post Liability (Liability Rules), on the other hand, is a mechanism, which leans on legal enforcement though courts or through other adjudication or authoritative bodies. With this mechanism, the polluter is forced to pay compensation for the damages caused to the environment in the course of pursuing economic activities. The major flaw of this is the high cost of litigation and the so-called judgment proof. Another problem in this respect is the so called "Environmental Negligence" or "Gross Environmental Negligence" which can be difficult to prove because of the joint venture agreement with the Nigerian government, coupled with its negligence on environmental issues in the Niger Delta Region. In Nigeria, for example, group litigations on oil spills against Shell have always been blamed on vandalism by angry youths. But vandalism can hardly be stopped in presence of perceived economic marginalization, absence of inclusive business to empower the locals of the surrounding communities, environmental negligence and oversight, and abuse of human rights are all primary issues that need some levels of considerations.

2.11.8 Nigeria's Oil and Gas Multinationals and Liabilities

This subchapter introduces major oil and gas corporations engaged in petroleum production in the Niger Delta Region. It further discusses some of the environmental liabilities of these companies.

Seven major oil and gas firms are mentioned here. There are the Shell Petroleum Development Corporation (SPDC), the Agip Oil Company Limited, Texaco Overseas Petroleum Company Limited, Mobil Petroleum Company Limited, Chevron Oil Company, Addax Oils and Elf Petroleum Company. Among these major oil and gas companies, the Shell Petroleum Development Corporation (SPDC) has been noted as the

biggest oil and gas explorer in terms of market size and also contributes the majority of both oil spills and gas flaring in the Niger Delta (O' Neil 2007, 9-12).

Multinational firms play significant roles in technology-based foreign investments, especially to the developing countries (OECD 2001). The growth in international trade and technology has equally been associated with growth in environmental problems, especially in the developing countries, where legal, political and level of mechanization are weak. Multinational firms are also sources of the present Nigerian environmental problems, particularly the socio-economic decline in the Niger Delta Region (Ofehe 2005, 23-26). Nigeria, like other developing countries, is characterized by inadequacies in environmental regulatory measures, government corruption, weak political foundations, including inactive public interests groups and Non-Governmental Organisations (Ofehe 2005, 14).

In respect to Corporate Liability, this is a term applied for the process through which responsibility for the cost of damaging the environment is transferred back to those that cause the damage. From a semantic point of view, environmental liability can further be construed as the legal provisions for which responsible parties are held responsible for degradations caused to the environment in the course of economic activities. Such parties shall be held liable for damages, destruction, loss of life and natural resources (OECD 2001); (Nigerian Weekly Law Report 2002, 65). This includes the reasonable costs of assessing such injury, destruction or losses resulting from such damage (Wetterstein 1992, 19). From the legal point of view, damaged environment not only causes personal injury and death, but also property damage. This calls for the liability on any company or producer, who in the course of a commercial or industrial activity produces waste, air or water pollutions, or any other disastrous effects on the environment (Salter 1992, 115). Therefore the term environmental liability is more often related to tortuous civil rules (it can be criminal, too) aimed at ensuring that the industrial or extractive activities engaged by the company is safe. Corporate liability is often treated as synonymous with strict liability, if proof of faults fails on the person causing the environmental damage. Oil and gas multinational companies operating in the Niger Delta Region have been found to be environmentally mindless (O' Neil 2007, 7); (Okonta and Douglas 2001, 58). Corporate responsibilities have been neglected and have not been taken into account in the petroleum industry (Okonta *et al*, 2001). Pursuant to Nigerian law on matters relating to environmental liability, the FEPA Act provides that a person who breaches the provisions

of the act commits an offence and on conviction is liable to fine, or imprisonment or both. According to Nigerian law, (FEPA Act Regulatory Document) the offence can be civil or criminal. The FEPA Act also provides that where there has been a discharge of any hazardous substance in violation of environmental law or environmental permit, the person or company responsible for such discharge will bear the liability of the costs of removal and clean up. In addition to liability for contamination resulting from hazardous materials, a firm which uses hazardous materials may face both criminal and civil penalties where it fails to obtain the required permits and approvals for its storage; use; appropriate transportation; discharge; and disposal of hazardous materials (Anago 2006, 90-92).

In Nigeria, because of the high-level of environmental degradation in the oil and gas exploration sites, corporate directors and shareholders should be made aware of their environmental responsibilities, including legal liabilities if they are negligence to environmental protection measures. They have the obligations to reduce their environmental liabilities by tackling environmental protection measures (Anago 2006). According to Driesen (2003), in the case of shareholder liability; the corporate veil that customarily protects shareholders from corporate liability may not do so in respect to environmental liability. Pursuant to the Nigerian law on shareholding, there are implications from an environmental liability perspective of a share sale on the one hand, and an asset purchase on the other. A shareholder of a company would typically not be personally liable for environmental damages or other liabilities of the company under the doctrine of limited liability. He or she is liable to the extent of his or her shareholding in the company, unless he or she is proved to have been aware of the environmental breach and is involved in the offending acts (Anago 2006, 112-115); (Akinseye 2000, 64).

It is necessary that shareholders show some ability to direct and control the oil and gas-related environmental problems that pollute the communities, which their corporations cause in the course of business activities. Shareholders are well advised to develop strategies to reduce the environmental liabilities of their corporations. In Nigeria, many of the oil and gas exploring wells are owned by individual investors, who operate under private companies incorporated either in Nigeria or overseas. These companies with individual shareholders have majority shares and should be targeted in the course of environmental wrongdoings (Nigerian Weekly Law Report 2005, 132). It then becomes necessary that a shareholder with large block of stocks in an environmentally prone

business activity should consider certain strategies, as to reduce the risk that he or she might be held liable for his or her firm's environmental liabilities. The same is true of the directors of a corporation, depending on the national law of the country, where the investment is located. In respect to "Director's Liability" a company director has the ability and duty to control the environmental activities of his company, for it is possible that the court may go for a passive company director for environmental liabilities (Nigerian Weekly Law Report 2005, 76). In this case, the court may want to know if the director participated in the creation and approval of the corporation's business plan. The court may also investigate the nature of any action taken by the director in question, as to prevent the corporation's release of hazardous materials, such as oil spills and gas emissions, which are characteristics of oil and gas exploration; amid the release of trace metals that are detrimental to the production of crops, such as cassava and yam. The court may want to know if the director participated in the day-to-day management of the corporation, in which there is burden of proof that the director is aware of the environmental degradation caused by the firm he or she is responsible for. As far as the liabilities of the shareholders and that of the directors are concerned, it is conclusive that there is no substitute for mindfulness in business practices, and also attentiveness to the environmental consequences that might arise in the course of business activities.

However, environmental concern is part of corporate agenda and it has to be emphasized. Multinational corporations ought to develop strategies to deal with environmental problems arising from their operations. Multinationals are equipped with huge financial, managerial and technical resources to embark on effective environmental programmes, and there should be enabling and enforceable legislation for them to comply with. Ecological issues in the extractive industries and depletion of natural resources by corporations have emerged recently in debates, globally (Nzeakah 2006, 32). Corporations, especially the multinationals operating in the developing countries are criticized for paying little attention to the environmental damages arising from their operations, and for relocating environmentally inappropriate technologies to countries that lack adequate or even non-existing environmental regulations and controls. Nigeria is cited in this study as one of such a country, where corruption and legal enforcement and compliance mechanisms are weak. Environmental disclosure and environmental auditing are corporate environmental requirements and therefore a liability, especially in the extractive industry. Auditing as an environmental tool is designed to reveal or to give

information on how far corporations have applied this management tool in documenting periodic evaluation of how well they are performing in the laid down environmental obligations. In the Niger Delta Region, no such disclosure or auditing has ever been obtained (Nigerian Weekly Law Reports 2006, 113). Environmental auditing concerns how corporations assess and verify compliances with own environmental policies, and would ordinarily include meeting regulatory requirements. Besides serving as a management toolkit, corporate environmental auditing and disclosures are also risk assessment tools for use in negotiating updated consent conditions. They highlight issues and help to give quality assurance in total environmental quality programmes (Salter 1992, 12). In addition to risk assessment and environmental auditing, corporate environmental liability includes environmental risk communication. Risk communication is a policy instrument and a regulatory instrument. Corporations ought to have a policy to inform workers and the public about the risks they are exposed to from industrial installations. In the Niger Delta Region, many of the oil and gas-bearing communities are unaware of the effects of gas flaring and oil spills on agriculture, health and fishery. If they have had the knowledge or made aware of such impacts through participation in the socioeconomic impact or environmental impact assessments (both have never taken places), they could have been aware of these dangers and could have developed abating strategies or alternative strategies. The concept of corporate codes of conduct, which have centred on declaration of business principles and practices by the multinational corporations that have now developed to a more substantive corporate self-regulation, are all instruments of environmental regulation (OECD 2003); (Sampson and Gary 2000, 2001). The increasing interests in environmental issues as well as other social conditions facing the multinational corporations have played to their competitive advantages. The increasing significance of brands, corporate reputation and image have all benefited directly or indirectly from corporate codes of conduct in areas of their businesses. This is more so as companies can be vulnerable to bad publicity for environmental negligence (Sprenger *et al.* 2003); (Hull 1998); (Gluek 1976, 87). In Nigeria, environmental risk communication has not been part of corporate cultural consciousness, especially in the oil and gas industry. It is not enforced in the Nigerian environmental or business legislation. This claim can be supported by the oil spill of 1999 in Elele (River State), where the oil and gas operator failed to inform the inhabitants about the incident until the community sued both the federal government and the oil company for environmental negligence,

human rights abuse and oversight (Nigerian Weekly Law Report 2004, 143-147). This is because there is no regulatory mechanism in place to promote environmental risk communication. It therefore becomes difficult to enforce its negligence.

Furthermore, corporate environmental disclosures, risk communications and auditing test corporate performance against its policy, which in a way help to foresee and review what competitors are doing. Environmental auditing arises from the concept of Corporate Policy Audit (CPA), and when commissioned, gives the information that a corporate environmental policy is in place, and is completely up to date, and can easily be available, says Salter (1992). In Nigeria, such has never been demanded by either the Ministry of Petroleum and Environment or the Directorate of Petroleum Resources (Anago 2006, 54-57). It can be argued that the absence of environmental auditing and risk communication has resulted to corporate environmental negligence in the Niger Delta Region. Many non-governmental organisations have documented that environmental negligence; human rights abuse and environmental oversight do exist and have contributed significantly to the present ecological damages in the Niger Delta Region (Nzeakah 2006). This means, therefore, that there is need for alternative independent regulatory body, inasmuch as both the government and the oil and gas multinationals are unwilling to take absolute responsibility of the foregoing oil pollutions in the Niger Delta Region.

CHAPTER THREE

3 Research Methodology

3.1 Introduction

This chapter deals with the field studies on the Niger Delta Region. The field studies become important in respect to the primary objective of the study, which is to demonstrate that the extraction of oil and gas in the Niger Delta Region has impacts on the physical environment, which triggers off socioeconomic decline. Two principal methods of data collection and analysis were employed, and were designed and directed towards experimenting, identifying, describing, analysing and presenting the information obtained in the course of carrying out the primary and secondary investigations. In the primary investigations, air, water, pH values, soils and cassava roots and leaves were collected during the field sampling, while chemical experimentation and analysis were conducted in the course of laboratory investigations. The secondary investigation employed a questionnaire survey technique, designed and distributed to carefully chosen members of the two areas under the study, including some respondents outside the two study areas. There was in addition a visual assessment through direct observation of the vegetation of the two study areas. The visual assessment was mainly to have a sight view of the physical conditions of the vegetation, including plants, trees and other economic crops.

3.2 Data Collection

In introducing the empirical part of this study in order to establish its necessity, it is important to make references to earlier comparable research works, carried out by other researchers. According to earlier studies conducted on the impacts of oil pollution-led degradation in the Niger Delta Region, all associated impacts begin with impacts on the physical environment (Nwaugo et al, 2005; Odu 1996). This is to say that the study cannot frog jump into socioeconomic impacts without first touching on the impacts on the physical environment, because it is from the impacts on the physical environment that socioeconomic impacts arise, particularly impacts on agriculture and fishery.

The primary data investigation entailed sampling of soil, water and air qualities, through

conducting laboratory analysis to assess the levels of soil contamination arising from oil spillage and the levels of air, soil, pH values and water qualities arising from gas flares, as to assess the effects of gas flaring and oil spills on the surrounding environment. As said earlier in the course of this study and also in the reasoned opinion of the author, it is only through the laboratory analyses that one can scientifically conclude that oil spillage and gas flaring are indeed technically detrimental to socioeconomic impacts on the oil and gas-bearing communities, which actually is the primary objective of this study. In addition, considering that the main theme of the study is on the socio-economic impacts, the secondary research design considers conducting a written questionnaire technique to assess how the affected people feel about their environment, their economy and their entire being, is highly appropriate. The research tool further enables the readers to have opinion on the respondents, especially if they feel that the extraction of oil and gas impact on their socio-economic and livelihood, including health and practice of agriculture and fishery, which are their main occupation. The visual assessment is a mere direct observation of the surrounding vegetation of the two study areas. As mentioned above, the author yet again believes that it is only through these two research approaches (laboratory investigations and a written questionnaire) that it can be established that the Nigerian oil and gas industry has a socio-economic impacts on the oil and gas-bearing communities of the Niger Delta Region. The study concept looks very much as if it employs technical perspectives, by reviewing oil spills and gas flaring, and moves onward to employ legal doctrines to solve the socioeconomic problems.

In the course of primary investigations, the laboratory experiments form major part of primary data collection, analysis and presentation: and it is only through the experimentation that one comes to know the impact of oil spills and gas flaring on the physical environment, before it turns to impacting the socioeconomic wellbeing. While on the other hand, the questionnaire format is an effort to obtain relevant information from the chosen locations, and targeted to specific groups. Such relevant questionnaire information were sourced from various sources, such as individuals from various NGOs, stakeholders and interest groups, oil and gas contractors, ordinary individuals and other pressure groups, companies and government establishments that are majorly located in the study communities. The questionnaire is aimed at establishing the drift in opinion on the true situation of environmental issues, arising from the operations of oil and gas exploration. The responses from the respondents will reveal the situation facing the oil

and gas-bearing communities, and will also form the basis for future environmental management in the area.

3.3 Description of the Study Area and Nature of Impacts

3.3.1 Introduction

Beginning with the Land-Use of the two study areas, agriculture is the predominant land-use activity of the areas, and 90% of the total land mass is potentially productive. Before then, over 60% of the land is designated for the production of annual crops under traditional bush-fallow farming system and 30% is under tree crops, such as cocoa, palm trees and other economic tree. Mixed farming is apparently the common and traditional method of agricultural practice of Izombe and Ogoniland, respectively. Other agricultural activities include livestock production, fishing and cottage industry in the form of hand craft. The vegetation of the two areas comprises of low land tropical rainforest with abundant rainfall, which has been modified by numerous anthropogenic activities, such as agriculture. Presently the vegetation, except for the oil extraction locations, is dominated by grasses, trees, oil palms, orange trees and other fruit-related trees. To better understand the study areas, a reference is hereto made to the appendices, especially to the map of Niger Delta, as well as the maps of Western and Central Niger Delta Region. These two maps can be helpful to get some insight of the study areas in Imo and Rivers states.

Niger Delta Region is the location where oil and gas are exploited in Nigeria. This region holds some of the world's richest oil deposits; it is also an environmental disaster (Dara 1998, 76). Niger Delta is located at the south east of Nigeria. Over 98 percent of the oil and gas reserves come from the Niger Delta Region, and occupied by a mosaic of indigenous nationalities. This region of Nigeria sustains the largest wetland in Africa and one of the largest wetland in the world (Cunningham and summer 1997). From onsite observations and visual assessment, decades of oil spills, acid rain from gas flares and other induced environmental degradations have killed fishes, impacted negatively on the vegetation and destroyed farmlands, which are the livelihood of the inhabitants. Oil and gas firms have operated in the Delta Region for many years with enormous environmental oversight and negligence, including lack of environmental accountability and auditing. Industry environmental standards and compliance to Nigerian

environmental regulations are rarely followed and implemented (Abdulkareem 2005, 23). Major drawbacks were that there were no federal environmental protection agency until 1988 and environmental impact assessments were not mandated until 1994, pursuant to Agenda 21 of the Earth's Summit in Brazil in 1992 (O'Neil 2007, 6). There is little pressure from the federal government on the control of gas flares, which contains large amount of natural gas, including release of trace metals. Hundreds of flares have burned non-stop for decades releasing greenhouse gases and causing acid rain (O'Neil 2007, 6); (Dara 1998, 80). The effect of oil resource extraction on the environment of the Niger Delta Region, as evidenced by the study on the two study areas, has been very glaring in terms of its negative effects on the region in respect to environmental degradations and subsequent socioeconomic dimensions. The industry has in the last four decades of oil spills and gas flaring impacted disastrously on the socio-physical environment, food security and health of the Niger Delta oil-bearing communities (Chokor 2003, 53). It has massively threatened the subsequent peasant economy and the environment and hence the entire livelihood and basic survival of the inhabitants (O'Neil 2007, 3-5). The region's environmental injustice, human rights abuses did not start with the discovery and exploitation of oil and gas in the coastal community of Oloibiri since 1956, but changed course at the end of the civil war (1966-1970), and since then about 4,000 oil wells have been drilled in the region (Ofehe 2005, 2). The 4,000 oil wells constitute potentially polluted sites, on which drilling wastes; drill cuttings, oil sludge's and various toxic chemicals have been deposited. The multinational corporations engaged in oil and gas exploration have been at the centre of environmental injustice in the Niger Delta Region (Ofehe 2005, 30); (Ahiarakwe 2005, 65).

Oil spills present potential danger to biodiversity with enormous impact on deep-ocean and coastal fishing and fisheries, threatening coastal erosion. The immediate effects of toxic and smothering oil waste constitute mortality and contamination to fishery and other food species, including long-term ecological disturbances and coastal degradation (Chokor 2003, 32). Oil and gas firms have not followed guidelines contained in FEPA and DPR documents, including other guidelines associated with Environmental Impact Assessment (EIA) (Odiette W 1999); (FEPA, 1988, 1991, 1992 and 1995 guidelines); (DPR 1991). Oil wastes from oil rigs poison the sensitive marine and coastal organic substrate, interrupting the food chain on which fish and sea creatures depend upon, and on which their reproductive succession is based. Commercial fishing, which is the second

livelihood of Izombe and Ogoniland, is affected. In addition, wildlife other than fishes and sea creatures, including mammals, reptiles, turtles, amphibians, burrowing animals and birds that live in or near the coastal lines and ocean are also poisoned by oily wastes (Ofehe 2005, 48); (Ukegbu 1998).

There is threat to human health, arising from exposures from the effects of gas flaring and oil spills. Scattered laboratory tests carried out in various Nigeria's institutions of higher learning confirm presences of trace metals, such as lead, zinc, mercury, benzo and pyrene in dumped sites. These toxic substances cause health problems such as cancer, breast sicknesses, skin and lungs problems, (Nigerian Quarterly Journal of Medicine, Vol. 4, 2004). Niger Delta Region is affected by the Petroleum Act of 1969 and 1991, Land-Use Act of 1978, the National Waterways Decree of 1997 and other petroleum industry-related legislation (Akinseye 2000, 77). There is total negligence on the part of the oil and gas miners on these enactments. According to Stranks (1998, 21) under civil law liability, negligence is defined as careless conduct injuring another. Common Law provides that the duties of the employer, as part of general law of negligence owe the duty to take reasonable care. General law of negligence further provides the doctrine of Vicarious Liability, which is described on the fact that if an employee, while acting in the course of his or her employment, negligently injures another employee or members of the public, for example, communities living around oil and gas exploration and production areas, rather than the employee, the employer will be liable for such consequences of negligence, says Stranks (1998). This clearly establishes that the Niger Delta oil and gas firms are liable to the exposures suffered by oil and gas-bearing communities. Niger delta communities are further affected by the deliberate allocation derivation formula (ADF), on which the federal government compensates the oil-bearing states, and which in various administrations were decreed by the Nigerian government. These allocation derivation formulae are as follows: in 1953 (100% local ownership), in 1960 (50%: local ownership), in 1970 (45% local ownership), in 1975 (20% local ownership), in 1982 (25%; local ownership), in 1984 (1.55%: local ownership), in 1992 (3%: local ownership), and from 2000 to date (13%: local ownership), (National Assembly Publication: FRN 2004, 37-41); (Chokor 2003, 98). A brief observation of this declining percentage of revenue to the region, through the national allocation derivation formula, confirms unsteady allocation derivation formula, and which mainly indicate the political leadership and economic agenda of the various administrations, and which hitherto

reveals the level of political and economic marginalization, as perceived by the oil and gas hosting communities. Loss of agricultural activities and fishery, when combined with very low allocation derivation funds amount to added socio-economic impact; and the effects of these two issues are not hidden in the course of assessing the wellbeing of the citizenry during the field study. This assertion leaves the Niger Delta Region to claim political and economic marginalisation from the Nigerian government, and environmental injustice from the multinational corporations (Ofehe 2005, 10-12).

Once again, Izombe in Imo State and Ogoniland in the Rivers State are the study areas of interest. Other oil and gas hosting communities could also have been chosen other than these two communities because there is no difference in their collective plight. The two localities are victims of environmental degradation arising from crude oil extraction. In this study, Izombe is victimized by oil spillage and Ogoniland, on the other hand, is a victim of gas flaring. The study does not create the impression that the two petroleum pollutions are tied to the two study localities one-on-one. Both localities suffer the same fates of oil spillage and gas flaring indiscriminately, and so do other oil and gas-hosting communities. Shell Petroleum Development Consortium (SPDC), the joint venture between the government of Nigeria and the Royal Dutch Oil Company, has oil and gas production facilities in Ogoniland. While Addax Oil and Gas Company operate in Izombe. In terms of the socio-cultural and economy, Izombe and Ogoniland share slightly the same geographical, vegetation and occupation, but differentiated significantly by population density and land mass. Below are two tables showing the population distribution of Ogoniland and Izombe.

Table 12: Population Showing Gender Distribution of Ogoniland

Male	Female	Total
25, 300	32, 300	57, 600

Table 13: Population Showing Gender Distribution of Izombe

Male	Female	Total
31, 420	36, 280	67, 700

When it is regional distribution of social services, the rural Niger Delta women are worse affected than those in the urban areas. According to the World Bank Doc. (1996), source of employment is a strong indicator of poverty or wellbeing. Whilst poverty affects households, whether headed by a female or not, it is most damaging where it affects the entire communities. This is particularly true in many of the oil and gas-bearing communities, as it reduces the operation of the local "Safety Net" of the community. This form of poverty is more pronounced in the study areas of Izombe and Ogoniland. Much of the people engage on subsistence farming, and their traditional values are declining due to effects of crude oil extractions. Effects of crude oil extraction have therefore undermined their agricultural activities. The findings of Consumer Surveys confirm that while women play essential roles in the societal economic life when gainfully employed, they remain seriously disadvantaged in terms of equal access to health, education and financial services (Document of the World Bank 1996, 33-37). Females have more difficulties obtaining loans from the traditional financial institutions in Nigeria. In addition, the largely female populations as shown in tables 12 and 13 above are largely farmers and petty-agricultural traders, and therefore carry out the larger proportion of agricultural activities, and thus contributing significantly to household wellbeing. They form the bedrock of most families in these study areas. Access roads and clean drinking water are daily problems of these rural women, as clean drinking water is adversely impacted by crude oil extraction. In Izombe particularly, in order to alleviate poverty and idleness, having now been stripped off of their traditional agricultural activities, the female groups engage in substantial self-help projects, often with insufficient funding and lack of government supports, and often through locally organized groups, while some households, headed by females adopt a variety of coping mechanism as survival strategy. The bigger population of the female distribution as described above can be construed as another impact on the socio-economic wellbeing of the two communities. This is because of the effects of oil spill and gas flaring in the areas, which affect their agricultural productivity, as well as their traditional petty trading in agricultural products. In the opinion of the author, the objective of the government should be to achieve growth with equity to create wider sources of non-oil and gas growth, to support households, particularly the female population, as engine of rural economic growth and empowerment. In addition, the roles of state governments, particularly in the nine states that make up the Niger Delta Region (the oil and gas producing states) should be defined

as enablers rather than competitors, as the states should be empowered to handle decisively all environmental degradation matters arising from crude oil extractions in their various jurisdictions, as expected of a country with a federation system of governance.

Furthermore, in respect to land-ownership in the Niger Delta Region, Landholding in this region, which also affects the two study areas, is a community property, and land tenure is based on customary laws (Ezejiofor 2006, 2). Customary Laws in the context of the Nigerian Legal System is defined as those laws that govern traditional and customary life of the people, of which the Niger Delta is inclusive (Okonkwo 1980, 41). By stipulation, the Niger Delta Customary Laws exist to regulate the use, protection, preservation and conservation of lands and forest. The application of customary laws in the region in terms of landholding and ownership changed with the enactment of Land-Use Act of 1978 (recently Cap 201 LFN 1990) (Ezejiofor 2006, 56). Land-use Act (1978) has authorized the public collection of land rents, which means that earnings from royalties arising from oil and gas extractions no longer go to the local communities. It instead stipulates that earnings arising from royalties should go to the Central government of the Federal Republic of Nigeria. With this, Land-use Act began the journey of dispossession, political and economic marginalization, corruption and environmental negligence and injustice, including human rights abuse in the Niger Delta (Ezejiofor 2006, 58).

As said earlier in this study, the main implication of the Land-Use Act to the Niger Delta Region is that all land in the territory except land vested in the federal government or its agencies, of which those located in the oil exploring sites are included, are vested on the State Governors. The State Governor of a particular state is therefore authorized to hold such land on trust for the citizens of the state, and be responsible for allocation of said land in all urban areas (Ezejiofor, 2006). The legal issue arising from this is that the contentious Land-Use Act has opened the process of land tenure by the state governor to abuse Section 28(2) of the Act, as contained in the Constitution of the Federal Government of Nigeria under article 20, to unlawfully revoke the right of occupancy of the locals for the federal government (Nigerian Weekly Law Report 2004); (Ezejiofor 2006, 64). It further revokes the Customary Law regime, which is targeted at dispossessing the locals of their natural land, (Nigeria Weekly Law Report 2004, 35-38). Before the enactment of Land-Use Decree of 1978, the local communities of the Niger Delta had direct dealings with the foreign oil companies over land acquisition despite

mining rights were the preserve of the federal government to grant (Ezejiofor 2006, 4). Under Section 16 of the interpretation of erstwhile Land-use Act of 1964, mineral oil and petroleum resource were excluded from land, which meant that though petroleum resources were vested in the state, the land supporting the mineral deposits remained vested in the communities and their families (Ezejiofor 2006, 42-44). Such has seized to exist under the Land-Use Act (Cap 201, LFN 190).

3.3.2. Izombe and Oil Spills

Izombe is a rural community of predominant farmers located in Imo State. Izombe, like its neighbour, Egbema (in Imo state) has witnessed oil-drill- induced environmental problems since oil and gas exploration and production began in the area (Odu 1996, 39). In addition to oil spills, Izombe has equally suffered intense associated gas flare in its flow stations (Okeke and Ukegbu 2006, 12). Though, there were no laboratory experiments conducted in Izombe in this study in respect to gas flaring because gas flare is already conducted in Ogoniland. This study therefore is only interested in conducting laboratory-based oil spill-related impacts. It ought to be established that studies have shown the impacts of associated gas flaring on the microbiological properties of the soil, and Izombe is not immune to this (Nwaugo *et al* 2005). The choice of Izombe as a field study site for oil spills is based on its many reports of oil spills incidents. Like Ogoniland, in respect to gas flaring, Izombe has just recently witnessed some protests because of environmental consequences arising from oil spills in the area. Frequent wide spread youth protests against Addaxx and Chevron Oil firms in the oil-hosting communities of Umunwama, Ugbele, Aboshi and Ndeuloukwu, seeking compensation for environmental atrocities, including protests of marginalization have been recorded in Izombe. Agriculture has been affected because of damaged vegetation and soils, including marine spills that impact on fishery. Izombe, like other communities in the Niger Delta Region, is one of the 10 rainforest vegetation in Africa. It is also the location of huge oil deposits and production has been going on for over twelve years (Odu 1996, 43). Izombe is one of the six oil and gas producing communities in Imo State of Nigeria. Izombe is relatively populated with about fifty-seven thousand and six hundred inhabitants, engaged in farming, civil service work and fishery. Izombe is a mono-cultural community with a single religion of Christianity, of which Catholicism is dominant. It has land mass of

about 12,700 sqklm with both rainforest and relative swampy vegetations. Waters in Izombe are murky and odorous. Fishery and biodiversity are affected due to ecological degradation arising from crude oil extraction. Its population based on the 2006 census shows a gender distribution as indicated in table 12 above. The study of oil spillage in Izombe is justified because oil spills have been recorded and documented in this community, and also Izombe is one of the communities in the Niger Delta Region that has suffered the effects of crude oil and gas extraction. Izombe is further characterised by an equatorial climate, with annual maximal humidity coinciding with months of high rainfall. The empirical study on oil spillage in this community concentrated on its effects on the physic-chemical properties of the soil and water, particularly its effects on crop production and other agricultural activities. Crop production contributes to about 65 percent of farming in Izombe. In respect to other vegetation indices of the area, include low land tropical rainfall, which has been impacted upon by numerous anthropogenic activities, such as agricultural practices and now oil and gas mining. The area is further dominated by scattered stands of tree crops, such as banana, orange trees, palm trees, etc. The soils of Izombe are further characterized by deep, porous and humus soils. The soils are mostly alluvial, fertile and high in organic carbon and organic matter contents and quite good for agricultural practices, only now that the areas with close proximity with oil rigs are impacted by oil spillage. According to Ukaegbu *et al,* (2007); (Ishishone 2005, 43), the wellbeing of Izombe can be improved if appropriate regulatory instruments are in place and enforced, as to improve on crop yields. The months of June, July, August and September are the wettest. While it is important to mention that the month of August is moderate in rainfall because of what is locally referred to as "August Break" – that is to say, when the rainfall pauses. The months of November, December, January and February are the driest with little or no rainfall. October has moderate weather. The mean ambient temperature is between 25-30 degrees centigrade, while relative humidity can be 88 percent, mostly at nights.

3.3.2.1. Soil Sample Collection for Empirical Studies

Investigations on the effects of oil spillage on the soil began with sample collection of soil from four polluted and four unpolluted locations in Izombe. The soil of Izombe community is sandy-loam and humus structurally and in property. Agip and Addax oil

and gas Companies operate in the area. At each point of sample collection, two samples of soil were collected at depths of 2.2 cm (top soil) and depths of 25-30 cm (sub-soil), at locations of 0.25 kilometres 0.75 kilometres, 0.95 kilometres and 1.00 kilometres away from the oil rigs borderline. These are allowable distances from the oil rigs. According to Nwaugo *et al*, 2005, 26-58) crops particularly the cassava tubes, which are the daily stable food of the area, perform well within these soil depths (please see tables 41, 42 and 43 for what local respondents think about impacts on cassava). Then the soil samples taken from these distances from the oil rigs were digested to prepare them for analysis. The bulk density was determined using the Core Sampler Method (Brake 1964). Then the soil samples were spread on a clean plastic tray and allowed to dry under electric dryer for some hours. The samples were then removed and transferred into a mortar and pulverized, and passed into a filter to remove dirt. Distilled water was then added after weighing, and the resulting mixture was heated at 70 degrees Celsius and then filtered again with filter paper and analyzed. Respective tests were carried out with appropriate equipment and methods, such as the percentage of organic carbon, which was determined with Walkley and Black Method; Exchangeable bases (ca, mg, K and Na) were determined by appropriate titration method, including available Phosphorus, total Nitrogen, exchangeable soil acidity and total petroleum hydrocarbon, were all determined appropriately. The soil pH values were determined with a standardized pH meter and the results were recorded as shown in table 21. The Conductivity of the samples was measured using a battery and operated with the bridge model MC-1 Mark V Electronic Switchgear at room temperature: the values were read out through the micro Siemens. Next, the cassava tubers, including leaves and stems were also oven-dried, pulverized and analyzed to identify if they were normal and if they lacked certain nutrients, as can be ascertained by respondents in tables 41, 42 and 43, respectively. These soil parameters/characteristics determine the fertility of the soil.

Table 14: Soil and Water Parameters: Oil Spillage

Soil Parameters	**Water Parameters**
pH Values	pH Values
Conductivity	Conductivity
Total Nitrogen Level	Sulphate
Sulphate Value	Sulphide Value
Chloride Value	Carbonate
Iron	Nitrate
Cobalt	Lead

The above are areas of laboratory experiments conducted on soil and water

Following the completion of the laboratory analysis, a comparison between the results obtained from the polluted locations and the results obtained from the unpolluted locations was carried out. It can be observed herewith as indicated in table 19, that the results of the two locations (PA and UPA) are wide apart. It can be concluded therefore that there is a wide deviation in soil parameters between the locations contaminated by crude oil when compared with the soil parameters obtained from uncontaminated locations. The laboratory results of the cassava tubers showed characteristics of deficiency and poor yield capability. This is in agreement with (Orubu 2002, 34), on the need for environmental regulation in Nigeria's petroleum industry, because if left unregulated, practise of agriculture would suffer, and thereby threatening food security. Cassava-based foods are the main stable food items in the Niger Delta Region, and not only in the Niger Delta Region, but also nationwide. The interpretation of the deficiency can further be concluded that there is a case of food insecurity and income insecurity, which impact on the socioeconomic wellbeing of Izombe people.

3.3.2.2 Ogoniland and Gas Flaring

The study of gas flaring was carried out in Ogoniland in the Rivers State. This is because the location is one of the most affected oil and gas producing community in terms of gas flaring as well as oil spillage. The vegetation of Ogoniland is a mixture of rainforest and mangrove. The temperature varies significantly because of the thermal heat arising from the flares (40-45 degrees centigrade: normal temperature without thermal heat from flares was (26-30 degrees centigrade). At the time of this study, the Shell Petroleum Development Company Limited (SPDC) operates in the area, but much of their facilities have been out of operation because of many damaged pipelines induced by local unrest. There are now over five flow stations in the area during the field study and each has a gas flare stack. The sampling locations were in four different areas and each location was between 0.2 to 1.00 kilometres away from the flare stack borderline. The locations were well spaced to ensure unbiased observations. In comparison, Ogoniland has a bigger population than Izombe. Ogoniland is about sixty-seven thousand inhabitants, and a land

mass of about 18,256 sqklm. Ogoniland's river banks are constantly polluted and eroded by perennial erosion and flooding, arising from extractive operations. Apart from the ecological problems facing the community, air pollution, thermal heat, effluent discharges and noise pollution coming from flare stacks are also daily problems of the people. These environmentally-related problems carry along health problems (Dara 2003, 31-35).

Choice of Ogoniland is based on the fact that it has one of the highest flared gases in the country, and has witnessed international known political unrest in the last one and half decades. The community has frequently protested violently in respect to oil flaring and contaminated soil arising from oil spills, and is among the economically marginalized and depressed area in the oil-bearing communities in the Niger Delta Region. It was in the course of the unrest that led to the execution of a frontline author and environmentalist called Saro Wiwa (1994). The Shell Petroleum Company has been in operation in Ogoniland for more than forty years, and protests from the inhabitants of Ogoniland has led to the seizure and abandonment of some of Shell's facilities for more than seven years running (Nigerian Weekly Law Reports 2005, 18-20). These characteristic effects justify Ogoniland as a choice for this study. Funding and security presented other problems to extend the study to other communities. Widespread flaring and venting of gas has been promoted by inadequate legal provision and political considerations. There is also a soft government glove in terms of fine penalties for gas flaring. For example, a fine of 2 Nigerian kobo (less than one cent in American monetary unit) per thousand cubic feet of gas flared in 1979; 5 Nigerian kobo (less than one cent) in 1990; and 10 Nigerian Naira (less than 6 cents in present currency exchange rate) (Chokor 2003, 86). (kobo is a Nigerian monetary unit. 100 kobo make one Nigerian naira). The present day naira exchange rates are: 225 naira for one Euro and 155 naira for one U.S dollar. This liberal regime of very low fine has not corresponded to the huge environmental consequences, including health factors arising from gas flaring. According to World Bank Global Gas Flaring Reduction Partnership, GGFR (2007), that about 25 billion cubic feet of natural gas was flared in Nigeria in 2005, and that Nigeria is a leading gas flaring oil producing nation (see Table 6 in chapter two above). Statistics have revealed that about 76% of associated gas in the Nigerian oil wells is flared each year (Chokor 2003, 112); (Dara 1998, 32-36).

3.3.2.3 Sample Collection for Empirical Studies: Equipment and Method

As was the case in Izombe, data collection and analysis started with primary investigation. Laboratory experiments in respect to gas flaring in four chosen locations in Ogoniland were carried out in order to determine the concentration levels of the following media: air, water and soil. Samples were collected at various distances around the flare sites. Laboratory instruments used for investigation were; pH Meter, Spectrophotometer, Soil auger, Weighing Balance, Beaker and Measuring Cylinder, Turbid Meter and Reagents.

The air quality monitoring was done with the Digital Automatic Gas Monitor (DAGM), and the gases monitored were Carbon oxide (Co_x), Nitrous oxide (NO_2) and Sulphur oxide (SO_2). Particulate Monitoring equipment was also used to detect and measure the amount of Suspended Particulate Matters (SPM) in the atmosphere. Replicate soil samples were collected from four sample locations, which included top soil and sub-soil. Like in the Izombe field study, the following soil parameters were analyzed - bulk density, Soil pH, and Organic carbon, Calcium, Sodium, Phosphorus and Magnesium. The recordings of the four pollutants were further analyzed and compared with the FEPA stipulated standards, of which the findings obtained are indicated in table 9.

Table 15: Soil and Water Parameters: Gas Flaring

Soil Parameters	Water Parameters
pH Values	pH Values
Conductivity	Conductivity
Total Nitrogen Level	Sulphate
Sulphate Value	Sulphide Value
Chloride Value	Carbonate
Iron	Nitrate
Cobalt	Lead

The above are areas of laboratory experiments conducted on soil and water

Choice of sampling location considered the following criteria: Wind Direction, Direction of the flare stack used in the flow stations, Accessibility and availability of open space without hindrances. Soil samples with appropriate distances in meters from flare stacks borderline were represented as follows; Sample H_1 at 0. 25 kilometers, Sample H_2 at 0.65 kilometers, Sample H_3 at 0.85 kilometers and Sample H_4 at 1.00 kilometers. These soil samples were extracted thirty centimeters deep into the soil. The results obtained are

shown in chapter four (table 18). Water sample laboratory investigations are represented with distances in meters from flare stack as follows: Sample X_1 at 0.30 kilometers from flare stack borderline and drawn from a pond water, Sample X_2 at 0.70 kilometers from the flare stack borderline and drawn from the stream water, Sample X_3 at 0.90 kilometers from the flare stack borderline and drawn from rain water and Sample X_4 at 1.2 kilometers from the flare stack borderline and drawn from a borehole water source. These sources of water samples are about the most available sources of drinking water in the study area, and therefore significant in terms of portable household water needs.

There was maximum safety and uninterrupted samples right from the time they were taken, to avoid contamination. Laboratory investigations in Ogoniland followed the same procedure and processes as were conducted in Izombe oil fields. There was not much baseline data available for some of the parameters, and therefore there was no comparison except in water, soil and few compounds. The WHO standards/limits were used and also in pH value in soil sample analysis, where FEPA Standards and WHO Limits of pH 6.5-8.5 were used for comparative analysis. In both soil and water investigations, the results of the physico-chemical parameters showed remarkable differences, as could be observed in tables 17 and 18, respectively: suggesting that gas flaring has indeed impacted negatively on the soil and water in those oil and gas extraction locations. This further means that agriculture has been negatively impacted.

3.3.3 The Questionnaire of Survey and its Analysis

The primary method has shown scientifically through investigations on soil, air and water, as indicated in tables 16-20 (soil); tables 20-22 (water) and table 23 (air), that both oil spill and gas flaring resulting from crude oil extraction do affect the surrounding physical environment negatively. The importance of the air, soil and water investigations lies on the fact that without such scientific examination on these media, it would be hard to draw up a convincing argument that whatever impacts the physical environment do also impact the agricultural practice, food insecurity and subsequently on the total livelihood of the people. The secondary methodology, on the other hand, through the questionnaire technique, has equally shown the various responses of the locales that their means of livelihood have been impacted by both gas flaring and oil spills, as shown from tables 24-43).

3.3.4 Evaluating Sundry Community Perceptions and Claims

In addition to the secondary investigation is the analysis of the community perceptions and claims of human rights abuse and environmental injustice: they are as well carried out and indicated on tables (44-49). This confirms that the primary and secondary research methods have proved that oil pollutions have impacted the surrounding environment, which subsequently impact the socioeconomic wellbeing. Public participation in this sort of questionnaire survey can facilitate solutions to environmental injustice problems, as absence of public perception and participation simply creates and amplifies environmental injustice (Ikoro J. 2003, 51). The questionnaire extension which tries to investigate the perceptions and claims of political/economic marginalization, environmental negligence, environmental injustice and human rights abuses, was conducted through the framework of qualitative and quantitative gathering of local responses, needed to build a local database and community capacity for future environmental regulatory measures. To actualize this, we are going to introduce the concept of logical reasoning or logical argument as an investigative method. Logical argument at this point is appropriate in the sense that the term 'logic' will help us to evaluate the arguments. In our study, the presentation of facts of environmental negligence and environmental injustice, as evidenced by community claims of human rights abuse and political/economic marginalization, which hitherto form the basis of argument, justifying the reasons behind community frustration that leads to pipeline sabotage and vandalism and subsequent oil spills, which result sometimes in the course of stealing crude oil; yet again prove beyond reasonable doubts and pointing to gross negligence. What this means is actually that the high rate of pipeline sabotage which leads to oil spills are caused by local youths who feel that they are suffering undue environmental injustice, environmental negligence, political/economic marginalization and human rights abuses, and that the only avenue left for them to get a bite of what nature bestowed on their land is to turn to stealing of crude oil, and sell same to international buyers or refine some to meet the gap in refined petroleum products demanded in Nigeria. Out of the three principal causes of oil spillage, pipeline sabotage is ranked highest with 59.7%. This high rate of pipeline sabotage that gives rise to oil spillage is very significant for this study to draw up a conclusion that would lead to solution.

The below-mentioned applicable logical reasoning toolkits are hereto briefly mentioned and assessed as follows: The main reason for assessment is to make a choice for the most appropriate tool.

Deductive Argument*: This is an argument in which it is believed that the statement provides the guarantee of the truth of the conclusion. In a deductive argument the statement or statements are expected to give support that is strong in such a way that if the statement is true, it would be impossible for the conclusion not to be true. This is sequel that if there is environmental injustice based on government and oil firm negligence, human rights violation follows and therefore true.*

Inductive Argument*: This is an argument in which it is believed that the statement provides the reasons, which support the probable truth of the conclusion. In this sort of argument, the statement is expected to be so strong that if it is true, then it is very likely that the conclusion thereafter would also be true. As in the deductive argument, if environmental negligence-led environmental injustice is true, claims of human rights abuse is therefore true. This is pursuant to Article 25 and Article 27 of the International Human Rights Law. (For further reading on both deductive and inductive,https://www.google.fi/#sclient=&q=deductive+and+inductive+reasoning&oq=ded&gs_l=hp.1.1.0i20l2j0l7.48600.51190.1.57177.3.3.0.0.0.0.11)*

Cause-to-Effects and Effects-to-cause Reasoning*: This two-way research toolkit is opposite in the sense that Cause-to-Effects Reasoning begins from the cause and goes onwards to effects: whereas Effects-to-Cause Reasoning starts from the effects and moves backwards to the cause of the effects. In our study, for example, Cause-to-Effects reasoning means acknowledging the presence of environmental injustice and attributing it to the rise of human rights violation, and the follow-up consequences. Whereas Effects-to-Cause means tracing the presence of human rights abuse to its cause, which is environmental injustice, and moving forward to its consequences, which is pipeline sabotage, leading to oil spillage.*

Any of the methodological tools mentioned above could be applied to establish a relationship between environmental injustice, environmental negligence, political/economic marginalization and human rights violation, on the one hand, and the continuous pipeline sabotage and vandalism that cause massive oil spillage, on the other

hand. In the light of establishing this, and when based on the findings of both the primary and secondary methods, the socioeconomic impacts are easily established.

However, it is necessary at this point to indicate some of the drawbacks of Inductive and Deductive research methods, and why Cause-to-Effect and Effect-to-Cause method is rather preferred. Inductive and Deductive logical reasoning bear antithesis to each other, and the concept of logical arguments are either inductive or deductive; and such that deductive reasoning strives from specific factors to general factors, whereas inductive goes from general to specifics. In the opinion of the author, other logical arguments, such as Epistemology (how we actually know what we know) or/and Ontology (how/why we assume what is real), can be applied to tackle the problem of relationship. But for obvious reasons that Inductive and Deductive reasoning may require additional logical arguments to establish the relationship between environmental negligence, environmental injustice, political/economic marginalization and violation of human rights, on the one hand, and pipeline sabotage that causes massive oil spillage, on the other hand, Cause-to-Effect and Effect-to-Cause is preferable. Its preference to others as the applicable reasoned argument is based on the fact that the opinions of the respondents on the impacts of the foregoing environmental pollutions stand out as a source of solid proof of evidence. In establishing such relationship, along with the findings of the primary investigations (linking oil spills and gas flaring to impact on the physical environment) and the secondary survey (establishing the opinions of the respondents in respect to impacts on their socioeconomic wellbeing), Cause-to-Effect and Effect-to-Cause can be sustained as a potent research method to tackle the problem of the foregoing relationship. (For further reading, see: http://en.wikipedia.org/wiki/Cause_and_effect).

For clarity, Cause-to-Effect or Effect-to- Cause can be referred to as Causality (Causation), indicating an event (cause/causes) and another event (effect, which is now the consequence). In the case of our studies, the cause, which is multiple: ranging from environmental injustice, environmental negligence by both government and petroleum companies, economic/political marginalization and abuse of human rights, which are running concurrently and precipitating to pipeline sabotage and the subsequent rapture and spill, as the consequence or effect. (See tables 44 and 49 on the claims of environmental wrongdoing, including its analysis and legal argument).

CHAPTER FOUR

4. Findings, Presentation of Data and Framework for Solution

4. 1 Introduction

Chapter four presents the results of the empirical investigations and the responses from the questionnaire technique conducted in the two study areas. It also includes the analysis and responses on the community claims and perceptions of wrongdoing both from the petroleum firms and the federal government. The results covered all the relevant laboratory investigations concluded in respect to oil spillage, which involved soil and water investigations, and on the natural gas flaring, which comprised of soil, ambient temperature, water investigations and pH value investigations. Tables 16 to 23 present results of the empirical investigations while tables 24 down to table 43 show the results obtained from the questionnaire technique. Tables 44 down to 49 contain the claimed environmental injustice, negligence and human rights violation, while subchapter 4.3 shows the analysis and the legal argument on the community perceptions. Chapter four further uses these research findings to establish the framework for solution.

4.2 Research Findings from Laboratory Investigation

Assessment of the effects of gas flaring and oil spills on agriculture in particular, was carried out through laboratory investigations. The research findings are shown from tables 16 down to table 23 as indicated above.

Table 16: Results obtained from analysis of soil samples (Polluted and Unpolluted Samples)

	PA	**UPA**	**PA**	**UPA**
Parameters	**Mean**	**Mean**	**SD**	**SD**
Bulk Density	1.69	1.38	1.2	0.98
Soil pH	5.6	6.5	3.99	4.31
Organic carbon	2.025	0.635	1.43	0.45
Na (ppm)	97.5	25.422	68.94	48.42
Calcium	1.2	1.24	0.85	0.67
Magnesium	0.52	0.465	0.47	0.33
Phosphorus	5.95	5.55	4.21	3.92

PA (Polluted Area) UPA (Unpolluted Area) SD (Standard deviation)

Table 17: Sample Result of Polluted Soil Impacted by Oil Spillage (Izombe oil field)

Soil Sample	**Unit**	**H1**	**H2**	**H3**	**H4**	**Control Point**
pH		4.40	4.35	4.60	4.70	**WHO Limits 6.5-8.5**
Conductivity		30.70	35.10	28.00	45.00	22.10
Nitrogen	%	0.20	0.15	0.19	0.19	0.25
Sulphate	PPM	6.50	6.55	3.30	5.70	2.00
Iron	PPM	285.250	290.400	208.6	410	226. 200
Chloride	PPM	5.40	4.45	3.70	7.10	8.00
Cobalt	PPM	0.028	0.040	0.041	0.040	0.20

Table 18: Soil Sample Results of Soil Impacted by Gas Flaring(Ogoniland Oil Field)

Soil Sample	**Unit**	**H1**	**H2**	**H3**	**H4**	**Control Point**
pH		4.30	4.20	4.55	4.55	WHO Limits 6.5-8.5
Conductivity		30.55	35.00	27.00	42.90	21.40
Nitrogen	%	0.18	0.10	0.10	0.14	0.20
Sulphate	PPM	6.30	6.40	3.20	5.20	1.90
Iron	PPM	275.850	280.500	209.5	409	206. 220
Chloride	PPM	5.36	4.95	3.50	7.15	8.35
Cobalt	PPM	0.020	0.040	0.045	0.045	0.20

Below are the data obtained from soil analysis in the gas flare locations. The data here differs slightly from those of Izombe in Imo State, as can be observed in Table 7. Slight variations in vegetation and the impact of gas flaring may account for the differences

Table 19: Comparing Sample Results of Soil Analysis of Both PA and UPA

	PA	UPA	PA	UPA
Parameters	Mean	Mean	SD	SD
Bulk Density	1.55	1.48	1.4	0.56
Soil pH	4.50	6.55	4.39	2.81
Organic carbon	2.95	0.835	1.76	0.35
Na (ppm)	32.5	0.86	55.94	0.35
Calcium	1.2	0.94	0.85	0.27
Magnesium	0.72	0.20	0.97	0.33
Phosphorus	6.95	4.55	4.21	2.92

PA (Polluted Area) UPA (Unpolluted Area) SD (Standard deviation

Table 20: Water Sample Analysis Results

Sample	Unit	X1	X2	X3	X4	WHO Limits
pH		5.60	5.50	6.55	6.25	6.5-8.5
Conductivity	US/CM	23.20	30.50	48.90	41.70	250
Sulphate	Mg/l	7.90	12.00	4.90	4.90	250.
Nitrate	Mg/l	2.60	3.08	1.45	0.07	50.
Sulphide	Mg/l	0.006	0.010	0.001	0.001	0.20
Lead	Mg/l	0.001	0.001	0.001	0.001	0.10
Carbonate	Mg/l	5.80	13.30	30.75	20.0	10.

Table21: Result of pH Analysis of Rain Water taken from 10 Points around Flare Stacks

Sample Points	Mean pH Values (2 Months)	Remarks
Point 1	5.10	Acidic Rain
Point 2	4.90	Acidic Rain
Point 3	5.20	Acidic Rain
Point 4	5.00	Acidic Rain
Point 5	5.25	Acidic Rain
Point 6	5.35	Acidic Rain
Point 7	5.00	Acidic Rain
Point 8	5.50	Acidic Rain
Point 9	4.80	Acidic Rain
Point 10	5.10	Acidic Rain

Table 22: Soil Sample Results of Soil Impacted by Gas Flaring in Four Sites

Soil Sample	Unit	H1	H2	H3	H4	Control Point
pH		4.30	4.20	4.55	4.55	WHO Limits 6.5-8.5
Conductivity		30.55	35.00	27.00	42.90	21.40
Nitrogen	%	0.18	0.10	0.10	0.14	0.20
Sulphate	PPM	6.30	6.40	3.20	5.20	1.90
Iron	PPM	275.850	280.500	209.5	409	206. 220
Chloride	PPM	5.36	4.95	3.50	7.15	8.35
Cobalt	PPM	0.020	0.040	0.045	0.045	0.20

Table 23: Average Ambient Air Concentration of Cox, SO2, NO2 and SPM measured at locations AL, BL, CL and FEPA Standards

Location	Cox(ppm)	SO2(ppm)	NO2(ppm)	SPM(mg/m3
AL1	4.88	2.61	1.60	11.93
AL2	5.10	2.93	1.68	12.89
AL3	5.84	2.30	1.41	11.98
BL1	5.86	3.62	1.49	12.92
BL2	5.17	3.57	2.69	11.37
BL3	4.97	3.86	1.92	10.81
CL1	3.98	3.75	1.56	11.78
CL2	5.81	2.99	1.38	11.99
CL3	4.99	3.51	1.96	12.80
FEPA STD	**1.00**	**0.10**	**0.06**	**0.25**

Source: Field Study Recordings 2010

4.3 Secondary Data Collection, Presentation and Analysis

The procedure for data collection in respect to the questionnaire, which forms part of the research method is prepared and administered to different categories of interest groups. The questionnaire format was distributed to target groups in both Izombe and Ogoniland, respectively. This decision was justified in view of the fact that both communities faced the same impacts, as far as land-use is concerned and as far as impacts are concerned. The results obtained are indicated in the tables shown from table 24 to table 43 below.

Table 24: Sex of Respondents

Sex	Frequency (F)	Percentage
Male	35	75
Female	25	25
Total	**60**	**100**

Out of the 60 respondents, 75% were male and 25% females. Bias cannot be construed, however. The domination of male may only suggest those who were more willing to participate in the questionnaire exercise, and somehow males were more concerned about the safety of their communities.

Table 25: Age of Respondents

Age	Frequency (F)	Percentage
21-30	7	11.6
31-40	12	22.0
41-50	20	33.3
51-60	11	18.3
Above	10	16.7
Total	**60**	**100**

The age distributions of the respondents can be observed in table 25 above. Ages from 41-50 years (33.3%) dominated the number of respondents, because this is the group that are more vocal towards the activities of the oil and gas explorers. While on the other hand, ages from 21 to 30 (11.6%) recorded the least in the distribution.

Table 26: Annual Income Levels of Respondents

Incomes in Naira	Very High	High	Average	Moderate	Low	Very Low	Frequency
10 – 29,000	3	10	11	-	3	3	50.0
20 – 50,000	2	3	2	-	1	2	16.5
50– 100,000	2	1	1	-	2	1	11.5
100-150,000	-	2	4	-	2	1	15.0
150-Above	-	-	-	-	2	2	7.0
TOTAL	**7**	**16**	**18**	**0**	**10**	**9**	**100**

Table 26 above shows how the inhabitants of Izombe and Ogoniland see their annual earnings. Though some of the educated ones do get employment from the oil and gas firms, but the majority of them manage to eke living out of whatever they can get from fishery and agriculture, which have now been impacted by environmentally-related crude oil extraction. 50% of the respondents voted on Naira 10,000 to 29,000, perhaps to show the level of discontent and the way their main occupations have been eroded by gas flaring and oil spills. 1 Euro is equivalent to 220 Nigerian Naira or 1 USD is equal to 164 Nigerian Naira – Exchange rate of the day).

Table 27: Educational Status of Respondents

Qualification	Frequency	Percentage
WASC/GCE	20	33.3
OND	15	25
HND/NCE	16	26.7
Degree	9	15
Total	**60**	**100**

Concerning educational status as shown above, only 20 (33.3%) of them have WASC (West African School Certificate). This is equivalent to the British General Certificate in Education (GCE-O level). Fifteen (25%) of them have OND (Ordinary Nation Diploma is a two-year professional educational certificate obtained after secondary education. 9 out of 60 respondents (15%) have Higher National Certificates and university degrees.

Table 28: Health Effects of Oil and Gas Exploration

Types of Ill health	Number of Respondents	Percentage
Bronchitis	19	38.10
Chronic Coughing	13	23.81
Lung diseases	10	19.52
Others Unspecified	4	9.52
Deaths	5	9.82
TOTAL	**51**	**100**

Table 28 shows the results from the questionnaire concerning health of the population due to exposure to the effects of gas flaring and oil spills, which affect the water body in the two communities. 38.10% responded of high level of bronchitis, 23% reported chronic coughing, while lung diseases and others (19.52 and 9.52%) come next, respectively.

Table 29: Nature of Impact Arising from Oil and Gas Production (Effects on Agriculture and Food Security).

Sector	Frequency	Percentage
Soil	24	40.0
Vegetation	10	16.7
Humans and animals	10	16.7
Atmosphere	8	13.3
All of the Above	8	13.3
TOTAL	**60**	**100**

As can be observed in table 29, respondents were asked to evaluate the impact of oil and gas exploration on the environment. 24 respondents (40%) of them admitted that exploration of oil and gas has affected their soil, which has destructive impact on agricultural productive, threatening food security. 10 (16.7%) were discontented with both vegetation and humans/animals, and they were affected. While 13.3 % of respondents, responded negatively to the atmosphere. All the sectors indicated in table 29 will eventually impact on agricultural productivity, apparently threatening the socioeconomic wellbeing of the people.

Table 30: Impact on Income of Respondents

Magnitude	Frequency	Percentage
Impact Very High	17	28.0
High	16	26.7
Moderate	15	25.0
Low	12	20.0
Total	**60**	**100**

28% (17) of the respondents in table 30 reveal that their incomes were affected. 26.7% (16) agree that the impact on their income is high, while 20% (12) were of the opinion that impact is low.

Table 31: Rate of Oil Spills in Izombe (Impact on Vegetation Cover and Soil)

Rate of Spill	Frequency	Percentage
Very High	20	33.3
High	16	26.7
Moderate	14	23.3
Very Low	5	8.4
Low	5	8.3
TOTAL	**60**	**100**

In table 31 above, 20 or 33.3% were of the opinion that the rate of oil spills in Izombe is very high. 16 or 26.7% said oil spills are high. Only 5 (8.4%) and another 8.3 % (5) have contrary opinion. From the replies given by the respondents, one can agree that the rate of oil spill is high in respect to responses along the percentage given above. This apparently affects the vegetation-cover and soil fertility, and thereby impacting on agricultural activities, and subsequently, on the socioeconomic wellbeing. Visual assessment (Direct observation) during the field study reveals the conditions facing the physical environment, such as weathering of trees and yellowing of leaves and plants, due to lack of soil nutrients. This, hitherto, points to the fact that soil nutrients, as revealed in the laboratory investigation on the soil, has been impacted by both oil spills and gas flaring.

Table 32: Rate of Gas Flaring in Ogoniland

Rate of Gas Flare	Frequency	Percentage
Very High	44	73
High	12	20
Moderate	3	0.5
Low	1	0.2
TOTAL	**60**	**100**

Table 32 above shows the level of gas flaring in Ogoniland, with 73% of the respondents agreeing that gas flaring is very high. This is followed by 12 (20) saying that gas flaring is high. Only one respondent has a contrary opinion. Direct observation of the vegetation revealed the poor vegetation of the area due to thermal heat arising from gas flaring.

Table 33: Impact on Agriculture

Agriculture	Frequency	Percentage
Very High	29	48.3
High	22	36.7
Low	9	15.0
TOTAL	**60**	**100**

In table 33, 29 (48.3%) respondents agree that oil drilling and the effects of gas flaring and oil spills in the region have negative impact on agriculture. Izombe and Ogoniland communities are basically farmers and fishermen, and anything that affects these valued sources of income will certainly affect their lives. It is not surprising that they rated the environmental impact on agriculture very high. 22 (36.7%) of the respondents agree that the effects of oil and gas drilling have high negative impact on their practice of agriculture. Only but 9 (15%) agree the impact on agriculture is low. Acidic rain arising from gas flaring, including associated particulates, such as soot, dust and fumes have negative effects on agriculture, health and surface property. Other impacts include global warming and elevated temperatures arising from thermal heat.

Table 34: Impact on Fishery

Fishing Output	Frequency	Percentage
Increase in Output	7	11.0
Decline in Output	52	87.7
Moderate	2	1.3
TOTAL	**60**	**100**

Fishing is one the main activities of the Delta Region, especially Ogoniland Community. It is justifiable to get the opinion of the people by asking them what they think about the impact of gas flaring that emits toxic gases that affects aquatic life, and spills from oil drilling that pollutes the water body, acidic rain that kills fish and shrimps. Table 34 indicates that 52 respondents (87.7%) agreed that fish yields have declined. Only 2 respondents suggest moderate fish output. This has disastrous effects on livelihood and food security.

Table 35: Impact on Socioeconomic Life

Aspects of Socioeconomic Life impacted	Frequency	Percentage
Economy	18	30.0
Health	15	25.0
Development	14	23.3
Security	13	21.7
TOTAL	**60**	**100**

Judging from the opinion of the respondents in Table 35 above, economy is the most negatively impacted, with 30% or 18 respondents agreeing to that. This is closely followed by health, with 15 or 25% of the respondents in agreement. Development and security are the least affected in this table, with 23.3% and 21.7% respectively. The views of the respondents in table 35 can establish the fact that there are negative impacts of crude oil extraction on the socioeconomic wellbeing of the people. Table 35, however answers the principal research question that the oil and gas industry in the Niger Delta Region impacts negatively on the socio-economy of the oil and gas-bearing communities.

Role of Oil and Gas Firms in Compliance to Environmental Responsibilities

Table 36: Opinion on the Oil and Gas Performance in Respect to Environmental Responsibilities.

Respondent	Frequency	Percentage
Satisfactory	5	16.7
Average	7	25.0
Poor	15	33.3
Very Poor	33	58.0
TOTAL	**60**	**100**

From what the respondents think about the roles of the oil and gas exploring firms in table 36 above, which actually is at the heart of the criticism and debate concerning corporate environmental liability: auditing and accountability, including environmental management. It can be seen herewith that 33 respondents (58%) have ill-feeling towards the oil and gas companies, because of their environmental negligence and oversight. 15 respondents rate them poor, only 5 respondents rate them satisfactory, and 7 respondents believe the environmental performances of the oil and gas firms are average. The responses as can be observed from the answers given by the communities affected by the operations of the oil and gas companies, can speak for themselves. Failures from the oil and gas firms range from environmental negligence, none environmental accountability,

failures on environmental auditing and use of faulty and obsolete facilities, which could have revealed the extent of their environmental responsibilities in respect to legal compliance and other environmental regulations.

Level of Local Activism against Environmental Pollution

Table 37: Local Response to Environmental Protection

Respondent	**Frequency**	**Percentage**
Very High	18	35.3
High	14	27.4
Moderate	8	15.7
Low	6	11.8
Indifferent	5	9.8
TOTAL	**51**	**100**

Opinion of the respondents regarding the environmental effects from oil and gas exploration, when asked about the reactions of the locals can be seen from table 37 to be astonishing. 35% (18) of the respondents voted very high. 5 (9.8) were indifferent. The negative effects of this can be construed by the frequent violence and protests in the Niger Delta Region of Nigeria. The level of violence in many localities around the Niger Delta has caused production cuts in oil and gas in Nigeria, for example in Ogoniland, offsetting high oil prices around the world. Nigeria is the biggest crude oil producer in Africa and the 6th or 7th oil producer in the OPEC cartel (Nigerian Weekly Law Reports, 2005, 110-11)

Table 38: Background of Farmers interviewed

Years of Farming	Frequency	Percentage (%)
18-20 Years of	3	20
Farming	6	23
20-25	4	17
25-30	5	40
Above 30 years		
Total	18	100%

Table 38 above only indicates the background of the farmers interviewed, while table 39 below indicates the causes of the perceived decline in agricultural productivity.

Table 39: Perceived Causes of Decline in Agricultural Productivity

Causes	Frequency	Percentage (%)
Infertility of Soils	2	12
Inadequate State Incentives	4	24
Declining Farming Interests	2	12
Effects of Gas Flaring	6	36
Changing Global Climate	2	12
Other Causes	Less than 1	4
Total	17	100

Table 40: Degree of Gas Flare Impact on Agricultural Productivity

Level	Frequency	Percentage (%)
Severely Impacted	30	50
Moderately Impacted	15	25
Slightly Impacted	8	14
No Impact	7	11
Total	60	100

Table 40 above shows clearly the impacts of oil spillage and gas flaring on agricultural productivity. It is important to get the opinion of the locals on agriculture, because agriculture and its related economic undertakings, such as petty trading on agricultural products are about the primary engagement of the residents. From the table above, 50% (30) respondents believed that there is enormous impact on agriculture. Only 25% of the 60 respondents were of the view that it had a moderate impact. 14% and 11% of the respondents had contrary views that gas flaring had slight impact and no impact respectively.

Table 41: Type of Agricultural Products Affected by Gas Flaring

Agricultural Product	Frequency	Percentage (%)
Cassava	4	25
Yam	3	15
Cocoyam	3	15
Palm Tree	3	15
Fruits	2	10
Vegetables	2	10
Other Agricultural Products	2	10
Total	19	100

Cassava is the most stable food item in the study area. Stables such as gari (processed from cassava tubers), is a national food item. The laboratory investigation on cassava conducted in chapter three is justified because of its economic potential. 25% of the 19 respondents as indicated in table 41 above believe that cassava, among the other cash crops of the community is adversely affected. While table 42 below shows how the 18 respondents viewed the outstanding parts of cassava adversely impacted. Table 43, on the other hand, shows the effects of gas flaring as perceived by the 21 respondents in Ogoniland.

Table 42: Part of Crops/Trees/Shrubs Affected by Gas Flaring

Part	Frequency	Percentage (%)
Leaves	6	40
Roots	5	20
Stem	3	20
Branches	2	10
Fruits	2	10
Total	18	100

Table 43: Effects of Gas Flaring Perceived by local Farmers

Effects	Frequency	Percentage (%)
Decolorized leaves	5	30
Stunted Growth	4	15
Roasted Tubers and Roots	4	15
Discoloration of Stems	2	10
Low Productivity of Farmland	3	15
Low Crop Yields	3	15
Total	21	100

Five respondents out of 21 (30%) complained about the declorization of the cassava leaves, which means an obvious impact on photosynthesis. Four (15%) complained of stunted growth.

Table 44: Reasons for Community Perception of Continued Pipeline Vandalism in the oil and gas hosting communities

Reasons for continued pipeline vandalism	**Frequency**	**Percentage**
Government Negligence on Oil Pollution	25	41
Continued Oil Spillage and Gas Flaring	16	27
Destruction of farmland by oil and gas firms	14	23
For economic gains	5	9
Total	**60**	**100**

Table 44 portrays what the 60 respondents perceive as the main causes of continued pipeline vandalism. 25 out 60 respondents, corresponding to 41 percent agree that government environmental negligence of the area is the primary cause of continued

pipeline rapture through sabotage. 16 (27%) respondents attribute pipeline sabotage to continued oil spills and gas flaring. While 14 respondents (23%) think that destruction of their farmland irritates the youths into sabotaging the oil firms by destroying their pipelines. Only 5 respondents representing 9% believe that the pipeline sabotage is intended for economic purposes. From table 44 however, it is apparent that there is gross feeling of community anger and apathy directed at both the government and the petroleum companies. It can be recalled from table 2 that pipeline sabotage ranked highest in the three causes of oil spillage, and scattered studies evaluate oil spillage as the principal cause of livelihood decline through failures in agricultural productivity in the oil hosting communities. This puts to rest the general claim by industry watchers that the youths are engaged in pipeline vandalism for economic gains.

Table 45: Community Perception of Economic and Political Marginalization by Government

Respondent	**Frequency**	**Percentage**
Very High	32	53
High	24	39
Moderate	2	4
Low	1	2
Undecided	1	2
Total	**60**	**100**

Table 45 shows that 32 respondents out of 60 (53%) believe that there is government economic and political marginalization on them and that it is very high. 24 of the respondents (39%) believe that the marginalisation is high. 2 respondents think that marginalisation is moderate, while 2% of the 60 respondents think that marginalisation is low and another 2% were undecided.

Table 46*: Community Perception of Cases of Human Rights Violation and Environmental Injustice*

Level	Frequency	Percentage
Very High	33	55
High	19	31
Moderate	6	11
Undecided	2	3
Total	**60**	**100**

Human Rights Violation is one area substantial percentage of the population of the community rate very high. 33 respondents of the 60 surveyed, about (55%) rate human right violation very high. Further 19 respondents (31%) rate human rights abuse high. 6 respondents rate it moderate. Only 2 respondents of (3%) were undecided.

Table 47: Community Confidence Level on Present Government Regulatory Mechanism

Respondents	Frequency	Percentage
Very High	5	9
High	7	11
Low	40	67
Moderate	8	13
Total	**60**	**100**

Table 47 above is quite interesting, as it reveals how much the oil and gas host communities rate the present government petroleum-related legislation, including its environmental regulation and management. 5 out of 60 respondents rate the present regulatory mechanisms as very high. 7 or 11% rate it high, while, on the other hand, 40 respondents have low confidence level, representing solid 67%. Only 8 people (13%) think that the present oil pollution regulation is moderate.

Table 48: Community Perception of Environmental Negligence by Government and Oil and Gas Firms

Respondents	Frequency	Percentage
Worryingly Very High	27	46
Worryingly High	19	31
Reasonably Moderate	9	15
Reasonably Low	3	5
No Opinion	2	3
Total	**60**	**100**

Table 48 reveals the perceptions of the community on environmental negligence by both government and the petroleum companies. 27 (46%) indicate very high rate of environmental negligence. This is followed by 31 respondents (31%) indicating high rate. 15% or 9 respondents indicate negligence at a moderate level. 2 respondents (3%) have no opinion on the level of environmental negligence.

Table 49: ***Community Opinion on a possible New Regulatory System***

Respondents	Frequency	Percentage
Very High	30	51
High	14	23
Moderate	7	11
Low	5	8
Undecided	4	7
Total	**60**	**100**

Table 49 shows how important a new regulatory mechanism is, when 60 respondents were asked about their respective opinion on the possibilities of adopting a new regulatory regime. 51% (30) indicated very high interest on the possibility of a new regulatory system. This is closely followed by 14 (23%) of the respondents indicating high interest. Only 7 (11%) indicated moderate interest. While 4 (7%) were undecided.

4.4 Analyzing Community Perceptions

A need arises to tackle the perceived problems of human rights violation, economic and political marginalization, environmental negligence and environmental injustices, cumulating to aggression by the locales as revealed in table 2. It can be recalled that among the three sources of oil spillage depicted in table 2, spillage through sabotage and pipeline vandalism ranked highest as much as 59. 7%. This clearly demonstrates the level of frustration and discontent among the locales of the oil and gas bearing communities, and these aggressive attitudes are not limited to the two research areas, but a growing trend in nearly all the oil and gas-bearing communities in the Niger Delta Region. On the basis of this revelation arise the argument about the causes of pipeline vandalism that creates the oil spills. It is however easy to say that the communities are largely responsible for their environmental and subsequent socioeconomic pitfalls, but when one considers the claimed levels of environmental injustices, environmental negligence by government and oil firms, perceived economic and political marginalization, there is a tendency to consider these community perceptions as the likely reasons for continued pipeline vandalism, as depicted in tables 44, 45, 46 and 48. It is not therefore difficult to formulate arguments and search for appropriate logics to justify the assumptions of the arguments; to infer how pipeline vandalism leads to massive oil spillage.

In line with the empirical part of the study, the secondary parts; the questionnaire survey and the sundry argumentations of the above-mentioned community perceptions and claims, is the necessity to include them as part of the holistic study and equally part of the search for a possible solution. The primary methodology has shown scientifically through laboratory investigations on soil, air and water, that both oil spills and gas flaring resulting from crude oil extraction do affect the surrounding physical environment negatively. The importance of the air, soil and water investigations hinges on the fact that without such scientific examinations on these media, it would be hard to draw up a convincing argument that whatever impacts the physical environment, as proved by the foregoing investigations, do also impact on agricultural practice, food security and subsequently, on the livelihood of the people. The secondary methodology, on the other hand, through the questionnaire technique has equally shown the various responses of the locales that their means of livelihood have been impacted by both gas flaring and oil spills, and both the primary and secondary research methods have proved that oil

pollutions have impacted the surrounding environment, which subsequently impact their wellbeing. Public participation in this sort of questionnaire survey can facilitate solutions to environmental injustice problems, as absence of public perception and participation simply creates and amplifies environmental injustice. The questionnaire also can be said to be part of investigating the claimed environmental injustices that are perceived as human rights violation, and which was conducted through the framework of qualitative and quantitative gathering of local responses, needed to build a local database and community capacity for future environmental regulatory measures.

4.5 The Argument

We can make a case from the results of the research findings and subsequent presentations, in respect to the underlying factors behind the decline in environmental quality that impact on the socioeconomic wellbeing, as to actualize the argumentations. Going further in our argument, a cause such as perceived political and economic marginalization, as shown in table 45, has all the potentials to trigger off unrest and anger in a locality, which is aware of providing the nation with such economic power house, and what it gets in return is environmental disaster. And such an unrest is capable of snowballing to pipeline vandalism, as portrayed in table 44. Furthermore, the community perception of government and petroleum company environmental negligence, as shown in table 48, amounts to environmental injustice and violation of human rights. According to the International Human Rights Law, quoting Article 25 (1), ***which stipulates that everyone has the right to a standard of living adequate for the health and wellbeing of himself and of his family, including food, clothing, housing and medical care and necessary social services and right to security in the event of unemployment and loss of livelihood***. In addition, there is the United Nations Stockholm Declaration of Human Environment (1972), which states that humanity "bears a solemn responsibility to protect and improve the environment for present and future generations. In its declarations, such as; ***Damaging oceanic pollution must be prevented; Non-Renewable resources must be shared and not exhausted; Wildlife must be safeguarded; The earth's capacity to produce renewable resources must be maintained; Development is needed to improve the environment; Compensation is due to states or localities endangered, etc***.

In all aspects, the oil and gas-bearing communities are victims of these human rights

abuse provisions, including being touched by those of Stockholm Declarations. The farmlands of the petroleum-hosting communities have been destroyed by oil spills, including the waterways where they fish, and their health has been impacted by continuous gas flaring because of thermal heat, noise pollution and hazardous substances emitted by flaring. Protection and improvement of the human environment is essential as it affects the socioeconomic lives of the people, especially those who live in close proximity with polluting industries. ***Article 22 of the Human rights Abuse stipulates that everyone has the right to social security and entitled to realization through national efforts and in accordance with its resources, of the economic, cultural rights and social aspects that are indispensible for his dignity***. Oil and gas hosting communities are further victims of this stipulation, as their lands have been affected by the Land-Use Act of 1978, which replaced the erstwhile Customary Law that entitled them to their ancestral land. ***Article 16 (3) provides that the family is the natural and fundamental group unit of society and is entitled to protection by the state.*** The perceived political and economic marginalization, as portrayed in table 45, means that the state and its apparatus are unable to offer the communities any measure of security and protection, and therefore an abuse of their human rights.

According to Maggio G and Lynch O (1992) "***in Human Rights: Environmental and Economic Development; Existing and Emerging Standards in International Law Global Society***" that lack of environmental protection and human rights abuse can threaten the long-term viability of development efforts, that nearly all disputes are in one way or the other connected to environmental protection, environmental injustice and human rights abuses. These are apparent in the Niger Delta oil and gas hosting communities. In the opinion of the author, achieving an appreciable and considerable level of community confidence will certainly reduce the levels of oil spillage through mitigation of local sabotage and pipeline vandalism. Such solution will also abate the perceived human rights violation, economic and political marginalisation and environmental negligence, which are behind the local resentment, discontent and youth frustration.

Image 3

NNPC /Friends of the Earth Publication (2008)
Poverty breads violence and crude oil theft, resulting to pipeline sabotage and

vandalism.***Image 4***
Evidence of Political Unrest and Youth Violence Resulting from Environmental Injustice: Source Friends of the Earth, Nigeria (2008)

4.6 Framework for Solution Proposal

4.6.1 Introduction

Nigeria is an example of a country, where legal enforcement and compliances are problematic to implement. Past chapters in this thesis have indicated the necessity to try alternative regulatory options in view of government failures in legal enforcement and compliance mechanisms, including inadequacies in environmental legislation and poor democratic foundations. This is in line with table 49, which favours community opinion on a possible new regulatory system. When compounded by massive corruption in the oil industry, including a reluctant national adjudication apparatus, arise the need for a new approach to solving government and oil firm environmental negligence, environmental injustice and claims of human rights abuses. In the light of corruption, which is high in the petroleum industry, and which spearheads most of the environmental problems, as mentioned above, the Nigerian legislation provides criminal penalties for official corruption. However, the government fails to implement the law effectively, and officials are frequently engaged in corrupt practices with impunity Nigerian Weekly Law Report 2007, 32-33). Massive, widespread, and pervasive corruption affects all levels of government, the judiciary and the security forces. The constitution provides immunity from civil and criminal prosecution for the president, vice president, governors, and deputy governors while in office (Nigerian Weekly Law Report 2007, 35). For, example, there are widespread perceptions that judges are easily bribed and litigants, particularly in litigations involving oil spills could not rely on the Nigerian courts to render impartial judgments. Litigants encounter long delays and alleged requests from judicial officials for bribes to expedite cases or obtain favorable rulings abound (Nigerian Weekly Law Reports 2007). This hitherto explains why nearly all oil spill litigations are lodged in foreign courts, for example, the Saro Wiwa litigations in the U.S Courts, mentioned in chapter two. In view of the above-mentioned reasons, and in the absence of alternative regulatory mechanism, this study has hereto proposed for the establishment for the institution of an independent Environmental Ombudsman within the Nigerian legal and political framework - with full independence to be granted by the constitution, fairness and impartiality. Nigeria needs an independent and credible and impartial Ombudsman that will respond to the needs of the oil and gas hosting communities, to cope with adverse effects of oil spills and gas flaring, which are life-threatening, causing a decline

in their socioeconomic wellbeing. The institution of an Ombudsman exists in many countries of the world and under different names, and therefore not a new concept as a regulatory mechanism. According to the opinions of several scholars in the purview of legal development, the International Ombudsman for environment and development is being established in response to trade-related environmental problems brought about by globalization and increasing world market: Founded by the World Conservation Union and the Earth Council Foundation, and originally conceived at the 1992 Rio de Janeiro Conference. The centre is designed to identify and advice, investigate and mediate in international disputes over the environment, natural resources and sustainable development issues. And because in many cases, an environmental ombudsman comes to the middle of the poor and those disadvantaged, such as the oil and gas-hosting communities of the Niger Delta, who are least to protect their interests or assert their right against the ruling class. It makes sense for such country, where there is wide dissimilarity and gap between the rulers and the ruled, to find a common ground. Because of the continued Nigerian government's interests in the oil and gas sector of the economy, an independent entity, in the form of Environmental Ombudsman is a considerable proposal to fill the gap.

According to Howard Gadlin (What's in a Name? 2000; 16 (1): Negotiation Journal 37)- he says that there has been a massive proliferation of institutions based on the Ombudsman models, either established by Act of parliament or by appointment, for various applications and for private and public applications. For example, in Finland, it is established as the Parliamentary Ombudsman in 1919 (Eduskunnan Oikeusasiamies in Finnish language), Australia, established hers as Commonwealth Ombudsman in 1976, Azerbaijan, known as Commissioner for Human Rights, Brazil, known as the Hearing Officer, Czech, known as the Public Defender of Rights. Other countries that have established Ombudsman in various names and purposes are, Denmark (1955), Sweden (1882), Venezuela, United Kingdom, the United States of America, etc. Included in this proposal is the possibility of establishing an independent specialized adjudication alternative in the form of an environmental court. According to Pring G. and Pring C. 2009, iv-v (*in Green Justice: Creating and Improving Environmental Courts and Tribunals*); that since 1992 (following the Earth Summit in Rio de Janerio 1992), over 80 countries have enacted laws that provide greater access to environmental information. And that judicial institution in some countries has responded to environmental challenges

in innovative ways: for example, India's Green Bench of Supreme Court, which hears public interest environmental cases filed by citizens. Other nations have established similar specialized environmental courts and tribunals, such as the Land and Environmental Court of New South Wales, Australia, and over 350 specialized courts and tribunals in 41 countries have been established. Furthermore, access to justice in environmental matters has gained ascendancy as an effective instrument for holding governments accountable and ensuring that environmental laws and regulations are complied with and enforced (Pring *et al* 2009, 6-7). Nigeria therefore is not the first country to enact and establish a specialized environmental court, or that of an environmental ombudsman; to work in concert. If and when actualized, as proposed by this study, these two regulatory options will act outside Nigeria's political influence and Nigeria's national court system, which is presently characterized by unfairness and corruption and unkind to environmental-related oil pollutions. The proposals are justified considering the government's equity in SPDC, which makes enforcement and compliance hard to obtain, and also considering the economic power of Nigeria's oil and gas industry, which will continue to be economically viable for many years to come. There are in addition, legal, moral, political and economic bases for the promotion of the aforementioned new regulatory mechanisms. In the context of "best interest" of the host communities in respect to their declining livelihood, is significantly necessary. In the context of considering the upcoming generations in respect to sustainable environment and development, it is necessary. In the context of considering the opinions of the respondents as shown in tables 44, 45, 46, 47, 48 and 49, it becomes apparent that an independent and impartial institution of a credible environmental ombudsman be considered, as suggested by this study. In the context that crude oil has many toxic components injected into the soil, as shown by the laboratory experiments, which leave high concentrations of heavy inorganic metals, which cannot be degraded by micro-organisms, and therefore require better remediation technology to remove. This is an example of environmental risk an impartial environmental ombudsman can deal with. In addition, in the context of failed government duty to protect its citizens, as indicated in table 45, makes the proposal inevitable. Black's Law Dictionary defines "duty" "as a legal obligation that is owned or due to another and that needs to be satisfied; an obligation for which somebody else has a corresponding rights" Black Law Dictionary 543 (8th edition 2004). Therefore, the Nigerian government in fulfilling its legal

obligation has the mandatory role in establishing an independent environmental ombudsman, as a new environmental regulatory mechanism.

4.6.2 The Proposed Models

This sub-chapter therefore describes the models for the Environmental Ombudsman and its attributes, which this study has proposed as an independent statutory institution to deal with the foregoing aspects of legal failures, such as non-compliance and lack of enforcement; arising from environmental negligence, human rights abuses and environmental injustice, which are in line with environmental protection. By function, the environmental ombudsman proposed as both solution to the socioeconomic decline and a contribution to knowledge in dealing with Nigeria's peculiar situations, is an independent statutory institution, whose main purpose is to investigate, mediate and advise environmentally-related complaints in respect to government mal-administration, environmental negligence, failures in legal enforcement, failures in government environmental liability, failures in corporate disclosure of environmental risks, failures in corporate environmental accountability, failures on environmental standards, failures in corporate environmental liability, failures in corporate environmental compliance, including corruption, environmental human rights abuse and environmental injustice. In Nigeria presently, there is a mobile sanitation Court, which only deals with urban solid waste matters. Imo state government is a good example, which not long ago established a Sanitation Court to deal with solid waste matters. The law establishing a Sanitation court was introduced and established under the Imo State Environmental Transformation Commission (ENTRACO), and has worked relatively satisfactorily in Imo state, but only limited to solid waste matters (Nwoko C. "Public lecture article on the Imperatives of Modern Waste Management Technologies: A Case for Imo State of Nigeria 2010, 12-13). Other Nigerian state governments have followed in establishing similar institution. Therefore, there is provision in matters related to environmental protection in Nigeria to accommodate environmental Ombudsman and a specialized adjudication such as an environmental court.

Two models are presented here. The first model – Mini-Model shows the institutional structure, and its position in the Nigerian legal and political landscapes. The second model shows the functions of the environmental ombudsman.

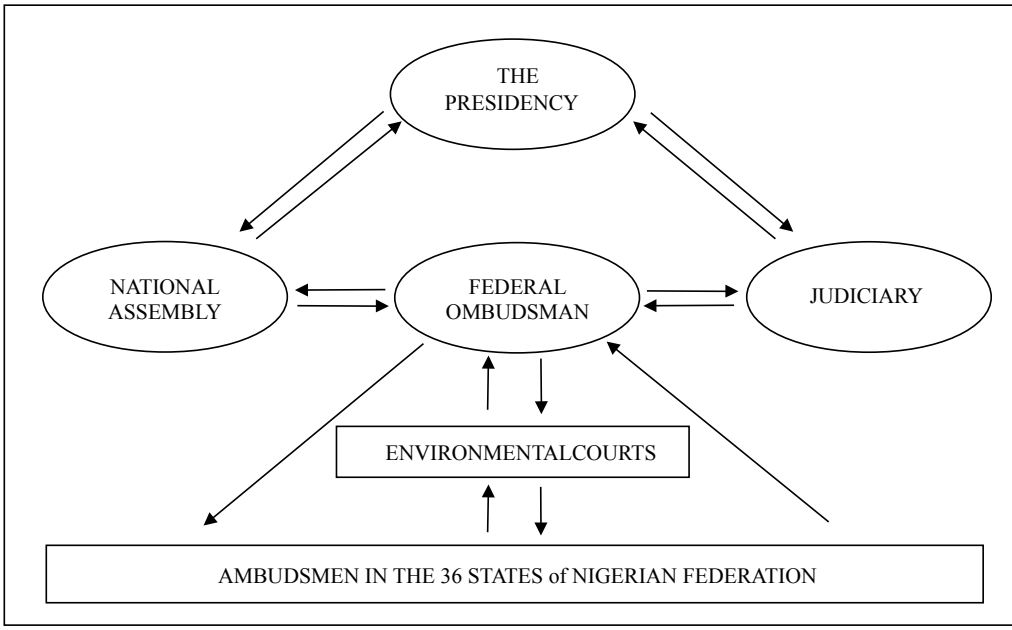


Figure 2: Mini Model of the Environmental Ombudsman and Environmental Court

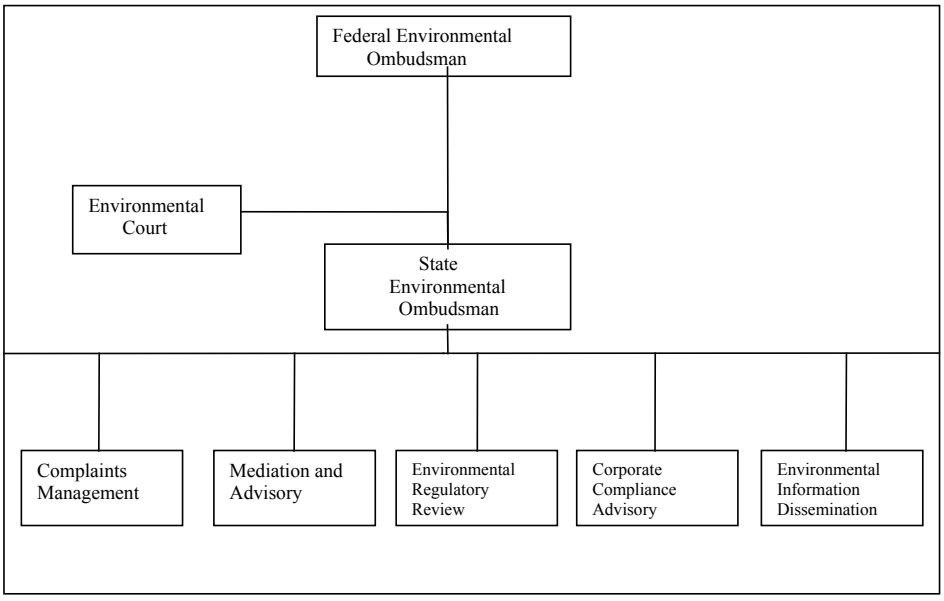
4.6.2.1 The Environmental Ombudsman and Functions

Before describing the functions of the Environmental Ombudsman, and in view of Nigeria's peculiar situation, it is important to indicate the type of environmental ombudsman proposed by this study. The institution of the environmental Ombudsman proposed here is one that should be neutral to resolve disputes: shall investigate environmental cases under the law establishing it. And for the purpose of performing the functions under the law establishing it, the ombudsman shall have all the powers, privileges and immunities to litigate and be presented in a specialized environmental court. The ombudsman is legally bound to listen to both sides in times of disputes, as natural justice demands, and assists in suggestive options and strategies for solving disputes. It cannot make a reverse legal decision, but can impose solutions.

In discharging its duties, the federal environmental ombudsman office will sit atop of the state environmental ombudsman offices in the 36 states of the Nigerian federation. The

state environmental ombudsman collects all environmentally-related complaints from the local government chapter of the ombudsman institution. This is because all the environmental problems arising from the extractive and mining industries, such as the oil and gas industry are located in the local government areas. For example, Izome is situated in Egbema/Ohaji Local Government Area of Imo State, and the Ogoniland is a local government in the Rivers State. All investigations must be carried out by the state office of the environmental ombudsman. The federal office of the environmental ombudsman carries out periodic reviews, works with the state offices and establishes network for sharing information and conducts studies to evaluate the pertinent environmental regulations, as to ensure their compliance. It furthermore ensures that the enforcement mechanisms are effective and makes recommendations to the legislative and executive branches of the government. If and when the need for litigation arises, the environmental ombudsman advises both the litigant and the defendant on matters of the law as they relate to the environmental complaints, and in accordance with the pertinent national environmental legislation.

Figure 3: Functions of the Environmental Ombudsm



4.6.2.2 Prospects for Environmental Court in Nigeria

As part of introduction, specialized court of adjudication is not a new concept in the administration of law and justice. Environmental court therefore is not a stand-alone in this aspect as it works in concert with the Environmental Ombudsman. For example, there is a specialized Family Court in New Zealand since 1981, but this was followed by other substantive law reforms. According to Atkin B (New Zealand Family Court in the University of Louisville Journal of Family Law 1991 Vol. 15, 397-398), the New Zealand Family Court is part of the District Court and it is an "Inferior Court"

In respect to establishing a specialized Environmental Court in Nigeria to work in concert with the environmental ombudsman, the study yet again becomes interested in specialized adjudication alternative and proposes the establishment of an environmental court. This is because of the present problems in the Nigerian judiciary, such as weak commitments to hearing cases involving crude oil-related environmental issues, and of course judicial corruption. Pursuant to the idea of an independent and specialized court to hear and decide environmentally-related litigations and complaints, many nations are rising up to establishing specialized courts, called Environmental Courts. According to World Resource Institute, the number of specialized courts that resolve environmental issues has grown from a handful in the 1970s to more than 350 in 41 countries (Pring and Pring 2009). The upsurge and acceptance for environmental courts is as a result of the complexities in environmental law and public interests in environmental problems. Such specialized environmental courts are ideal for Nigeria, in respect to long delays often experienced in traditional courts. Furthermore, environmental courts depend on some elements, such as legal framework, political system and the objectives of the country establishing the environmental court, and these elements, particularly the Nigeria's political system, qualifies Nigeria to adopt an environmental court in concert with environmental ombudsman, to deal with its environmental problems. Besides News land, a good number of nations, both from the developed and developing countries have already established environmental courts. Such countries are Australia, Brazil, Sweden, and Canada (World Resource Institute, 2009). For instance, News Zealand began with the establishment of Appeal Boards under the Town and Country Planning Act of 1953. The present environmental court in News Zealand replaced the Planning Tribunal as a result of the Resource Management Amendment Act 1996. In addition to the number of already

established environmental courts, some nations are in the process of establishing theirs. These countries are located in the developing countries, and they include Chile, India, Hawaii, Bolivia, Thailand, the Philippines and Abu Dhabi (World Resource Institute 2009). The environmental court has the status and power of a District Court, and therefore can conduct prosecutions and enforce decisions through civil and criminal proceedings.

4.6.2.3 Reasons for Environmental Court and its Arrangements

Specialized Environmental Courts are not some new phenomena as they have in times past existed in the Nordic counties, notably in Denmark, which established a Nature Protection Board in 1917 and Sweden, which instituted Speciality Water Courts in 1918. Finland established Water Courts, as a specialized court for water-related issues, such as pollution and construction, including compensation. These specialized courts served these three Nordic countries in the purposes which necessitated their establishment, and they do not exist nowadays. But Nigeria, with its peculiar environmental problems needs such specialized courts. Furthermore, all these specialized courts in the three Nordic countries were desired at the time they were created to serve specific purposes, and were gradually discarded as soon as the purposes necessitating their establishment were solved. The 1990s and 2000s saw more specialized courts globally due to the increasing complexities in environmental laws. In respect to the ineffectiveness of the traditional courts in Nigeria, compounded by political influence, the following reasons prompt the need for the Nigerian government to establish environmental courts in conjunction with the environmental ombudsman. Environmental court will create access to justice, particularly to the affected oil and gas-bearing communities, as they feel that traditional courts are corrupt. Three cases mentioned earlier in this study were not heard in Nigeria because the litigants had low confidence in the Nigerian judiciary; hence they took their cases to the United States and Holland for hearing. Example of such litigation outside the Nigerian courts is: Wiwa v. Royal Dutch Petroleum, 226F 3d 88 (2000). Establishment of specialized environmental court will promote efficiency, because environmental courts decrease the time needed to make case decisions, as it is always time-consuming in traditional courts. In addition, burden of proof, such as gross negligence, would not present delays as most of the triggers of environmental degradations are technical in

nature and therefore easy to prove. Economic consideration is another advantage, because the environmental court will decrease the costs both for the litigants and the defendants. Expertise in dispensing judgements will be enhanced, including accountability, particularly administrative accountability. Above all, environmental court will increase public confidence, as the majority of Nigerians have low confidence level in traditional courts in delivering fair decisions in environmentally-related cases because of the government equity in the oil and gas industry, and because of judicial corruption. The special environmental court proposed by this study is an actual judicial court with trained and expert judges. Like the ombudsman, the specialized environmental court must be independent of the executive and legislative branches of the government. The judges may be banned from hearing other cases, if need be. The environmental court can only hear environmental law-related cases, such as pollution permits, oil spills, gas flaring, environmental accountability, environmental standards and environmental quality. The environmental court proposed by this thesis is a single national court which sits in a number of courthouses in the capital cities of Nigeria's 36 states, with environmentally-trained prosecutors with both criminal and civil powers. The environmental court must be established with enforcement tools to ensure compliance and enforcement, and compensations when awarded. This is an important aspect of establishing it as well as the ombudsman, so they can work effectively together. As a specialized court, it must sit outside the pyramids for courts of general jurisdiction, and must not be bound by the strict rules of evidence. Appeals arising from environmental courts can be made on a Point of a Law only to the Federal Appeal Court of Nigeria.

4.6.3 Consideration of other possible Regulatory Mechanisms

In some cases, it can be hard to apply a single approach to solving an environmental problem. It may involve a policy mix that can eventually be enacted and regulated. This is particularly true in some countries where legal enforcement and compliances are hard to implement. To work alongside with the proposed environmental ombudsman and specialized adjudication alternative, the study herewith adds further regulatory mechanisms that are stand-alone. The Nigerian government has not done enough in terms of environmental protection and regulation. Nigeria is a federation of 36 states and the Federal Capital Territory of Abuja. These 36 states are the federating units. In conformity

with the constitution, all the 36 federating states of Nigeria are equal and should exercise some autonomy for self actualization, as enshrined in the constitution, such as matters relating to environmental problems. The states claim independence according to the constitutional provision establishing them, but there is neither political framework nor legal freedom supporting such actualization - even though the legal system of Nigeria is based on the federal structure (Akinseye 2000). The type of federation being practised in Nigeria has implications for national environmental law. Litigations concerning oil spills and other environmental negligence are hardly lodged in courts where the environmental wrongdoings were committed. Litigations are often lodged elsewhere. Such judicial practices indirectly enhance corruption in legal disputes between oil and gas companies and the host communities (Nigerian Weekly Law Reports 2006, 54). If the litigations which often are a class suit are lodged and heard where the environmental violation has taken place, there would be the possibility of reducing judicial corruption, because the voices of the affected communities would be heard. It would also create confidence on the affected communities, inasmuch as the affected communities would be able to attend court hearings because of close proximity.

4.6.3.1 Improving Production Technology in the Oil and Gas Industry

It is a fact that mankind needs petroleum products, natural gas, but the land, the physical environment and water bear the consequences and therefore must be protected. In most countries, petroleum drilling legislation requires oil and gas firms to apply appropriate technologies and management and sound environmental standards in their operations. In respect to advances in drill technologies, advanced 3-D Seismic Surveys help firms to locate potential oil reserves more precisely, instead of creating unnecessary oil wells, which litter the landscape after extraction. Safety and environmental management programs have reduced oil spills from offshore platforms, and wetland risks are equally mitigated by improved technologies. http://www.adventuresinenergy.org/exploration-and-production/Protecting-Sensitive-Environments.html (for further information, please see the attached address). In the light of improved drilling technologies, the next straightforward alternative means of reducing emissions arising from gas flaring, including reductions in oil spillage is to improve on the technologies applied in crude oil

production. According to Kuranga (2002), most of Nigeria's oil and gas technical facilities were built in the 1960,s and 1970,s. They were built according to the environmental standards of those years. Decree 70 of 1970, which assess imported technology was only decreed in 1970, and was silent on issues concerning technology-related environmental assessment (Nwoko 2001). Hence, the present facilities in use need to be changed so that modern types of production facilities, which are environmentally designed and installed, are applied in the oil industry. Modern crude oil production technologies that would cut down on gas flaring, for example, is not beyond the acquisition of the various oil and gas firms in the Niger Delta Region to install, considering that Nigeria produces close to 2.9 million barrels of crude oil daily (Nigerian Weekly Law Reports, 2007). Such modern crude oil and gas extraction technologies would significantly cut down on gas flaring between 50 to 75 percent says Chokor (2003, 46-49). In the majority of the oil rigs in the Niger Delta Region, most of the equipment engaged in extractive activities are supposed to be retired. For example, crude oil pipelines are highly corroded with weak mechanical valves, creating rooms for crude oil spills and leakages (Chokor 2003). Switching from the present obsolete technologies to modern extractive technologies, such as engineered gas reinjection reservoirs is the most efficient alternative to reduce gas flaring, and subsequent greenhouse gas emissions. This is in line with the already existing knowledge that there is need for favourable accesses for the acquisition of environmentally sound technologies, so much that faulty and obsolete equipment have been accused of causing much of the pipeline rapture. As said earlier, in Nigeria, technology imports in the form of turnkey contract arrangements or joint ventures, including other foreign investment portfolios are governed by National Technology Acquisition Decree 70 LFN 1970. This decree, which is a creation of the military regime in 1970, is silent on environmental issues. It only provides supportive measures to promote technology co-operation between Nigeria and the suppliers. The primary aim of decree 70 is to enable the transfer of necessary technological know-how as well as building up of economic, technical and managerial capabilities for the efficient use and further development of the acquired technology (Nwoko C. 2001); (Duruigbo 2003, 39-42).

Technology acquisition involves joint efforts by enterprises and governments to obtain the full benefits, and both suppliers of technology and the technology acquirer (Kemp 2000, 77); (Harris and Tallon 1989, 14). In recent years, and because of environmental

problems, there is now a call to shift from pollution control technologies to resource efficiency technologies (Deventer 1997, 65). But in Nigeria, this is not happening insofar that local and foreign firms that invested in the Nigerian extractive industries are mindless of the environmental consequences which their operations can bring about (O; Neil 2007, 11); (Ofehe 2005, 29). The problem is further compounded by the failures of Decree 70 (1970) to address environmental consequences that can arise from imported technologies. Adaptation of resource efficiency technologies puts emphasis on acquisition of technologies that guarantee resource efficiency, apparently enhancing the wellbeing of the physical and surrounding environment as well as promoting sustainability. Technology acquisition laws must therefore take note of this aspect. From the legal point of view, a country's legislation is often tied to its experiences and culture. Legislation relating to technological acquisition and subsequent development are centred on the national experiences, political foundations and socio-economic and socio-cultural awareness (Houtte 1995, 236). Truth is that the majority of the developing countries, such as Nigeria have weaknesses in political and educational foundations, including weak economic base, which when put together make internal development of technologies a difficult option for the government and its people. Many developing countries do institute both legal and administrative authorities to screen and approve technology imports, but in the case of screening imported technologies, cost-benefit analysis is more considered above other criteria. This is true in the case of Nigeria's technology acquisition legislation, where environmental impacts are not considered in the acquisition agreement (Okono 1985, 51-55). Therefore environmental appropriateness of the technology to be acquired should often come into considerations. In the opinion of the author, technical evaluation of the technologies to be imported should be readdressed, as to include environmental considerations. Technical attributes of the technology should emphasise production processes. Questions relating to resource efficiency capabilities and pollution control mechanisms should be assessed for adoptation and diffusion. This is because technologies with pollution control mechanisms are expensive to operate in respect to environmental control because they require extra technologies to control pollutions. This could be a huge problem for Nigeria in terms of costs. Environmental degradations arising from oil spillage and gas flaring require extra and sophisticated technologies to remediate and therefore needs indebt technical assessment and agreements between the oil and gas firms and Nigeria (Nwoko 2001). On the other hand,

technologies that guarantee resource efficiency production capabilities are cheaper because they do not require extra technologies to control pollution and in addition, they enhance sustainable development.

4.6.3.2 Legislating Anti-Corruption in the Petroleum Industry

Corruption in the Nigerian oil and gas mining is a cancer to all aspects of the industry, ranging from upstream to downstream operations, even going beyond the industry. Four of the major national refineries designed to fulfil national demands for gasoline, kerosene and other petroleum products only run at a production capacity less than 25% (NNPC Publication 2007). To fill the gap, refined petroleum products importers were licensed by the federal government, and the same question of corruption trails their importation (Nigerian Weekly Law Report 2007). Government corruption and negligence have equally worsened its bargaining power in the NNPC-Shell Consortium (Nigerian Weekly Law Reports 2007, 19-21); (Akinsye 2000, 67). Corruption and negligence have equally entered into other aspects of the oil and gas industry, such as the Nigerian government response to Oil well Spacing (OWS). Oil Well Spacing regulations are specified by industry standards, on how to drill oil wells with appropriate distance from one well to the other, and in respect to protecting farmlands and other community livelihood spaces. In Nigeria, Oil Well Spacing industry standards are not applied and therefore defective (Nigerian Weekly Law Report 2002, 123). There are no effective regulatory mechanisms in place to enforce and maintain spacing of wells. For example, in other oil and gas producing countries where industry standards are enforced, such as the United States, no oil well can be legally drilled without the permission of the Railroad Commission. In the United States, Railroad Commission is the regulatory agency for oil well spacing, and no issuance of permit is given to prospective oil operators until the drill site meets the regulations (Williams, Maxwell and Meyers 1974, 440-441, 612-613). According to Duruigbo (2003), Nigeria has no such oil well spacing regulatory body. By all accounts, there is a huge sacrifice of farmland for petroleum exploitation, and it affects the economy of the localities where oil and gas mining takes place (Akinseye 2000).

The resulting problem is that much land is wasted in respect to oil and gas exploitation than in agriculture and fishery. More problems do occur when the oil wells are dried and

abandoned and oil wells that are not in use would litter the landscape of the Niger Delta Region. In objection to this failure, the Nigerian leading environmental advocacy group - the Environmental Rights Action/Friends of the Earth posits, "***That in the Niger Delta, the soil has lost its fertility and the water has lost its fecundity, destroying the basis for farming and fishing***". Niger Delta landscape is littered with polluted sites, waste pits, overcrowded-abandoned oil wells and toxic dumps (Nzeakah 2000, 33). Inadequate checks and balances and ineffective legislation on anti-graft can only quicken and install corruption, resulting to several socioeconomic problems, of which environmental negligence and oversight are apparent. There are certain enactments that deal with the issue of corruption, but in most cases, they seem to be laws in the textbooks than in the courtrooms. Such laws are, Advance Fee Fraud and other fraud-related offences Act of 2006. The next one is the Corrupt Practices and other related offences Act of 2005. There is also the Criminal Code Act (77, 1990). Others are the Evidence Act (112, 1990) and the Money Laundering (prohibition) Act (7, 2004). The problems with these laws are political favouritism and absence of compliance and enforcement mechanisms (Nigerian Weekly Law Reports 2006).

4.6.3.3 Challenges of Agricultural Policy

Agriculture is the main occupation of the people of the Niger Delta Region. After agriculture, fishery and animal husbandry follow. It is also the primary livelihood of Nigerian as a country, engaging about 55% of the population (Trade and Technology Policy of the Federal Republic of Nigeria 2004, 18-20). Any environmental hazard on agriculture affects the entire livelihood of the nation, particularly the inhabitants of the oil and gas-bearing communities that depend solely on fishery and agriculture. Agriculture therefore needs sound policies and enactments at the wake of crude oil mining-related environmental degradation. Challenges of agricultural policy therefore and herewith refer to a set of laws relating to domestic agriculture, including imports of foreign agricultural products, for example, new technologies and improved insects-resistant crops. In this respect, the Nigerian government can implement agricultural policies with the goal of achieving specific outcomes in respect to domestic agricultural activities and agricultural market products (Chokor 2003, 56-59). The government may embark on land-use and land reform policies, though difficult to achieve in Nigeria in respect to traditional land

ownership tenure, but the present environmental impacts arising from oil and gas operations have necessitated such. Though on paper, Nigeria has reasonable articulated agricultural policies, which target increase in agricultural production to enhance farm yields and achieve food security, but none of its recent agricultural policies have articulated new agricultural technologies or any improvement on seed and crop production (Chokor 2003). Enacting specific legislation, such as the "Zoning and Land Use Legislation" to deal with the special situation in the Niger Delta in respect to the declining agricultural production arising from damaged soil and vegetation, has become necessary. Tables 29 and 33 point out in the field study carried out in two communities in the Niger Delta, and according to these tables, the responses are of the opinion that agricultural activities are negatively impacted by both oil spills and gas flaring. Gas flaring causes acidic rain and acidic rain affects the vegetation and crops negatively. It causes stunted growth in plants. For example, acidic rain falling on the plants damages the waxy layers of the plant leaves and makes the plant vulnerable to diseases. The cumulative effect means that even if the plant survives, the damaged layers of its leaves will be weak and the seeds would be unable to germinate (Chokor 2003, 74). Acidic rain affects aquatic life and thereby threatening biodiversity. Same goes with oil spills in respect to agricultural production. Oil spills either land spill or marine spill affect the physical environment and the vegetation, and thereby impacting on agriculture and food security (Odu 1996, 45-47). Because of the indirect effects of oil and gas production operation in the Niger Delta, it becomes very necessary to review the national agricultural policy. The policy objective should be a policy question, such as those environmentally relevant trends in agricultural production activities, including the main objectives of such policy or policies. Two regimes should emerge from these questions, such as new agricultural technology and amendment in agricultural legislation, or a new agricultural legislation.

4.6.3.4 New Agricultural Technology

Policy context in respect to new agricultural technology targets Genetically Modified (GM) crops. It is true that farmland supports many habitats and species in any agricultural field. It is true also that there is the tendency of gene flow through pollen transfer from a genetically modified crop to a non-genetically modified one. However, technology has

from generation to generation been a misunderstood concept and modified gene crop is no exceptional. There is one school of thought, which differs and argues that Genetically Modified (GM) crops improve food and feed production and quality. To this effect and in respect to the fact that oil spills and gas flaring have impacted very negatively on agricultural activities in the oil and gas-bearing communities, there is need for new technology in the food production sector. The question that GM crops improve food and feed quality is supported by Beever (2000); (Jacobs and Michael 1991), its adoption as a new agricultural policy is necessary. The Green Revolution of the 40s brought together improved varieties, increased the use of fertilisers, irrigation and synthetic pesticides, which helped in food production. Though, the application of pesticides has brought about huge environmental costs, and other associated risks. According to Paoletti and Pimental (2000, 19), use of pesticides has fundamental impacts on the biodiversity. There are numerous cases where pesticides have killed birds. But its advantages outweigh its disadvantages, more so now that global population is in the increase and land is non-elastic. The introduction of the genetically modified (GM) crops is controversial, yet its benefits, especially in consideration of its elimination effects on the controversial use of pesticides are well documented (Maffei *et al.* 1996, 54-57). GM technology has reduced pesticides applications in agricultural practice. As Phipps and Park (2002, vol. 11, 1-18) argued, that it is estimated that the use of GM soybean, oil seed, cotton and maize varieties, which were modified for herbicide tolerance, reduced pesticide use by a total of 22.3 million kg of formulated product in the year 2000. Another argument for the emergence and adaptation of new technology for agriculture is in the causation of deforestation and forest conservation. Deforestation for agricultural purposes is a problem in Nigeria on the whole, particularly in the Niger Delta Region. There is no reforestation program in existence. Economic growth in Nigeria provides improved infrastructure, but at the expense of deforestation. Deforestation in the Niger Delta, arising from damaged soils and vegetation requires substitution, such as genetically modified seeds and crops (Evoh 2002, 28). In general, deforestation for alternative agricultural products to compensate loss of export earnings arising from trade barriers from the markets of developed countries compounds the problems of protecting the environment. This is a problem to many developing countries, including Nigeria. Cotton production is a good example, where exports to the developed markets, especially to the United States of America, faces trade barriers (Gunningham and Grabosky 1998, 272-273); (Cairney

1993, 44).

In making a case against the applications of agricultural chemicals in favour of GM technology, deforestation arising from agricultural chemicals has increased in Nigeria and has serious detrimental environmental impacts in terms of air and water pollutions. These chemicals change the structure and fertility of the soil and its acidification, including the contamination of the aquatic system (Chokor 2003, 55). Applications of agricultural chemicals for bigger yields and outputs have come about against the backdrop of breaking foreign trade barriers by exporting at low prices, as to be competitive in the developed country markets. Nigeria has experienced leakage of fertilizer and urea nutrients into lakes and rivers (Osunbor 1997, 119). In the opinion of the author, there are inadequate funds and skilled manpower to check the excesses of ecological and biological diversity in the Niger Delta Region. In respect to the above-mentioned problems, the environment is further affected, and this can justify the need for a new technology in the agricultural sector, such as the genetically modified crops mentioned above. In addition to this is the fact that majority of the farmers in the Niger Delta Region and other parts of Nigeria practise shifting-cultivation method of farming, which involves clearing forests by burning and farming on them and abandoning them to another piece of land as soon as it is observed that they decrease in quality and quantity in soil fertility (Osunbor 1997, 37-40). Shift-cultivation can be sustainable, but it leads to massive deforestation. According to the author, this method of farming degrades natural resources and increases carbon dioxide emission amid existing gas flares. This should call for the intervention of new technologies through commercial farming, against the traditional smallholder or community or farming method that employs crude farming methods. Employment of new farming technologies in respect to improved and modified crops can allow farmers to maintain productivity without degrading natural resources. This in turn should reduce the need to abandon plots of land already cleared for farming than to go clearing additional forests to make new farming plots. This is because there is scarcity of farmland in the Niger Delta due to the effects of petroleum-contaminated agricultural soils in the region. In respect to the necessity of new agricultural technology, it then becomes imperative to assess the various types of technologies that are available for possible application and investments. Two major regimes of new technologies emerge here, and they include technologies embodied in inputs and capital goods. For example, improved genetically modified crops, as discussed above. The other is the application of

new technology, which relies mainly on new management practices. This includes the choice of technology that saves land by limiting deforestation, reclamation and remediation of crude oil-related damaged soils and through the avoidance of pesticides. New management concept includes specific legislation, such as “Seed Law”. Seed Law, also called Seed Act, can be debated on its merits and demerits and enacted to improve the agricultural productivity for those oil-bearing communities facing adverse effects of environmental degradation. By definition, seed law means the application of rules to govern the commercialisation and application of seeds, such as what kind of seeds can farmers grow or distributed to farmers, and under what conditions. The law is to protect farmers and not to penalize them (Tiratsoo 1979). The main idea of seed law is to ensure that only approved seeds are distributed to farmers to improve agricultural production and mitigate food insecurity. The law if in place can enhance the application of biotechnology and genetically modified crops. This is mainly to offset the imbalance in agricultural production caused by damaged soils and vegetation, caused by environmental degradation. The role of the seed law is to ensure that farmers are dictated to use the new variety of crops/seeds. These choices as suggested above can be very appropriate in a region such as the Niger Delta.

CHAPTER FIVE

5. Concluding Statement

The main purpose of this study was to assess the socioeconomic impacts of oil pollution arising from the Niger Delta Region's oil fields, including its subsequent solution. The thesis began by accessing the sources of environmental problems arising from the operations of the oil and gas companies, beginning with investigative studies, the primary and secondary studies, which are compiled in chapter three, with relevant presentation on chapter four. The study touched on various aspects, such as corruption in the petroleum industry, judicial corruption, and failed government duties in enforcement mechanisms. The study concentrated its research on two known sources of oil pollution, which are oil spillage and gas flaring, and these studies were empirical part of the study, while the secondary studies involved questionnaire surveys and interviews to sound the opinion of the communities in respect to political/economic marginalization, human rights abuse, environmental injustice and environmental negligence by the government. These crucial findings are contained in tables 44 down to 49, whereas tables 23 down to 43 indicated the opinions of respondents drawn from the various oil and gas-hosting communities. Other study targets were on the industry perspectives, such as failures in environmental accountability, environmental auditing and environmental negligence. International perspectives were also assessed in respect to international environmental laws that Nigeria is a member-state. The overall research questions touched on the environmental consequences and how they impacted the Niger Delta Region, socioeconomically speaking. The study also reveals how environment negligence and absence of environmental accountability on the part of the oil and gas companies impacted the socioeconomic, food security and health of the communities located within the oil and gas exploration sites. Included are also Nigerian government failures on legislation, particularly in the oil and gas industry, and how the government's involvement in the equity holding in the Shell Petroleum Development Consortium (SPDC) affected the legal enforcement and compliance in the petroleum industry. This observation has therefore enabled the study to propose alternative regulatory measures, where independence and fairness would reign, such as the possibility of a specialized

environmental court, nationwide, and an independent environmental ombudsman, nationwide too. These two independent entities would wedge in between the government and the public, in respect to government's environmental negligence and mindlessness, including those of the oil and gas companies.

The field studies conducted on the Niger Delta Region reveal how the various communities located within the oil and gas sites perceive the operations of the oil and gas firms, in respect to environmental issues and corporate social responsibility. The in-depth study of the impact of oil and gas operations led to the narrowing of the research findings into proposing alternative and effective regulatory options, such as establishing an independent mediating institution and a specialized court: only if there would be a political-will to do so. The in-depth study further acted as a starting point of assessing the consequences of environmental pollution and degradation on the inhabitants of Ogoniland and Izombe, both in the Rivers State and Imo State, respectively. One can as well say that what happens in these two study areas do also happen in other oil and gas hosting communities in the Niger Delta Region, making the study comprehensive.

The analysis of data collected from the field study, as can be observed from both the laboratory work and the questionnaire responses, reflects on the research questions. The data collected and its subsequent analysis yielded the already discussed research findings, which ascertain the questions posed by the research. Findings were limited to national aspects and did not include international or corporate aspects, because, according to Nigerian Weekly Law Report (2005, 23-24) international environmental laws are not effective in domestic settings, and because the activities of the multinational corporations can be regulated by the regulatory mechanisms of the host government.

Based on the findings from the empirical case study, the study concludes that there is relationship between environmental consequences on the physical environment from pollutions arising from oil and gas exploration, which in turn impact negatively on the socioeconomic, agriculture, health, and food security.

Important concluding statement is that there are environmental impacts on the localities in Nigeria where oil and gas drilling are situated. These can be observed from the results of both the experiments and responses of the questionnaire. Affected localities had often responded to environmental consequences in the form of complaints to both the federal and state governments and to many international environmental bodies (Dara 1998, 55). The operations of the oil and gas companies create serious ecological and environmental

problems, such as damaged soils and vegetations arising from oil spills and gas flaring, affecting agriculture. There are further impacts on the aquatic life – biodiversity and fishery, which in part is the livelihood of the oil and gas hosting communities. The environmental consequences have also global dimensions because gas flaring in the Niger Delta Region emits greenhouse gases, and subsequently resulting to the changing climate scenario. Though there are available laws to deal with environmental protection, for example, the gas Flaring Act 1984, which was enacted to abate the flare of gas from the oil wells, and yet there are gas flares to date. Another is the Corrupt Practices Act 2005, which also was enacted to check and punish infringers, but corruption still persists, particularly in the petroleum industry, judiciary and in the political landscape. It is true to say that environmental negligence arising from failures of legal compliance and enforcement, including corruption, does promote negligence. The final conclusion in respect to major research findings therefore is that, in view of the failures from both the government and its authorities in enforcing the laws for the companies to comply with, as the law cannot enforce itself, a bill to add an environmental Ombudsman within the Nigerian political and legal framework is highly needed. The Ombudsman will act as the 'Defender of the Citizen's Rights', which includes above other things, to investigate; advice; oversee and coordinate the state of the environment nationwide, particularly in the oil and gas sector. Each state of the federation is entitled to the office of the ombudsman and collectively they will act as the Republican Moral Council. The office of the ombudsman strengthens legal compliance and enforcement and makes it efficient. The ombudsman bill should provide the office with the enabling legal power to gain full unrestricted subpoena powers to have accesses to corporate environmental audits, accountability and environmental monitoring, and be called for mediation in the course of disagreement or conflicts between mineral resource communities and the mineral extracting companies. The ombudsman should be empowered to litigate and draft environmental reports and recommendations of filed complaints for decision-making. The Petroleum Ministry which is under the Presidency, and which controls the Directorate of Petroleum Recourses, and the later which is responsible for environmental regulation, and under which the Petroleum Act is applied from, is not able to enforce the relevant laws governing the environmental problems arising from the oil and gas industry. It is like one making laws that would confront him later in the course of doing the activities for which he was drafted to do. It therefore becomes pertinent for the law to

establish an intermediary between the government and the corporations. In addition, Nigeria should enact a law for the establishment of a single national special environmental court, which is a trial court with nationwide jurisdiction, and hears appeals from state environmental ministries and land-use permit decisions. Having now examined the problems of legal compliance and enforcement, including corruption and the fact that the petroleum ministry, in which environmental regulations are under, considering again that the Petroleum Ministry is under the Presidency, this study therefore comes up with a mini-model for the position of the Environmental Ombudsman in the Nigerian Federation. Ombudsman will fill the gap for the government's ineffective handling of legal enforcement in matters relating to environmental protection and regulation. The three-tier federal structure should now include the provision of the Ombudsman, in the federal, state and local government levels, including the specialized environmental court.

In summary of this work, the study faced a number of perplexing challenges, particularly in the field study, and also in obtaining the necessary information in respect to the questionnaire. The difficulty was assessing the correctness of the information given by the various respondents, including the interpretation of the answers they gave. It was observed that fear to disclose what confronts them daily was apparent, for reasons they feared that the questionnaire was a government plot to keep them perpetually entrapped in their environmental decadence.

Nigeria today faces environmental consequences arising from the operations of the multinational corporations in the oil and gas industry. Understanding the sources and the consequences of the oil pollutions and the challenges they pose are apparently the genesis of this study. The study has not narrowed its view on the environmental challenges and problems arising from the oil and gas industry alone. It has similarly stretched its views to include other aspects of environmental issues arising from everyday activities, such as agricultural production. The decision to make the study more elaborate in this sense stems from the fact that environmental problems of our time have become so complex and equally tangled with everyday activities, and to the extent that narrow-minded view of it does not reveal the extent environmental consequences can impact mankind. In respect to achieving complete summarized environmental consequences arising from the oil and gas exploration and production operations in Nigeria, a conclusive review can be drawn from chapters three and four. On the consequences of environmental impacts of oil and gas exploration, the case studies carried out in Ogoniland and Izombe demonstrate

the environmental impacts experienced in these two oil-producing communities, and they are not different from what happens in other oil and gas producing communities in the Niger Delta Region. According to earlier studies carried out in Obiafu, Elele and Obrikom, including gas flare studies in Kolo Creek and Ebocha Oil fields and Oshi Flowstation, all in the Niger Delta Region, indicate the same patterns of environmental consequences (Ekoriko and Moffat 1990, 56-59), (Odiete 2001, 13) and (Imo 2000, 46). The questionnaire research tool concluded on these two oil-bearing communities summarizes conclusive information on how the inhabitants see their well-being, their health and livelihood affected by oil and gas explorations. Tables 44 to 49 reveal critical issues facing the communities, and it is from the findings of these tables that concluded this study, leading to the proposed solution.

Gas flaring impacts on human health: it has very negative effects on the physical environment, nationally, regionally and globally. Gas flaring causes acidic precipitation. The incineration of sour gas from the oil wells (hydrogen sulphide) produces sulphur oxides, which when combines with atmospheric oxygen and water results in acid rain. Acidic rain has negative impact on the environment; particularly its impact on agriculture is well documented. Sulphur oxide causes air pollution and contributes to greenhouse gas emission and subsequently climate change scenario. Table 32 shows high level of gas flaring as revealed in the questionnaire responses from the inhabitants of Ogoniland. The answers given by the respondents in Table 32 correspond with Table 6 which makes Nigerian gas the most flared in the world. Table 28 shows the high level of health factors and environmental consequences arising from gas flares in the Niger Delta Region. The health and environmental impacts answer the questions posed by the research questions about impact on the socioeconomic and health dimensions. Research question number three can be answered in respect to failures in the various national laws, such as the FEPA Act (1988-92), which deals with pollution controls, the Petroleum Act (1969), the Gas Re-Injection Act (1984) and the Petroleum Drilling and Production Act (1969). Tables three and four reveal that oil spills are quite high in the Niger Delta Region of Nigeria, impacting on agriculture (tables 33, 40 and table 41), while (table 34) indicates high impacts on fishery. The inhabitants of the Niger Delta Region, particularly Ogoniland and Izombe are principally farmers and fishermen. The environmental problems arising from oil and gas exploration in respect to failures in national legal compliance and enforcement, and failures in environmental accountability and negligence of the oil and

gas companies have impacted the livelihood of the citizens, food security and health factors. Furthermore, Table 36 reveals that the oil and gas companies operating in the Niger Delta Region have low responses to preventing environmental degradation, such as gas flaring and oil spills. This low response corresponds with the belief that there are inadequate mitigation or abatement measures, and there are also no intervention measures from the international environmental law perspectives. Substantial failures in this end could have been mitigated if Nigeria is an accession state of any of the international conventions on petroleum, such as the International Convention on Civil Liability for oil pollution and damage and International Convention on Oil Pollution Preparedness, Response and Cooperation. As can be seen from chapter three and the tables in chapter four, it can be summarized that the exploration of oil and gas in the Niger Delta Region of Nigeria, has serious ecological and environmental consequences, impacting the socioeconomic, health and food security of the region.

These environmental consequences and impacts have been promoted by failures of the national legislation, which come short of mechanisms for compliance and enforcement. There are also serious failures of environmental accountability, auditing, industry standards, including perceptions of political/economic marginalization, human rights abuses and environmental injustice and environmental negligence.

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APPENDISES

SAMPLE OF QUESTIONAIRE

TOPIC: SOCIOECONOMIC EFFECTS OF OIL DRILLING AND GAS FLARING IN IZOMBE AND OGONILAND COMMUNITIES IN IMO AND RIVERS STATES

Dear Respondent.

Please read the following questions and provide your answers as sincerely as you can in the space by ticking "X"

Personal Information

1. Sex: Male ☐ Female ☐

2. State of Origin …….....…….……..

Local Government Area ….....…….....……..

Age in Years: 15-21 ☐ 21-30 ☐ 31-40 ☐ 41-50 ☐ 51-60 and Above ☐

Marital Status: Single ☐ Married ☐ Divorced ☐ Separated ☐

Name of Community or Town …….....….....…….

Occupation: Farming ☐ Fishing ☐ Civil Servant ☐ Trading ☐

Mining ☐ Oil Company Worker ☐

Educational Qualification Completed:

Elementary/Primary ☐ Secondary ☐ Vocational ☐ Professional ☐ University ☐

Place of work: At Home ☐ Inside Village ☐ Outside Village ☐ Unemployed ☐

How has oil and gas exploration impacted on your earnings?

Very High ☐ High ☐ Moderate ☐ Low ☐

Has oil drilling any impact on your community? Yes ☐ No ☐

Which oil and gas firms operating in your community?

Shell Petroleum Development Company (SPDC) ☐

Nigerian National Petroleum Corporation ☐

Exxon/Mobil ☐ Chevron Nigeria Ltd (CNL) ☐ Agip Oil Company Ltd ☐

Elf Petroleum ☐

Has oil and gas exploration activities impacted on agricultural activities in your Community, and to what extent? Very High ☐ High ☐ Moderate ☐ Low ☐

How has oil and gas exploration impacted on your socioeconomic life?

Very High ☐ High ☐ Moderate ☐ Low ☐ Very Low ☐

Were Fishes and other aquatic lives affected? Yes ☐ No ☐

What role or roles do the oil companies play in environmental abatement measures?

Very High ☐ High ☐ Moderate ☐ Low ☐ Very Low ☐

What usually causes oil spills and gas flaring in your area?

Sabotage ☐ Accident ☐ Negligence ☐ Corroded Pipes ☐ Vandalization ☐

Since the advent of oil and gas exploration in your community, what is the level of crop yield?

Increasing ☐ Decreasing ☐ I do not know ☐

What has been the level of local activism against environmental pollution?

Very High ☐ High ☐ Moderate ☐ Low ☐ Very Low ☐

During oil spillage, how many hectares of land were affected?

Less than one hectare ☐ Between three and five hectares ☐

Between ten and fifteen hectares ☐ Above twenty hectares ☐

Difficult to estimate ☐

Has oil spills ever disrupted agricultural activities? Yes ☐ No ☐

Has there been any difference in crop yields during oil spills and in non-oil spills?

Yes ☐ No ☐

Was any compensations paid to the affected farm owners? Yes ☐ No ☐

If yes, who paid the compensation …….....……..

What was the level of infrastructural development before oil and gas exploration activities?

Very Poor ☐ Poor ☐ Moderate ☐ High ☐ Very High ☐

What is the level of infrastructural development since oil and gas exploration?

Very Poor ☐ Poor ☐ Moderate ☐ High ☐ Very High ☐

Have there been any clean-up activities in the area? Yes ☐ No ☐

If there has been clean-up exercise, how was it carried out

……
……
…….....……..

Who has affected the clean-up exercise?

Oil and gas companies ☐ Local government ☐ Community efforts ☐

Federal government ☐ I do not know ☐ Nobody ☐

FACT SHEET on NIGERIA

THE COUNTRY

Nigeria is a massive country of more than 120 million people comprising 250 ethnic groups speaking over 4,000 dialects. It is partitioned into 36 states. In size, Nigeria is 577,355 sq miles; that is more than two and half the size of California. You can view a map of the country. For a more detailed map of the country, see this. Nigeria is bordered by the Republic of Benin to the West, Cameroon to the East, Niger and Chad in the North and the Gulf of Guinea to the South.

The Federal Republic of Nigeria came into existence in 1914 when the British colonial government amalgamated the Lagos colony and the Northern and Southern Protectorates for administrative purposes. Previously, Nigeria consisted of four different empires: The Northern Empire, the Calabar Kingdom, the Oduduwa Empire and the Benin Empire.

Nigeria obtained independence from Britain on 1 October 1960 and a federal government was formed. In 1963 Nnamdi Azikiwe became the first president of the Federal Republic of Nigeria. Political stability was short-lived, however. In 1966 a group of army officers killed the prime minister, overthrew the federal government and installed a centralized government. Later that year army officers again revolted against the government and General Yakubo Gowan became head of the new military government.

Regional and ethnic tension flared in the unstable political climate. In 1967 Nigeria was divided into 12 states and the massacres of Igbo peoples in the north led to the declaration of a separate Republic of Biafra. This declaration marked the beginning of a three-year civil war in which more than one million people died - mainly Biafrans.

The war ended in 1971 with surrender by the Republic of Biafra. Throughout the 1970s and 80s, Nigeria saw a succession of military coups and governments. In 1975, General Yabuku Gowon was overthrown by General Murtula Muhammed, the number of states was increased to 19 and plans were drawn up for a new capital in Abuja, to replace Lagos. During the 1970s and 80s Nigeria's oil industry boomed, however, only a minority of Nigerians benefited. Most of the population struggled for daily existence, suffering prolonged droughts, inflation, high unemployment, official corruption and ethnic tension.

In 1983, the armed forces deposed the elected government of the National Party of Nigeria. There was strong support for the coup, as there was widespread opposition to

state corruption. In 1985 General Babangida became the first military president and promised to restore democracy to Nigeria. Eventually, in 1993, Nigerians went to the polls. However, General Babangida annulled the election.

A political crisis ensued and General Sani Abacha seized power. Throughout his regime Abacha showed a flagrant disregard for human rights, freedom of speech and democracy. Thousands of people were detained, many fled the country, killings and human rights atrocities were widespread. Minority movements that attempted to secure control over their environments and oppose the government were brutally suppressed.

In 1993, 300,000 Ogoni people marched in protest at the money being made from their oil-rich lands, which were being exploited by the Anglo-Dutch consortium Shell. The march marked the start of a period of military terrorisation of the Ogonis. The plight of the Ogonis was brought to the world's attention in May 1994 when the environmentalist and writer Ken Saro Wiwa was arrested along with other Ogoni leaders on fraudulent charges. The world looked on in horror when in November 1995 Ken Sara Wiwa, along with eight Ogoni leaders, was executed. Abacha died in June 1998 and General Abdulsalami Abubakar became the interim president.

Official Name:	Federal Republic of Nigeria
Location:	western Africa
Capital:	Abuja
Official Language:	English
Total Area:	923,770 sq km.
Population:	107 million
Life expectancy at birth:	54.65 years
Literacy:	57.1%
Primary religions:	Muslim and Christian
Currency:	the Naira
Natural Resources:	petroleum, tin, columbite, iron ore, coal
Climate:	Equatorial in the south, arid in the north and tropical in the centre.
Geographic Features:	Coastal forests in the south, savanna in the north; 35.6% of the land is arable and 12.4% wooded.

Nigeria is the only oil-rich country in sub-Saharan Africa: accounts for 95% of the country's export revenue. However, most of the population see little sign of the wealth: Nigeria has a 50% inflation rate and 40% unemployment.

NIGERIA

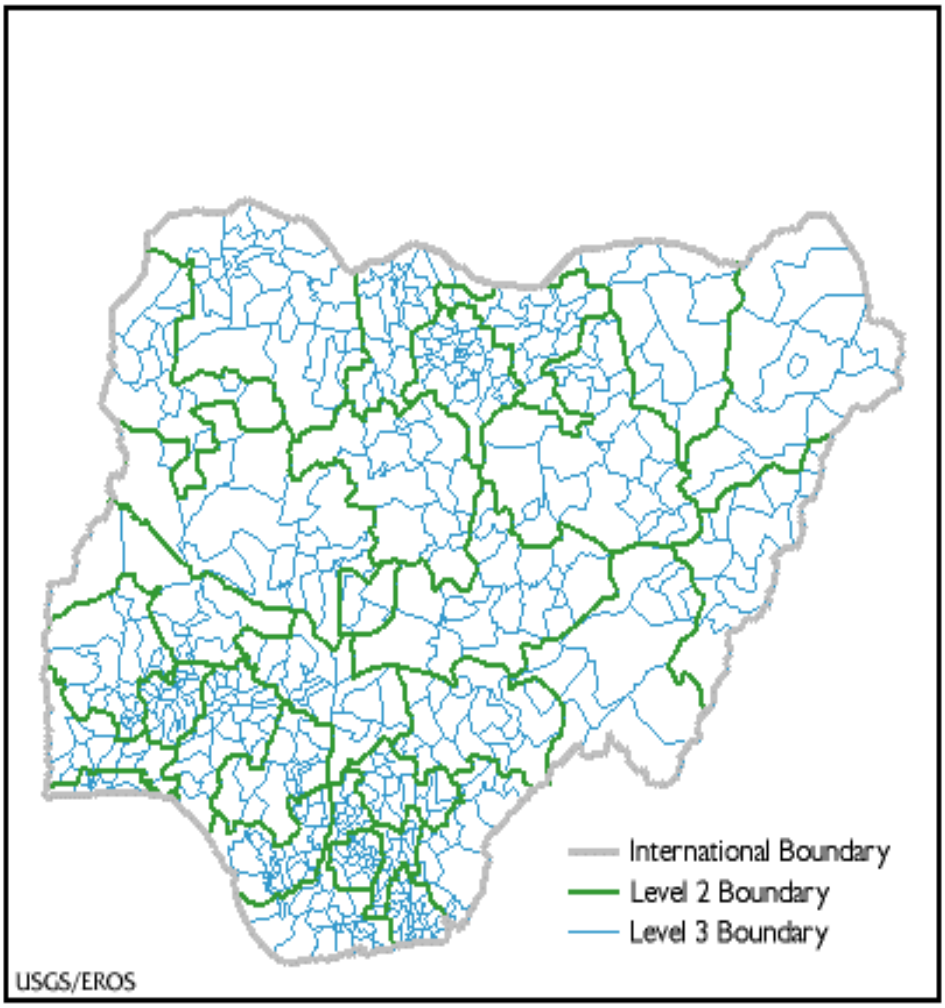
Population:	103,912,489 (July 1996 est.)
Population growth rate:	3.05% (1996 est.)
Birth rate:	42.89 births/1,000 population (1996 est.)
Death rate:	12.71 deaths/1,000 population (1996 est.)
Sex ratio:	at birth: 1.03 male(s)/female under 15 years: 1.01 male(s)/female 15-64 years: 1.04 male(s)/female 65 years and over: 1.02 male(s)/female all ages: 1.03 male(s)/female (1996 est.)
Infant mortality rate:	72.4 deaths/1,000 live births (1996 est.)
Total fertility rate:	6.24 children born/woman (1996 est.)
Languages:	English (official), Hausa, Yoruba, Ibo, Fulani
Literacy:	age 15 and over can read and write (1995 est.) total population: 57.1% male: 67.3% female: 47.3%
Religions:	Muslim 50%, Christian 40%, indigenous beliefs 10%
Nationality:	noun: Nigerian(s) adjective: Nigerian
GOVERNMENT	
Country name:	conventional long form: Federal Republic of Nigeria conventional short form: Nigeria Data code: NI
Government type:	democratic civilian government (after a fifteen-year largely despotic military rule between December 31, 1983 and May 29, 1999.
National capital:	Abuja :on 12 December 1991 the capital was officially moved from Lagos to Abuja; many government offices remain in Lagos pending completion of facilities in Abuja
Independence:	1 October 1960 (from UK)
National holiday:	Independence Day, 1 October (1960)
Legal system:	based on English common law, Islamic law, and tribal law

Suffrage:	21 years of age; universal
Judicial branch:	Supreme Court, judges appointed by the Armed Forces Ruling Council; Federal Court of Appeal, judges are appointed by the federal government on the advice of the Advisory Judicial Committee
Flag description:	three equal vertical bands of green (hoist side), white, and green
ECONOMY	
GDP:	purchasing power parity - $135.9 billion (1995 est.)
GDP - real growth rate:	2.6% (1995 est.)
GDP - per capita:	$1,300 (1995 est.) GDP - composition by sector: agriculture: 38% industry: 22% services: 40% (1994 est.)
Inflation rate - consumer price index:	57% (1994 est.)
Labor force:	42.844 million by occupation: agriculture 54%, industry, commerce, and services 19%, government 15%
Unemployment rate:	28% (1992 est.)
Budget:	revenues: $2.7 billion expenditures: $6.4 billion, including capital expenditures of $1.8 billion (1994 est.)
Industries:	crude oil, coal, tin, columbite, palm oil, peanuts, cotton, rubber, wood, hides and skins, textiles, cement and other construction materials, food products, footwear, chemicals, fertilizer, printing, ceramics, steel
Agriculture - products:	cocoa, peanuts, palm oil, rubber, corn, rice, sorghum, millet, cassava (tapioca), yams; cattle, sheep, goats, pigs; fishing and forest resources extensively exploited
Exports:	$9.9 billion (f.o.b., 1993) commodities: oil 98%, cocoa, rubber partners: US 52%, EC 34%
Imports:	$7.5 billion (c.i.f., 1993) **commodities**: machinery, transportation equipment, manufactured goods, chemicals, food and animals

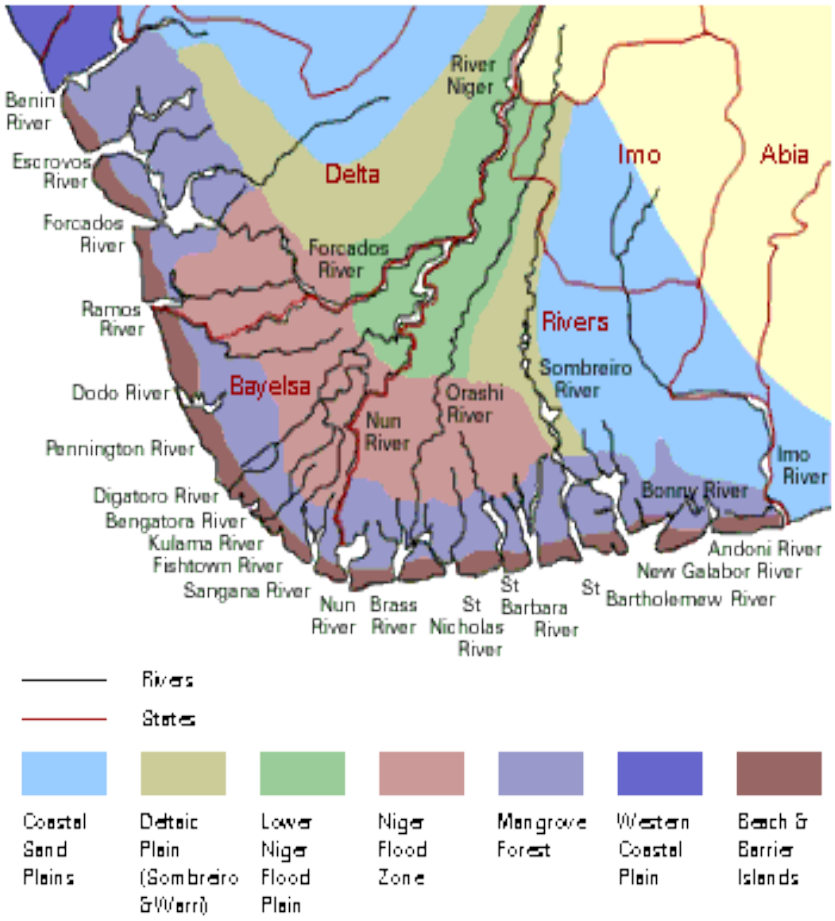
	partners: EC 50%, US 13%, Japan 7%
Debt - external:	$32.5 billion (1993)
Telephones:	492,204 (1990 est.)
Telephone system:	average system limited by poor maintenance; major expansion in progress **domestic**: microwave radio relay, coaxial cable, and 20 domestic satellite earth stations carry intercity traffic **international**: satellite earth stations - 3 Intelsat (2 Atlantic Ocean and 1 Indian Ocean); 1 coaxial submarine cable
Radio broadcast stations:	AM 35, FM 17, shortwave 0
Radios:	20 million (1992 est.)
Televisions:	3.8 million (1992 est.)
Railways:	total: 3,557 km (1995)
Highways:	total: 112,140 km
Waterways:	8,575 km consisting of the Niger and Benue rivers and smaller rivers and creeks
Pipelines:	crude oil 2,042 km; petroleum products 3,000 km; natural gas 500 km
Merchant marine:	total: 33 ships (1,000 GRT or over) totaling 387,552 GRT/636,578 DWT ships by type: bulk 1, cargo 16, chemical tanker 3, oil tanker 12, roll-on/roll-off cargo 1 (1995 est.)
Ports and harbors:	Calabar, Lagos, Onne, Port Harcourt, Sapele, Warri
Illicit drugs:	passenger and cargo air hub for West Africa; facilitates movement of heroin en route from Southeast and Southwest Asia to Western Europe and North America; increasingly a transit route for cocaine from South America intended for West European, East Asian, and North American markets

MAP OF NIGERIA SHOWING ROADS AND RAILWAYS

MAP OF NIGERIA SHOWING ADMINISTRATIVE BOUNDARIES



NIGER DELTA REGION: VEGETATION



MAP OF THE WESTERN AND CENTRAL NIGER DELTA FEATURING TERRITORIES OF ITS MAIN ETHNIC NATIONALITIES

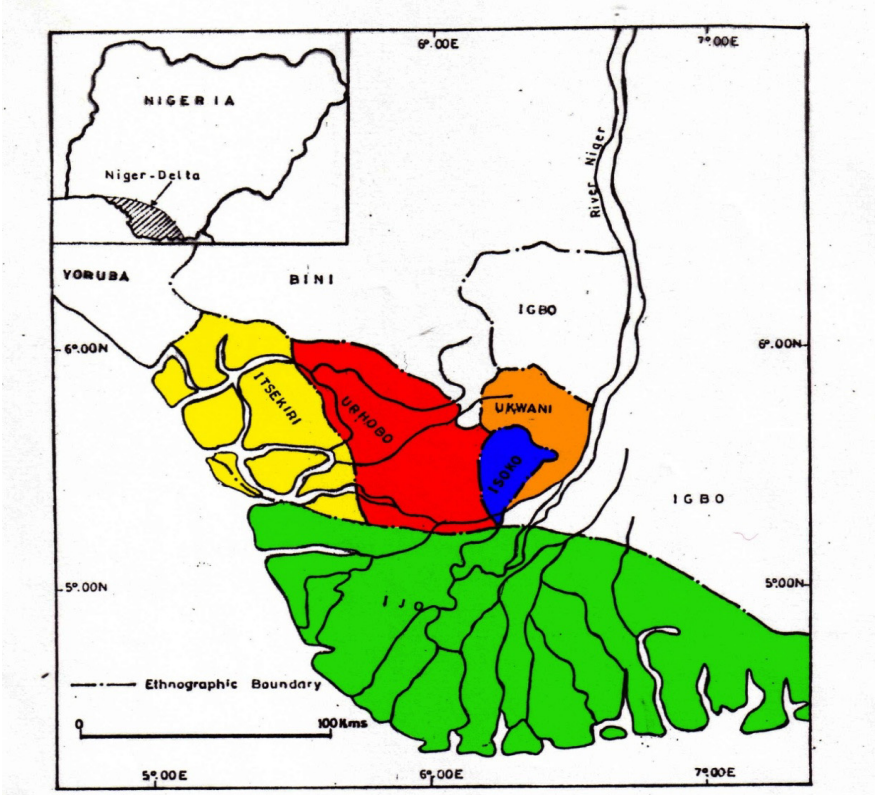


Fig.1: The Main Ethnic Nationalities of the Niger Delta.

Map drawn by Prof. Albert Aweto.
University of Ibadan, Nigeria

CHARLES N. NWOKO
Environmental Law and Management

Gas Flaring is a problem: Microclimate from the gas flares causes enormous heat and evaporation, resulting in excessive dehydration. Poisonous chemicals arising from flares, such as nitrogen dioxide, sulphur dioxide, benzene, tolene, xylene and dioxin cause health problems. There is in addition a visibility problem arising from scattered light emanating from the surfaces of air-borne particulates. Greenhouse gas concentration in the atmosphere is another problem of gas flaring, including 24/7 noise pollution arising from the high frequency oozing sound from the flare stacks.
Oil spillage comes next: Crude oil contains several different compounds in the course of its biosynthesis formation – with hydrocarbons on the lead, such as alkanes, cycloalkanes and aromatic compounds. Oil spills on both land and sea reduce the flow of water as a result of buoyancy, drowning birds, generating enormous ecological and socioeconomic problems.

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