BE306E Master's Thesis in Environmental Management

"Gas Flaring/Power plants in Nigeria: Socio-economic and Environmental Impact on the People of Niger Delta"

By
Ochuko Thompson Oghifo (Candidate No: 4)

Spring 2011

Universitetet i Nordland
Bodø Graduate School of Business

BE306E Master's Thesis in Environmental Management

(Bodø, Norway)

Topic

"Gas Flaring/Power plants in Nigeria: Socio-economic and Environmental Impact on the People of Niger Delta"

By

Ochuko Thompson Oghifo (Candidate No: 4)

Spring 2011

ABSTRACT

The atmosphere is kind. It takes the carbon dioxide (CO2) and other heat-trapping greenhouse gases that humans create and disperses them equally all over the world. But that is also its cruelty. The accumulation of these waste gases over the decades, disproportionately from industrial countries but increasingly from some developing ones, is over-whelming the planet's energy balance and heating up its surface and affecting human wellbeing. Gas flaring and thermal plants emissions in the Niger Delta region are example of such pollutions, this accumulation must end, but how that would happen is hard to imagine.

Ecological economics framework is suggested as a more fruitful approach to socio-economic and environmental problems than the now dominant neoclassical paradigm. The background and theories of Neo-classical and ecological economics is given in this paper, as well as the main characteristics of their approach. Differences between neoclassical and ecological economics are elaborated with respect to the concept of sustainability and economics (reductionist versus holistic), the approach to decision making (aggregated versus highly disaggregated), and the view of social and institutional change.

This study is to understand how theories and practice of organization and environmental management in Niger Delta region are functioned; these issues will be analyzed through an Ecological and Neoclassical economics theories on the emission of uncontrolled air pollutants from all the existing and proposed thermal plants/gas flaring in the country. Calculations are performed to study the distribution of carbon monoxide (CO), oxides of nitrogen (NO_X), particulate matters (PM), sulphur dioxide (SO_2), and volatile organic compounds (VOCs). The estimated emissions ranges are 978–24,607, 1635–41,148, 37–924, 19–472, and 11–286 ton/annum for CO, NO_X, PM, SO_2, and VOCs, respectively. The present locations of these plants across the country are characterized by skewed emission distribution both per capita and across the land. Given the potential environmental and health impacts of these emissions, several measures are suggested to reduce future impacts and assist the country in achieving sustainable development.

Key results of the study are: We identify two primary scientific clusters, one clearly confirming the existence of the ecological-economics school of thought, and the other largely capturing the neoclassical environmental view. Yet, there are some surprising exceptions: Both schools of thought share a conceptual definition of sustainability that is integrative in considering ecological, societal and economic dimensions ('three pillar concept') and is geared at preserving the development potentials of society.

DECLARATION

I declare that I personally authored this work. As much as possible, all ideas and sources of information have been duly referenced in line with the ethics of academic honesty. I wish to declare emphatically that this work has not been published either in part or whole for the award of any academic degree. I am exclusive responsibility for any omissions, errors and weaknesses that might be found in thesis.

.....

Ochuko Thompson Oghifo

ACKNOWLEDGEMNTS

I am most grateful to the Almighty God for giving me the needed strength and courage to accomplish this course successfully. Baring all the difficulties that came my way while researching into this important topic, I have nothing but just to say His grace has been my driving force.

I am sincerely and deeply thankful to my supervisor, Professor Ove Jakobsen whose patience and inspiration spared me on to success. All your efforts and suggestions have shaped and given me in-depth knowledge into how natural resources can be managed sustainably.

I further express tons of gratitude to Bodo Graduate School of Business for giving me this opportunity to acquire knowledge in this field of study.

Finally, I want to say a big thank you to my informants who gave me valuable support and information to come out with this work.

Ochuko Thompson Oghifo

May, 2011

Bodo.

TABLE OF CONTENT

APPENDIX

LIST OF TABLES

LIST OF FIGURES

ABBREVIATIONS USED

C.S.R.....Cooperate Social Responsibility
E.M.S.....Environmental Management System
N.G.O.....NON-Governmental Organization
E.P.A.....Environmental Protection Agency
F.D.I.....Foreign Direct Investment
J.H.S.....Junior High School
G.H.G.....Green House Gas
M.L.N.R.....Ministry of Lands and Natural Resources
M.E.S.T……..Ministry of Environment, Science and Technology
M.O.E.....Ministry of Energy
SHS.....Senior High School
MSLC.....Middle School Leaving Certificate
MDGs.....Millennium Development Goals
SCF……..Standard Cubic Feet
SPDC……...Shell Petroleum Development Company

CHAPTER 1

1.0. Introduction

The discovery and extraction of natural resources has brought different consequences to countries that are endowed with such resources. While some of these nations have become economically strong and self sustaining, others have been drawn into serious economic hardships and conflicts. Proponents of the resource curse, project have it that the citizens of these countries rather suffer from abject poverty, environmental damages, pollutions, diseases, illiteracy and score very low on the United Nation‘s Human Development Index (UNDP, 2006).

The Niger Delta region, where Nigeria Current Large Oil and Gas resources are located, to with the Niger Delta as the unifying feature has remained a source of global interest. With openness to the Atlantic Ocean and watercourses with access to the sea and rivers such as the Benue and Niger Rivers, the Niger Delta embodies some of the major coastal upwelling sub-ecosystems of the world and is an important center of marine biodiversity and marine food production ranked among the most productive coastal and offshore waters in the world. However, pollution from domestic and industry sources, over-exploitation of Oil and Gas resources and poorly planned and managed communities and coastal developments and near-shore activities are resulting in a rapid degradation of vulnerable land, coastal and offshore habitats and shared living marine resources of the region putting the economies and health of the populace at risk. The deterioration in water and air quality (chronic and catastrophic) from land and sea-based activities (especially industrial,(flaring/power plants), agricultural, urban and domestic sewage run-off, eutrophication and gas flaring have been identified as a major Tran boundary environmental problem by communities in the region.

Mainstream economics of the neoclassical kind was not developed primarily to deal with environmental problems. When facing a new category of problems, it therefore also seems reasonable to consider alternatives to the neoclassical paradigm. The limited reversibility or irreversibility of many environmental impacts is one reason to question conventional economic reasoning, which generally assumes that everything can be traded against everything else in monetary terms. Secondly, ethical and ideological issues become accentuated in relation to environmental problems. Even if it were accepted that impacts can be traded against each other in one-dimensional, monetary terms, the price at which such trading should occur is always open to debate. The idea of correct prices for purposes of resource allocation suggested by conventional cost-benefit analysis becomes less convincing, if not absurd. Why those prices? What right does one have, as an economist, to define so-called correct prices or correct rules

for valuing environmental impacts or other impacts in monetary (or other one-dimensional) terms? There are ethical reasons to suggest, for instance, an infinite price for irreversible degradation of the natural resource base available to future generations. And, as already indicated, irreversible impacts are the common case rather than the exception. The burning of coal, oil or natural gas is an irreversible process. Pollution of air, water and soil is often irreversible or difficult to reverse, and the same is true of land exploitation for various purposes, or interference with ecosystems.

Environmental and socio-economic issues become business issues. Thus, what is good for the economy is equal to what is good for the environment (Silverstein, 1993). At a pragmatic level, there are some obvious reasons for environmental management study. The traditional view about regulation ecology and economy sounded like ecology versus economy. Social benefits that demand strict environmental standard confronts industry's private costs, cost of prevention, and clean-up faced reducing of competitiveness and price increase. Fortunately, companies make a business in the real world of dynamic competition, not in the static world with many economic theories. Thus, it can be concluded that static view of ecological regulation is incorrect today. Moreover, it is not simply enough for companies to have only resources. Using resources productively is what makes for successful competitiveness today. Companies and states can improve resource productivity by providing existing products more efficiently or by making products more valuable for customers, products customers are willing to pay for (Porter, Der Linde 1995). Some researchers deem that industry's pollution today means inefficiency. Really, when scarp, harmful substances, or energy forms are discharged into the environment as pollution, it is sign that resources have been used incompletely, inefficiently, or ineffectively (Porter, Der Linde, 1995). However, it is so naïve to allow that most of companies existed to over look their policy into environmental compliance fast. Unfortunately, traditional ways of business dominates rooted tightly in company's top management conscience. Moreover, several years ago, most business hoped that the environment issues would disappear, but till date it has still not; it has only gained more important (Woolstone, 1993). Some scholars believe that technology will solve environmental problems and can replace natural capital by profit maximization in resource utilization (weak sustainability- neoclassical economics paradigm) why other believe that is only to an extent that technology can replace natural capital (strong sustainability- ecological economics paradigm). All these world trends claim from the firms to consider environmental issues in long – term perspective. How should companies be motivated into environmental friendly policy and who should determine ecological standard: government, policy makers or companies themselves? This is real tight challenge toward sustainable development.

Since the controversial book by Meadows et al. (2004 for the update of the 1972 edition), the debate about the physical limits to growth has remained lively. If one considers the controversies between economists, one can schematically distinguish two antagonist positions. According to the first and most optimistic one (the so-called "weak sustainability" position), long run economic growth is possible within a finite world thanks to substitutions between natural resources and man-made inputs and thanks to technical progress. This position is well illustrated by the contributions of Dasgupta and Heal, Solow or Stiglitz to the Review of Economic Studies symposium on the Economics of Exhaustible Resources (1974) but many other contributions followed.

The second position is much more pessimistic about the long run growth prospects in a finite world. It first relies on a critical appraisal of the representation of the production process in neoclassical growth theory: following Georgescu-Roegen (1971), ecological economists like (Cleveland and Ruth, 1997) and (Daly, 1997) consider that neoclassical growth models rely on much too optimistic assumptions about substitution possibilities between natural and man-made inputs and about how they can be affected by technological progress. They outline in particular that neoclassical growth models ignore the physical laws (the conservation laws and the second principle of thermodynamics) that govern the transformation process of matter and energy in all human activities, in particular the production of goods and services.

Therefore, a cluster analysis of both ecological and neo-classical economics paradigms is used in this project to analyze how their approach can positively influence the emission of uncontrolled air pollutants from all the existing and proposed Gas flares/ power plants in the Niger Delta region. In evaluation of our survey results, we discuss to what extent the clusters that we identified do-or not to-represent the two schools of thought of Ecological and neoclassical economics perspective, on the issues of sustainability and economic development in the Niger Delta region; how they group around these issues, how they feel about the current scientific divide, and what they expect to be future environmental and economic development of the region, though the Neoclassical economics approach is commonly practice in the region, but this paper will compare with a replacement by ecological economics approach to address these pollutions problems in the region.

1.1. Background of the Study

Niger Delta is the southernmost region of Nigeria. It is located in the South-South District of the Southern Region of Nigeria and is surrounded by small communities such as Batan, Odidi 1 and Odidi2, Escravos, Ekpan, etc. These communities within Niger Delta area are just a few kilometers apart. The inhabitants of

these communities are predominantly fishermen. Apart from fishing, farming is another economic activity these villages are engaged in.

Due to the production of the crude oil, the communities around Niger Delta region have limited access to fishing and agricultural activities. Oil spill and carbon particles in their rivers, land and air from CO2 emissions from gas flares\power plants has made it difficult for fishing and farming activities in the area, which also affect their health and lands for other purposes. This means their major source of livelihood has been taken away from them. Meanwhile, it has not well been established as to the kind of package which would be made available for these communities not to become worse off as a result of less access to fishing activities and other socio-economic activities within their community where oil production and drilling takes place. In addition, oil production comes with huge environmental challenges especially at a time where climate change and its negative consequences have captured global attention. Unlike land, defining property rights for the use of the sea is rather difficult (Vatn, 2005, p. 261), however contends that undefined or unclear property rights may yield both large conflicts and losses. The oil production off the coast of Niger Delta has indeed created a rivalry in the use of the sea; there would be some cost if any of the agents is excluded from the use of the water resource. The oil drilling infrastructure in the Niger delta has also come under attacks from local residents who claim they have not been compensated for their loss of land and source of livelihood to the oil production. These local residents sometimes damage oil transporting pipelines and set fire to them. Other times, they have engaged the companies in warfare and on some occasions taken foreign expatriates hostage. Supporters of the local residents quote the African Charter Article #21 to back their actions. Three clauses in the charter read:

- All peoples shall freely dispose off their wealth and natural resources. This right shall be exercised in the exclusive interest of the people. In no case shall a people be deprived of it.

- In case of spoliation, the dispossessed people shall have the right to the lawful recovery of its property as well as to an adequate compensation.

- States parties to the present Charter shall undertake to eliminate all forms of foreign economic exploitation particularly that practiced by international monopolies so as to enable their peoples to fully benefit from the advantages derived from their national resources.

If this Charter is anything to go by, then the local communities along Niger Delta have to be compensated in a way that will not make them worse off since they have to give up their source of livelihood. One way

could have been an agreement for the oil companies to give employment to the residents but this may not materialize since most of the residents have not had education and training in oil extraction, other ways is implementation of sustainable policies and good practice in oil industries production activities including all stake holders. This research work also examines who is responsible for this situation in a context where multinational oil companies have been operating for decades. It highlights how companies can take advantage of the weak regulatory systems that characterize many developing countries, which frequently results in the poorest people being the most vulnerable to exploitation by corporate actors. The Niger Delta people have been systematically denied access to information about how oil exploration and production will affect them, and are repeatedly denied access to justice. The Niger Delta provides a stark case study of the lack of accountability of a government to his people and of multinational company's almost total lack of accountability when it comes to the impact of their operations on human right and environment.

For the last twenty years, contributions to endogenous growth theory have dealt with the question of long term growth in the presence of scarce natural resources and/or pollution. But surprisingly, the vast majority of those papers (even rather recent ones) disregard the laws of physics and the ecological economists' criticisms to the neoclassical representation of the production process. For instance, (Grimaud and Rougé, 2003), (Grimaud and Rougé, 2005) and (Groth and Schou, 2007) build models in which a natural resource is one of the production factors of a Cobb–Douglas technology; (Stockey, 1998) and (Hart, 2004) propose growth models with pollution in which no material flow is explicitly modeled. Other contributions to growth theory aim at taking the ecological economists' criticisms more explicitly into account. Papers like (Bretschger, 2005), (Smulders, 1995a), (Smulders, 1995b), (Smulders, 2003), (Bretschger and Smulders, 2010) and (Pittel et al., 2006) explore the long term consequences of material balance constraints and low substitution possibilities between material and man-made inputs. In spite of the resource scarcity, they all show that under some conditions, long term growth can be sustainable thanks to research and development investments. Similarly, Akao and Managi (2007) adopt a material balance approach and put forward the sustainability conditions for long term growth in an economy with finite (but recyclable) resource, pollution and bounded assimilative capacity.

Differences between the present neoclassical and ecological economists cannot be described in terms of black and white. Rather we have to deal with divergent tendencies. According to the Finnish philosopher Georg Henrik von Wright (1986), there is a tension within science generally between reductionist-mechanistic modes of thinking on the one hand and holistic-evolutionary tendencies on the other.

Reductionist and mechanistic approaches have dominated physics, chemistry and biology since Newton and have succeeded in some respects. Considering especially the environmental problems now facing mankind, von Wright calls for an increased emphasis on holistic and evolutionary approaches. Similar tensions exist within economics. Neoclassical economics is largely on the reductionist-mechanistic side, why ecological economics is more holistic and evolutionary. Extreme beliefs in specialization and division of labor within science, between policy areas and in society generally, can be given as an example of the reductionist tendency of neoclassical economics. Thus the neoclassical economist tends to believe in very clear boundaries between economics and other disciplines and in the possibility of giving useful advice on the basis of highly specialized knowledge. Environmental economics and environmental policy are largely seen as areas that can meaningfully be detached from other study areas in economics and other policy areas. In this way, environmental economists are expected to take care of environmental problems and suggest a rational environmental policy, while other economists need not bother and can continue to do what they did before in fields such as agricultural and food economics, transportation economics, international economics, business economics, public finance, etc.

Ecological economists on the other hand emphasize a organic/holistic or inclusionist [as opposed to exclusionist - see Pirages (198911 approach to economics and policymaking. Specialization and division of labor is seen not only as a positive possibility, but also as a danger. The relationship between disciplines, for instance social sciences, is one of overlap, rather than one involving clear boundaries. Every scholar should try to attain a balance between specialized knowledge and knowledge at a holistic and more interdisciplinary level. According to the holistic view, scholars in all disciplines should consider how environmental and natural resource concerns impinge on their subjects. Thinking in environmental terms has to permeate all subfields of economics and all policy areas. Environmental policy overlaps with transportation policy, energy policy, food policy, etc., and policy discussion has to include, or even start with, visions of society that comprise all so-called sectors of the economy. Another case of neoclassical reductionism concerns the idea of economics that is advocated for purposes of practical economic analysis. Neoclassical economists, too, may realize that the world is complex, but they feel that far-reaching simplification is necessary. Practical economic analysis is reduced to monetary analysis. Cost-benefit analysis, for instance, can be seen as a case of monetary reductionism. Here the institutional economist suggests a more holistic and disaggregated view of economics. Equilibrium theory has been mentioned as an example of the mechanistic tendencies of neoclassical economics. Economists in turn have a preference for organic and evolutionary thinking. “Patterns modeling” (Wilberand Harrison, 1978) is a characterization of this interest in how the ecosystem, technology, institutions, habits, values and the

economy at large evolve through time (cf. also Norgaard, 1985). Where neoclassical economists use models that are closed in a mathematical sense, ecological economics prefer models which in the same sense are theories and open-ended or only partially closed (Myrdal, 1978). For instance, knowledge about environmental impacts is often fragmentary rather than complete, but together the different fragments may represent meaningful patterns. Attempts to bring everything together in simple equations or in one-dimensional terms may convey a false feeling of control.

This Thesis findings are based on survey of available information from the representatives of national institutions (Environmental protection agency- EPA), Ministry of lands and natural resources, Ministry of environment, Science and Technology, Ministry of Energy. Other institutions like Nigeria Petroleum Company (NNPC), the Nigerian Extractive Industries Transparency Initiative (NEITI) where also conducted, and extensive internet research among sources, like ecological and neo-classical economics text books, journals and article, the international oil companies Nigerian Branches, Environmental Rights Action (ERA), Amnesty International, World Bank and other internet sources. The desk research is complemented with field studies in and around the Warri/Effurun area of Niger Delta region and work shop at Nielson environmental field school conference in the USA to share ideals of environmental pollution and damages. The first chapter describes the background of the research, and the second chapter links them with the objectives of the paper and the appropriate knowledge in the field. So far it is concluded that survey can be appropriate as a methodology for researchers no matter if they are proponent or positivist, interpretive or phenomenological philosophy. With regards to the unit of study several type of sampling are discussed with their respective advantages and disadvantages. It is also important to note that appropriate size of sample depends on the purpose of the research that is reflected in the overall design of the survey (qualitative- statistical).

The settlement of these points will enable data collection process to be essential. It does not really matter if is interviewed or self administered questionnaire is chosen as data collection method for the project. The consideration of interviews in contrast with self administered questionnaire within the same chapter again helps to when either mode is preferable used. Data analysis is characterized both from a point of quantitative and qualitative method.

1.2. Research Question and Problem

From the view point of cooperate researcher, Gas flaring has been agued to be of particularly importance, since most oil and gas companies operation is surrounded with gas flaring and power plants in Nigeria.

Thus, in principle, Gas flaring offers a route to growth, because there will be oil production and business opportunities but with high level of pollution risk to the socio-economic and environment of communities in the region that these operation takes place. Therefore, there is need to control the level of gas flares and power plants through adequate approach and policies. For this matters, the main issue to be addressed is; the impact of Gas flaring and power plant emissions to the socio-economic and environment in the Niger Delta region and the adequate approach to address these practices. Thus, this study will find out if the main stakeholders would come up with better answers to the problems connected to oil drilling and production if they use the framework based on ecological economics instead of the neo-classical paradigms that is presently in practice in the region.

1.3. Statement of the Problem

There are major problem of our time, from energy, the environment, climate change, food scarcity, and financial security could not be understood in isolation. They are systematic problems, which mean that they are all interconnected and interdependent. The fundamental interconnectedness of our major problems makes it clear we need to go beyond economics to overcome the global economic crisis. In the Niger Delta, majority of the flaring of natural gas takes place is the home to some 31 million people and the location of massive oil deposits which have been extracted by the Nigeria government and by multinational oil companies for decades and oil has generated an estimated $600 billion since the 1960s. The Niger Delta is Nigeria‘s largest wetland region and is the third largest wetland in the world. It covers over 70,000 square kilometers between latitude 4o15'N and 4o50'N and longitude 5o25'E and 7o37'. It is characterized by extensive interconnectivity of creeks, deltaic tributaries, flood plains, mangrove swamps and other coastal features. The Niger Delta has been declared a key zone for the conservation of the Western Coast of Africa on the basis of its highly rich oil and gas resources and extraordinary biodiversity. It harbors a large reserved of oil and gas, family and species of wildlife, especially important and fascinating variety of fishes and birds.

Despite this, the majority of Niger Delta’s population lives in poverty, no electricity power supply and highly polluted environment. Many of the planned electric power generators are thermal power plants that will burn fossil fuels to generate electricity. In thermal plants, gaseous emissions are of great concern. Major components of these emissions are air pollutants, which include carbon monoxide (CO), oxides of nitrogen (NO_X), particulate matter (PM), sulphur dioxide (SO_2), and volatile organic compounds (VOCs). This project identifies the quantity and location of pollutant emissions and points out the localized and uneven geographic distribution of electric power plants and gas flaring emissions in Nigeria.

For decades, since oil and gas production started in Nigeria, the approach was from the mainstream economy (neo-classical economic paradigm). Their focus was that; to be healthy the economy must constantly increase the amount of energy and raw materials that flow through it in order to generate ever greater wealth, and in order to be happy people must have more and more of this wealth so as to have access to consumer goods. They see economic growth as the central driver of economic, social and environment progress though the "trickle-down" effect growth will ensure that wealth created in higher income groups, will spread to the lower income layers of the population. But this is not actually happening in the Niger Delta region, apart from not receiving the spread of the wealth from growth in the higher income groups, they are also facing more difficult problem from the impact of emissions from oil and gas production-growth, to their environment and well being. According to Francis Bacon, (1561-1626), from the historical roots of mainstream economy, stated that, we should endeavor to establish and extend the power and dominion of the human race itself over the universe, Descartes (1596-1650), also described the earth and the whole visible universe in the manner of machine. Mainstream economy (neo-classical economics), is based on a mechanical worldview, consequence of the mechanistic worldview is that the whole universe is completely causal and deterministic. The future of any part of the system could- in principle- be predicted with absolute certainty if its state was known in details, there is no capacity for creativity, spontaneity, self movement, or novelty. In this perspective, the society is nothing more than a mere mechanism based on the interplay between egocentric individual seeking their own need, which is exactly the approach of oil production companies in the Niger delta region, Nigeria.

It is also important in this paper, that we further explain the activities of gas flaring and power plants by mainstream economy in greater detail and problems it entails, to give us clearer understanding of the process of production in the Niger delta region. Crude oil is often found mixed with natural gas, which must be separated from the oil during extraction. While it is technically possible to capture and utilize the separated natural gas, in Nigeria the associated gas is generally combusted and flared in the open air. There are currently approximately 100 continuously burning gas flares in the Niger Delta and just offshore locations, some of which have been burning since the early 1960s. According (Environmental Rights Action/Friends of the Earth Nigeria, 2009), based on satellite data, the US National Geophysical Data Center estimated that Nigeria flared 15.1 billion m^3 of natural gas in 2008, second only to Russia. Base on (GGFR, August 2009), gas flares are a significant source of greenhouse gas emissions and emit particulate matter, sulphur dioxide, nitrogen dioxide, as well as carcinogenic substances such as benz[a]pyrene, dioxin, benzene and toluene, which can have severe health effects for local populations and cause environmental problems. Thus, those residing near the flaring sites may suffer from serious

health problems including respiratory illness, asthma, blood disorders and cancer. Although a Shell spokesman disputed the health impacts of the gas flares, of no scientific proof (Shell spokesman Wim van de Wiel, 6 August 2009), the UNDP has declared that gas flares destroy natural resources and local livelihoods, alienate people from their land, and "adversely affect human development conditions ("Niger Delta human development report", 2006). In additional to the negative environmental effects, gas flaring is inefficient from an economic point of view. The Nigerian government has estimated that it loses about $2.5 billion in revenues annually due to not selling the gas (Vanguard, "Nigeria loses $150 bn to gas flare in 36 yrs", 15 July 2008), instead of utilizing the gases usefully, they are flaring it away, which does not only waste natural resources, but also pollutes the environment and affect human health. This is the practice within the oil and gas production stakeholders' paradigm in Nigeria.

It is clear proof from the evidence of oil and gas production in Nigeria, that Triple Bottom line principle of ecological economics paradigm of the integration of environmental protection, society and nature are not properly included in the framework of neoclassical economics approach in the region. Therefore, it is time for change; the current form of global capitalism is ecologically and socially unsustainable. More stringent environmental regulations, better business practices, and more efficient technologies are all necessary, but are not enough; we need a deeper systemic change to address the situation of global ecosystem crisis and the socio-economic and environmental pollution from gas flare and power plants in the Niger Delta region. A new generation of environmental issues faces more threatening than any has perceived before, some local pollution problems such as intense heat, burning- rivers or smog are becoming regional and even global i.e. ozone depletion and global warming. Faced with these problems, we can not say anymore is not our responsibility to clean; moreover, we are the first generation that can destroy its very existence (Winsemius Guntram, 1992). In this light, we can realize that economic can no more be studied within isolation and internal competition between players, there will be need to implement holistic approach to thinking, business should be seen as an ecological model woven into the environment and society. The strands forming a very complex system (Hopfenbeck, 1993), especially as structures and processes in business today are strong governed by their natural environment and societies. Therefore, we see the need that, if the stakeholders of oil production in the Niger Delta region will come up with better solution to the pollution problem if they use the frame work base on ecological economics.

Ecological economics is a new Tran disciplinary field of study that addresses the relationship between ecosystem and economic system in the broad sense. These relationships are central to many of humanity's current problems and to building a sustainable future but are not well covered by any existing scientific

discipline (Robert Costanca, 1997). This frame work is not known by most stakeholders in Nigeria oil production, therefore it is relevant to be used to address the problems of pollution in the Niger delta region. Some researchers have argued that today's situation could lead to ecological crisis, other consider environment issues as multiply manageable ecological problems. However, business leaders all over the world recognize increase societal awareness of environmental problems is strong pressure on all sectors of industry. According to Winsemius and Guntram (1992), this pressures spread from four directions: government which are responsible for ecological regulations that should be rigid and inflexible, customers focus on buying green products, competitors and employees, which are characterized by striving to work at cooperation with advanced environmental records and good reputation. As noted, environmental management could try ecological problems cooperation face. Moreover, it can improve organizational function in light of 3E criteria: effectiveness, which is expressed in improvement of environment; efficiency, which is improving the environment at the minimum cost, and equity, showing fair play between all participants. Thus, the impetus for this study is to analyze by an Ecological and Neoclassical economics cluster approach to policy makers and investors and other stakeholders in the sector of the environmental implications of air pollutants from gas flares and power plants to the socio-economic and environment in Niger delta, how it effect the environment and health of settlers in the region. Though the paradigms of Ecological and neoclassical environmental economics have been described in various articles and books and are also embedded in different professional associations, however, we cannot take for granted that the paradigm debates described in the literature are actually mirrored in exactly the same way in the perceptions and opinions of researchers looking at sustainability from an economic perspective. In relation to the situation in the Niger Delta region, oil production activities is currently from a Neo-classical economics approach and has not really benefited the locals and the environment so far, it presuppose that people seek to maximize utility why the proposed new economic assert in addition that people have morality as a source of evaluation. Neo-classical economics treat the market as a separate self-containing system, new economic asserts that the economy is a subsystem of the society and culture. Neo-classical economic assumes that the market is basically competitive, new economics argues that cooperation between interrelated actors are fundamental, we are members of one another (Baldwin 1902), therefore it seems appropriate to consider the framework base on an ecological economics paradigms to re-address the pollution situation in Niger delta region.

1.4. Objectives of the Study

The objectives of this study revolve around alternative sources of stakeholder frame work in the Niger delta region, to find adequate perspective to address the livelihood and perceived environmental consequences gas flares and power plants emissions may have on the health of local residents and the ecosystem as a whole. The study therefore has two objectives to investigate:

- To study how theories from ecological and neo-classical economics paradigms addresses the situation to the problem of pollution from activities of oil production operation in the Niger Delta area and its impact to the environment and livelihood of the local residents.

- To assess the regulatory mechanisms put in place to mitigate any environmental or health hazards local residents as well as the immediate environment may face.

From the objectives stated above the following project questions will guide me to elicit information.

Objective 1:

- What green house gas emission is all about
- Gas flaring and power plants in Nigeria
- Culprits in the game of the Niger Delta oil production and their practices
- What are the environmental and health impacts of green house gas emissions from flaring\power plants in the Niger Delta area?
- What are the main sources of livelihood for local residents around Niger Delta?
- How are the local people involved in discussions on the oil exploration and drilling?

Objective 2:

- Environmental management theories and practices
- What are ecological\neo-classical economics perspective of sustainable development
- Ecological economics and neo-classical economics theories related to the problem in the region

- What regulatory mechanisms are there to be followed to curb ecosystem destruction?
- How would information be managed in such a way that local residents would be well informed on the activities of the oil companies?
- What other source of alternative energy supply could be used?

1.5. The Thesis Structure

The entire thesis comprise of six chapters which are:

- Introduction
- Literature and Theoretical frame work
- Methodology
- Empirical Findings and Analysis
- Conclusion and Limitation

This project is therefore taken in partial fulfilment of the requirement leading to the award of a Master of Science Degree in Business, at Bodo Graduate School of Business, University of Nordland, Norway. First and foremost, the introduction chapter has the goal to present general view of the research assignment and to define the research question. It clarifies my motivation for the chosen research topic. The chapter spells the starting point for choice of the theoretical frame work. Secondly, the literature review throws light on the research area and theoretical frame work throws more light on gas flaring and use of power plants, it defines what gas flaring is all about, and then continues to look at the ecological impact of gas flaring to the socio-economic and environment. It further compares the method of gas flaring and power plants approach from a neo-classical and ecological economics perspective. The methodological chapter takes into consideration the collection of data for analysis. It highlights the research design/strategy, qualitative method and inductive approach. The analysis and discussion chapter emphasis the manner of which the information ascertain from the field work is discussed. The perception of the resource person that was interviewed and questionnaires distributed is dealt with in this chapter. Finally, the conclusion and limitation chapter provides a summary of the main point of research and proposal for further research.

1.6. Gas Flaring and Power plants in Niger Delta, Nigeria

Flaring has been a long-standing issue in the Niger Delta. It is a very explicit sign of natural resource waste (and hence economic mismanagement), also causing environmental problems. The oil companies have mainly been interested in the oil, because of low local market prices for gas (and up until recently also international price levels not sufficiently high to facilitate large-scale transformation into liquid natural gas (LNG). Also the Nigerian judicial context has been a lack of tax regimes or legislation sufficiently strong to discourage flaring. The air pollution stems firstly from the sheer quantities of hydrocarbons being burnt off, but also because the gas being burnt is not only natural gas (mostly methane), but also heavier gas types and pollutants like hydrogen sulphide (H2S), which give off more air pollution. In addition to nitrogen and sulphur oxides (which cause respiratory problems and acid rain) and un-burnt methane, the flaring also gives off cancer-inducing benzene and other toxic gases (SEJ 2004). In addition you have CO2, which is not a big local problem, but should worry the global community, and indeed Nigeria and Africa, which can be hit pretty hard by global warming. The CO2 emissions from flaring in Nigeria were estimated at 34 million tons for the year 2002 (ERA 2005). The Associated Gas Re-Injection Act of 1979 (amended 1984 and 1985, see Annex: Petroleum legislation in Nigeria) is the judicial framework for flaring regulations. Flaring is currently taxed by a Gas Flaring Penalty that fetched US$ 20 million in government revenue in 2004 (NEITI 2006a). It is however clear that this penalty is incredibly cheap compared to penalties in some other countries. The federal government launched its "flares out by 2008" vision in 1996, saying that all routine flaring must stop by the year 2008. Nigeria's largest petroleum operating company Shell Petroleum Development Company (SPDC) soon stated they had adopted the same target. The vision has until now not been put into law, however. SPDC now has stated it will not be able to reach the 2008 target, and has asked for an extension of the government's deadline. However, more general laws also apply, which was proved by the Federal High Court on the 14th of November 2005, when it ruled that all flaring, by all oil companies, must stop on grounds it violates constitutional rights to life and dignity. The ruling came after members of Iwerekan community in Delta State forwarded the case (FOEI 2005). SPDC has also appealed the Federal High Court ruling.

Over the last few years, a number of gas gathering projects have been put in place, and the Nigeria Liquefied Natural Gas (NLNG) plant on Bonny Island has been expanded numerous times. Time and time again, web and newspaper articles have promised a decrease in flaring would be the result. Were these predictions truthful? Well, it depends on how you define "decrease". If you are a bit creative, you can define an increase in utilized quantities of gas (which reduce the relative share of gas being flared) as a

"reduction in flaring". But we doubt the people of the Delta would see it in the same way, as the actual number of cubic meters of gas stays the same. The new thing seems to be that the recent gas developments at least seem to have decoupled the growth in flaring from the growth in oil production. NNPCs figures show stabilization, but no overall decrease in the quantities of gas being flared (NNPC 2006b).

In thermal plants, gaseous emissions are of great concern. Major components of these emissions are air pollutants, which also include carbon monoxide (CO), oxides of nitrogen (NO_X), particulate matter (PM), sulphur dioxide (SO_2), and volatile organic compounds (VOCs). This project identifies the quantity and location of pollutant emissions and also points out the localized and uneven geographic distribution of electric power plants and gas flaring emissions in Nigeria.

CHAPTER 2: LITERATURE REVIEW

This study is going to make use of theories that are related to ecological and neoclassical economics paradigms toward natural resource management and Sustainable Livelihood Approaches. The main focus will be on resource regimes and Alternative approach by oil production stakeholders toward environmental sustainability and socio-economic standard of livelihood.

Neoclassical economics tends to support and legitimize a view of progress in society which is limited to the traditional indicators of GNP growth, balance of payments, employment, indices of inflation, etc. But the debate about environmental, transportation, energy or food policy suggests that this conceptual framework is insufficient and that analysis limited to such indicators can be dangerous to society. A number of catchwords have been used to suggest a new direction for societal development. Early in the 1970s, "qualitative growth" was suggested to focus on the fact that some growth may be negative and cancerous, while growth of other commodities may be mainly beneficial (cf. Leipert, 1983). A second catchword is "eco-development", meaning ecological development which focuses on impacts upon ecosystems and the natural resource base of future generations. Self-reliance is suggested as a strategy leading to improved environmental performance at the local and regional levels (Sachs, 1976, 1984). According to (Herman daly, 1996, p. 220), the economics of sustainable development is a change of vision that involves replacing the economic norms of quantitative expansion (growth) with that of qualitative improvement (development) as a part to future progress. Scholars from the ecological economics also stated that a scientific or technological solution which poison the environment or degrade

the social structure and man himself are of no benefit, no matter how brilliantly conceived or how great their superficial attraction, (E F Schumacher, 1993, p. 173-181), unlike the neoclassical economist who traditionally focus upon "utility" as the end of economics. Ecological economy consistence stresses postulate that ecosystems are influenced by economic input (e.g. agriculture, fishery, de-foresting) and by economic output such as (pollution from production, distribution, consumption and redistribution). The challenge of ecological economics is to find solutions that use the actual means efficiently and wisely in the service of this ultimate end. One of the most serious problems today, with regard to the goal of sustainability, is that growth is the main organizing principle in economics. Daly argues that, since growth is unsustainable, we need a new ethics to guide the actions within the economy in harmony with the limitation of the natural world. The new ethics is suggested by the terms of "sustainability", "sufficiency", "equity", and "efficiency". To capture this cluster of values in one sentence, Daly suggest the following formulation; "we should strive for sufficient per capita wealth- efficiently maintained and allocated, and equitably distributed- for the maximum number of people that can be sustained over time under these conditions" (Daly, 1996, p.220). Sufficient is meant to illustrate what is necessary, not only to look upon humanly created wellbeing, but also the sustainability of the natural ecosystems. One must maximize the total number of human beings that through the years can live with sufficient wealth.

The way one classifies schools of thought in economics is always open to debate. I will refer to two broad categories as stated above, i.e. Ecological economics and neoclassical or mainstream economics. The mainstream may be further divided into Keynesians or others who believe in some degree of government intervention as a necessity in a market economy, and those who downplay the role of government and believe firmly in the potential of the market to solve all kinds of problems, socio-economic and environmental problems included. About 1870, marginal utility theory was developed as a more fruitful value theory than the previous labor theory of value. Equilibrium theory in terms of supply and demand, and the mathematical approach to economics, became the dominant mode of thinking. Isaac Newton's mechanics were an important source of inspiration and economists hoped to become as "scientific" as their colleagues in the natural sciences. Objectivity and value neutrality were the goals and it was believed that economics could be purified of all kinds of political elements. "Political economics" became "pure economics", or just "economics". Amitai Etzioni's Society for the Advancement of Socio-Economics, approaches economics from an interdisciplinary point of view and stresses the need for an analysis of the ethical foundations of economics (Etzioni, 1988). Other groups speak of social economics, humanistic economics and interdisciplinary economics. There are also networks dealing explicitly with environmental issues in relation to economics, such as the New Economics Foundation (Ecological

economics) with the Living Economy Network. Prior to the discovery of the crude oil in Niger delta, the sea and land was governed by the open access regime where local fishermen and farmers had access to the use of the sea and land in good conditions. Now, government has introduced institutions that have curtailed the rights of the local fishermen and farmers to some part of the sea and land, why other parts are highly contaminated from oil and gas production. North (1990, p.3) cited in Vatn (2005, p.10) defines institutions "as the rules of the game in a society or, more formally, are the humanly devised constraints that shape human interaction".

I am going to use ecological economics theories and principles to revised the neoclassical economics assumptions chosen by Marshall to make economics a machine of scientific discovery, has turned economics into a science with a narrow focus through selecting a very limited view on man, focusing on rationale of life and omitting relevant factors due to the choice of methods, but Marshall denied explicit analogies between the law of physics (mechanics) and economics (Marshall, 1920, I.II.1). Theories on circulation economy and triple bottom line will also be used in this thesis to know what actions are the most appropriate to be taken in order to minimize all forms of pollution and conflicts, the resource here is the Niger delta region.

Sustainability and Livelihood has been defined differently by various authors. Sustainable development involves meeting the needs of the present without compromising the ability of future generations to meet their own needs. Economic growth provides the conditions in which protection of the environment can best be achieved, and environmental protection, in balance with other human goals, is necessary to achieve growth that is sustainable. According to (Daly, 1996, s.221);

"The bequest to the future of manmade capital is thought to more than compensate for the depreciation and liquidation of natural capital". Zadek (2001) has termed sustainability accepting the principle substitutable resources, weak sustainability. Weak sustainability gives no guarantee against the overuse of vital resources in the ecosystem. Only to certain limit can manmade capital or technology substitute natural capital. In discussing weak vs. strong sustainability, Ayres point out that "one key insight that has emerged is that there are a number of services of nature that cannot even in principle, be replaced by manmade capital or human labor. This is the essence of what is meant by "strong sustainability" as elaborated by a number of authors.

In respect to socio-economic and livelihood, according to Chambers and Conway (1992, p. 55)

A livelihood comprises of the capabilities, assets (stores, resources, claims and access) and activities required for a means of living: a livelihood is sustainable which can cope with and recover from stress

and shocks, maintain or enhance its capabilities and assets, and provide sustainable livelihood opportunities for the next generation; and which contributes net benefits to other livelihoods at the local and global levels and in the short and long term.

2.1. Introduction

This section highlights various philosophies propounded about the concept of Gas Flaring and power plants green house emissions impact to the socio-economic and environment in the Niger delta region. It uses different theories of ecological and neo-classical economics paradigms to address the issues of pollution in the region. "There is no smoke without Fire", for that matter it is worth having some view on the situation of environmental and socio-economic pollution in the Niger Delta region. This chapter will also discuss greenhouse gas emissions, the origin of gas flaring and power plants, what are gas flaring, their culprit and business practices and the impact of gas flaring to the environment, societies and on climate change. Before further looking into different environmental management and sustainability approaches and theories of ecological and neoclassical economics paradigm and how they can improve the standard of Livelihood and poverty reduction and development in the region

2.2. Theoretical Framework

One important aspect which I have to put into consideration before conducting this project is to distinguish between Economic and uneconomic growth. Uneconomic growths are growth in production process and services which externalize social and environmental cost that are base on fossil fuels, involve toxic substance, deplete our natural resources, and degrade the earth's ecosystem. Why Economic growth, are growth of more efficient production processes and services which fully internalize cost that involve renewable energies, zero emissions, continual recycling of natural resources and restoration of the earth's ecosystem (Capra Henderson 2009).

The history of exploitation of natural resources and other environmental and socio-economic deterioration indicates that something is wrong with the objectives, with approaches to decision making, and with accounting practices which have been developed by mainstream economists and upon which our societies have relied. Reliance on monetary control instruments does not seem enough in view of the many failures that have occurred and the difficulties ahead of us. Just as the aeroplane pilot needs more than one kind of instrument to manage his aircraft, something similar may hold for business leaders, politicians, bureaucrats and indeed anyone who cares about the environment. Attempts to modify GNP by adding

something that is judged valuable and subtracting components which are judged environmentally harmful may improve things somewhat, but it will not take us out of the main dogma of monetary thinking. For this reason, a recent proposal in Sweden to estimate a "green GNP" in monetary terms is not sufficient and may in fact postpone a necessary transformation of thinking habits in relation to economics. So it seems as if the idea that all factors or impacts can meaningfully be reduced to some monetary equivalent has to be replaced by a strategy of disaggregation, whereby monetary and non-monetary impacts are kept separate. According to this disaggregated, and in a sense more holistic idea of economics, non-monetary impacts, e.g. changes in the state or "position" of natural resources, are as "economic" as monetary impacts (Soderbaum, 1987).

In his article "The economics of the coming spaceship earth", Kenneth Boulding (1966) argues strongly that stocks (or non-monetary positions in my vocabulary) are important in economic analysis: "The essential measure of success of the economy is not production and consumption at all, but the nature, extent, quality, and complexity of the total capital stock, including in this the state of the human bodies and minds".

2.3. Green House Gas Emissions

Greenhouse gases are atmospheric gases that cause climate change by trapping heat from the sun in earth's atmosphere - that produce the greenhouse effect. Climate change and the obligation to reduce green house emissions have become one of the most important policy issues in global system. The greenhouse effect is the heating of the surface of a planet or moon due to the presence of an atmosphere containing gases that absorb and emit infrared radiation. Thus greenhouse gases traps heat within the surface – troposphere system. Greenhouse effect was discovered by Joseph Fourier in 1824, first reliably experimented on by John Tyndall in 1858, but it was first investigated qualitatively by Svante Arrhenius in 1896. The scientific basis of climate change has been well recognized since the seminal contribution of Svante Arrhenius in the 1980s.

Climate change had been known for about 100 years but it was not until 1997 in Kyoto, Japan, now commonly known as Kyoto protocol did the world decide it needs to make a joint effort at addressing these problems, especially carbon dioxide emissions as well as other greenhouse gases. As Arrhenius noted, greenhouse gases – which includes carbon dioxide, nitrous oxide, methane, water vapor, and certain industrial chemicals such as chlorofluorocarbon – are transparent to sunlight but selectively absorb the infrared radiation through which the earth returns energy to space. In effect greenhouse gases

traps heat in the atmosphere, so increase in their concentrations should give rise to accompany increase in means global temperature. Arrhenius claims that fossil fuel combustion may eventually result in enhance global warming. He found that the average surface temperature of the earth is about 15 degree centigrade because of the infrared absorption capacity of water vapor and carbon dioxide. He then suggested that a doubling of carbon dioxide concentration would lead to 5 degree centigrade temperature rise. Thus greenhouse gases comes from a broad range of human activities, including energy use, emissions from gas flares and power plants, changes in land use (such as deforestation), and agriculture. They can vibrate in the infrared region because of their symmetry and these vibrations create transient charge separation. With such dipole moment, they can absorb and emit infrared radiation. Therefore, it is important to find solution to the situation in the Niger Delta region, where high level of green house gas emissions are taking place, through gas flares and power plants from oil production, which contribute to the present global climate change problems of today.

2.4. Power Plants

In the Niger Delta region, Nigeria is presently developing some strategies toward a sustainable environment and economic growth through the provision of electricity power supply to be available in the country at a sufficient level in other to improve development. Though previous studies showed that generation, transmission, and distribution of electricity need to be overhauled to achieve improved energy supply for all, but generation should be given adequate attention, due to the preference for thermal plants in the current drive towards improved electricity generation and their concentration in two air sheds (the south-west and south–south) of Nigeria's air basin. Presently, less than 50% of the 6159 MW hitherto from the various electricity generating units commissioned between 1966 and 1990 are available for consumption. To improve on this, some steps taken include putting in place some power generating units under the National integrated power projects (NIPPs) by the Federal Government, encouraging the upstream petroleum operators to build and operate electricity generating plants under the joint venture system and the licensing of independent power producers (IPP) by the Nigerian electricity regulation commission (NERC) under the deregulation programmed. Table 2.4.1 below shows electricity generating unit commissions that are available for consumption between 1966 and 1990; Table 2.4.2 shows some power generating units put in place to improve on the electricity generating unit commission under the national integrated power project (NIPPs), by Nigeria federal Government.

Table 2.4.1

PHCN successor power plants

S/No	Power station	Capacity (MW)	Year commissioned	Location/State	Region
1	Lagos thermal	1320	1985	Egbin/Lagos	Southwest
2	Afam thermal	971	1965	Afam/Rivers	Southsouth
3	Kainji hydro	760	1968	Kainji\Niger	Northcentral
4	Shiroro hydro	600	1990	Shiroro/Niger	Northcentral
5	Jebba hydro	576	1986	Jebba/Niger	Northcentral
6	Delta thermal	912	1966	Ughelli/Delta	Southsouth
7	Sapele thermal	1020	1978	Ogorode/Delta	Southsouth

[a] PHCN- Power Holding Company Nigeria Plc., Nigeria's electricity national grid owner.

Table 2.4.2

National integrated power plants (NIPPs) in Nigeria

S/No	Power plant	Capacity (MW)	Status	Location/State	Region
1.	Papalanto	335	Commissioned	Papalanto/Ogun	Southwest
2.	Omotoso	335	Commissioned	Omotoso/Ondo	Southwest
3.	Geregu	424	Commissioned	Geregu/Kogi	Northcentral
4.	Eyaen	451	Construction	Eyaen/Edo	Southsouth
5.	Sapele	450	Construction	Sapele/Delta	Southsouth
6.	Egbema	338	Construction	Egbema/Imo	Southeast
7.	Gbarain/Ubie	225	Construction	Gbaran/Bayelsa	Southsouth
8.	Omoku	230	Construction	Omoku/Rivers	Southsouth
9.	Alaoji	504	Construction	Alaoji/Abia	Southeast
10.	Calabar	561	Construction	Calabar/Cross Rivers	Southsouth
11.	Ibom Power	188	Commissioned	Akot Abasi/Akwa Ibom	Southsouth
12.	Ikot Abasi	300	Construction	Ikot Abasi/Akwa Ibom	Southsouth
13.	Mambilla Hydro	2600	Construction	Mambilla/Taraba	Northeast

In other to be forward looking and to accept that present economics and political structure acts like a barrier to any improvement which is capable of delivering sustainable development in Nigeria, we have to estimate the potential emissions of air pollutants from operating, licensed, and thermal plants under construction in Nigeria, emission factors of stationary gas turbines for electricity generation in AP-42 of the United States environmental protection agency (EPA, 1995) were used in (Table 2.4.3), below.

Table 2.4.3: Emission factors used in emission computation

Parameter	Emission factor (lb/MMScf)	Reported emission for Nigeria (x 10^3 metric tons)
CO	180	21424

Parameter	Emission factor (lb/MMScf)	Reported emission for Nigeria (x 10^3 metric tons)
NO_X	301	835
PM	6.76	NA
SO_2	3.45	764
VOC	2.09	3424

[a] Source: Extracted from Table 3.4-1 of EPA (1995).
[b] Source: WRI (2003).

Population distribution of air pollutant figures reported in per capita emissions of pollutant were obtained by dividing total emissions of pollutant by the population for a particular host state of the country reported in NPC (2007). Similarly the land distribution of air pollutants was obtained by distributing the total emissions of pollutant by the land area of a particular host state obtained from Mamman et al. (2004).

2.5. What is the Term Gas Flaring?

Geologists realize that some of the richest deposits of oil sit together with deposit of natural gas. Gas flaring is the practice of burning off natural gas when it is brought to the surface in place where there is no infrastructure to make use of it. In the 1960's and 70's, worthless gas was continuously flared at oil wells from Texas to Saudi Arabia. At its peak, the practice pumped about 110 million metrics tones of carbon dioxide to the atmosphere each year- about 0.5 percent of the world's carbon dioxide emissions. Since then, the practice has been reduced largely because companies has realised the commercial potential of the gas. Pressure to reduce flaring increased when negative impact of burning the gas became better understood and effort began to reduce the CO2 emission driving climate change. However, flaring is commonplace in Nigeria, where an estimated 40% of gas produced is burned off- about 2.5 billion standard cubic feet per day. Worldwide, the gas lost to flaring could meet one third of the EU'S natural gas needs each year (Friends of the Earth, 2010).

From definitions, A Gas flare, alternatively known as gas stack, is an elevated vertical conveyance found accompanies the present of oil and gas wells, rigs, refineries, chemical plant, natural gas plants, and land fills. It is used to eliminate waste gas which is otherwise not feasible to use or transport. They also act as safety system for non-waste gas and are released via pressure relief valves when needed to ease the strain

on equipment. This protects gas processing equipment from being over pressured. Also in case of emergency situation, the flare system helps burn out the total reserve gas.

Flaring and venting of natural gas from oil and gas wells is a significant source of greenhouse gas emission. Its contribution to greenhouse gases has declined by three quarter in absolute terms since a peak in the 1970s of approximately of 110 million metric tons/year and now account of 0.5% of all anthropogenic carbon dioxide emission. The word bank estimated that over 150 billion cubic metres of natural gas are flared or vented annually, an amount worth approximately of 30.6 billion dollars, equivalent to 25 percent of united state gas consumption or 30 percent of European Union gas consumption per year (Word Bank, September 2009).

2.6. Origin of Gas Flaring

Gas flaring started under the British rule, with its double standard, Shell and BP started exploring for oil in the Niger Delta region in the 1930's. The first field was found in 1956 and first export was made in 1958. Flaring of gas mixed up with the crude oil began right at the start, and so did recognition of its unacceptability. In the run-up to independence in 1960, the secretary of state to the colonies, Lord Home was asked to address the flaring as; there might be wastage of energy and resources going on, which one day, those giving advice to the Nigerians (i.e, the British) could be reproached. The official response, citing economic and lack of markets, was complacent; "until there is this worth while market and until there are facilities (e.g. pipelines and storage tanks) to use the gas, it is normal practise to burn off this by product from the oil wells" (Debbie Legall (New Petroleum Industry Bill for Nigeria, 2004).

In reference to a publication of media Briefing-friends of the earth (October 2004), oil production began in Niger Delta Nigeria about 45 years ago and so did the practice of flaring associated gas. The waste involves in the practice and expected controversy of its effect, was recognise earlier on. Following the oil fuelled 1967- 1970 civil war, the industry developed via joint venture with government's Nigeria national petroleum cooperation in which companies such as Shell, ExxonMobil, Chevron Texaco and Total, Elf are operators but hold lesser interest percentage -(Friends of the Earth 2004). The development of the oil industries continued during the 16 years Nigeria spent under military rule, and Nigeria has become a major source of oil for developed world, currently supplying 10% of Shell global output. According to CIA world fact book, the oil sector provides 20% of Nigeria's GDP, 95% of foreign exchange earning and about 65% of budgetary revenue. But Nigeria is still rank as one of the poorest 30 countries in the world, with 60% of the population estimated to be living below poverty line.

There is confusion over how much oil and associated gas is produced in Nigeria. The most recent and independent information source suggest over 3.5billion standard cubic feet (SCF) of associated gas was produced in 2000, of which more than 70% was burnt off, i.e. flared. As oil production has increased, Nigeria has become the world highest gas flarer, both proportional and absolutely, with about 2.5 billion SCF per day being flared. This is equal to about 25% of the UK gas consumption. The single biggest gas flarer is Shell petroleum development company Nigeria LTD (SPDC). A recent report from word bank, 2009, estimates flaring to represent an annual economic loss to Nigeria of about US $2.5billion.

2.7. Culprits in Niger Delta Oil, Flares and Power Plants

The Niger Delta has about 606 oil fields (355 onshore, 251 offshore). 193 of these are currently operational, while 23 have been abandoned due to bad prospects or total drying up (NNPC 2006c). From 1999 to 2004, an average of 180 wells was drilled annually, the rate differing from year to year in relation to the prospects of filling Nigeria's OPEC-quota (NNPC 2006b). All in all, about 5,284 wells have been drilled throughout the Niger Delta Region (NDDC 2004). Petroleum activities are indeed very visible; the landscape is criss-crossed by pipelines, some lie on the surface, other's are dug down, visible by the clear-cut paths through the vegetation ("Right of Way"), owned by the pipeline company and marked with signs. Along the roads you can see different supply bases and in the rivers and along the coast, barges and other vessels are moored. At night, gas flares light up the sky in many places, being visible from far distances. Over 1,500 of the aforementioned 3,000 communities host some kind of oil and / or gas facility (NDDC 2004). What once only was farming and fishing communities now have become communities on top of oil fields. All oil prospecting companies in Nigeria are guilty of these pollution acts and gas flaring. However, the biggest culprits are SHELL DEVELOPMENT COMPANY NIGERIA (SPDC), ExxonMobil and Chevron, (Word Bank-Dec 2009). These three companies are the operators of most of Nigeria oil production, while TOTAL AND AGIP fill in some extra of the persistent gas flares. Shell had previously said it will end gas flare in all its production facilities by 2007 but did not have any concrete plan of action to this effect except the expansion of its liquefied natural gas project- the principal avenue to be used to monetize the associated gas currently being flared. ExxonMobil had also said it will end flare in 2004 and earmarked the east area gas project (EAGP) as the principal project to achieve this, also like Shell, nothing concrete has come out of this. Chevron said it would achieve zero flare in it facilities by 2006, hinging its attainment on the Excravos gas project phase 2 and 3, like its partners in crime, it has also come up with its lame excuse of insecurity for failing to meet this target, (Word Bank GGFR partners unlocked value of wasted gas- 14th, Dec 2009).

Many consider Statoil to be in front among the oil companies when it comes to financial transparency, the company does not seem to have any problems fulfilling the requirements of the Nigerian Extractive Industries Initiative. The fact that Statoil follows what seems to be the general Nigerian modus and does not make the Environmental Impact Assessments for their Nigerian operations publicly available to environmental organizations or any other stakeholders apart from the Nigerian Department of Petroleum Resources, weakens Statoil's image of transparency. However, it seems clear that Statoil runs on double standards from its country of origin, where it would be unacceptable not to disclose such environmental information of public interest. Because of past and present experiences with petroleum activity in the Niger Delta, with widespread environmental destruction and little or no economic development, the population is deeply suspicious towards the oil companies. Because of this, Statoil has to prove itself when it comes to corporate social responsibility in Nigeria. Some Nigerian stakeholders look upon the company as a somewhat friendlier player because of their somewhat innovative (in the context of Nigerian oil sector) human rights work. But to expand this sentiment, and reduce the public's suspicion would require improved information flows and a continuous dialogue vis-a-vis civil society. Lastly, it is worth noting the paradox of Statoil fronting the most and receiving most recognition for their community development project in Akassa. It is not really part of Statoil's own CSR definition or mainstream definitions of the concept for that matter. While Statoil's sponsorship work is commendable, core CSR is about using the assets of the company; its business skills and technological competence to develop the host nation and host communities, not to double as charitable aid workers.

2.7.1. Controversial Business Practice

With regard to gas flaring, Shell admits that it made little progress in reducing gas flaring in 2009, primarily, the company claims, due to the problematic security situation. In January 2010, the House of Representatives of Nigeria met to discuss a new legislative framework regarding gas flaring; the House of Representatives agreed "that 31st December, 2012 shall be the terminal date of gas flaring in Nigeria". According to the House of Representative Nigeria, 13 January 2010, Companies not meeting the deadline would have to pay stiff penalties. However, the Federal Republic of Nigeria has often set and then shifted deadlines to stop the gas flares, and this new legislative framework is still under deliberation.

Through its subsidiaries, primarily SPDC, Shell was responsible for the emission of 7.7 million tonnes of greenhouse gases (CO2-equivalent) from gas flaring in 2008, (Shell spokesman Wim van de Wiel, 6 August 2009). According to (Dutch Shell Plc, sustainability report 2008)", figures for 2009 emissions

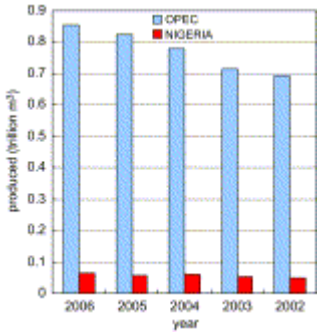
are not yet publicly available. It should also be noted that Shell is not the only oil company flaring natural gas in Nigeria; ExxonMobil and Chevron, and to a lesser extent Total and Agip, also flares. In 2007, Shell Nigeria promised "to shut down production from any fields where there is no prospect of a solution for gathering the associated gas by 2009", "Shell Nigeria Annual Report 2006", 2007, a promise that has not been fulfilled. Nevertheless, the company claims that since 2002 SPDC has spent over $3 billion to install gas-gathering equipment, reducing continuous flaring by more than 30%. However, the company had already achieved this result in 2005, and there has been little progress from 2006 onwards. According to Royal Dutch Shell Plc, Sustainability Report 2008, Shell's 2009 Annual Report claims that, "The security and funding situation has hindered progress," and that at least another $3 billion is needed for another program to put out more flares. However, even if the funds for the planned program can be raised, the company only expects to be able to capture 85% of the total associated gas produced by its operations, meaning that some flaring will continue, (briefing note "Harnessing Nigeria's gas", May 2009).

2.8. Environmental and health impacts of Gas Flaring/Power Plants Emissions

While environmental and health implications of these pollutants cannot be overemphasized, their impacts on agriculture have been established. Soil moisture can be reduced by the presence of some of these gaseous emissions in the soil (Savabi and Stockle, 2001), thus affecting crop yield with impacts on nutrients availability for some crops (Lieffering et al., 2004). There can also be a threat of toxic effect on both vegetation and soil (Bedell et al., 2003). Ruth-Balaganskaya and Kudrijalt (2002) confirmed the possibility of sulphur products becoming a route for sulphur migration in the soil–plant system. Damage that can result from consumption of these gaseous emissions by vegetation can affect aesthetic value of plants and reduces their economic value as food (Westenbarger and Frisvold, 1994) and fiber. While serving as CO2 sink in the atmosphere (Johnson and Fegley, 2002), resulting water can become harmful to vegetation (Cape, 2003) and aquatic life (Havens et al., 1993). Particulates are ubiquitous in the troposphere and of special interest since they contribute to both light scattering and absorption of radiation with consequential visibility and climate effects ([Madhavi and Badarinath, 2004] and [Penner and Novakov, 1996]. Similarly, particulates in the atmosphere can lead to a weaker hydrological cycle that connects directly to availability and quality of fresh water (Ramanathan et al., 2001). Chameides et al. (1999) suggested that the resulting haze from atmospheric particulates could depress optimal yields of 70% of the crops grown in China by at least 5–30%.

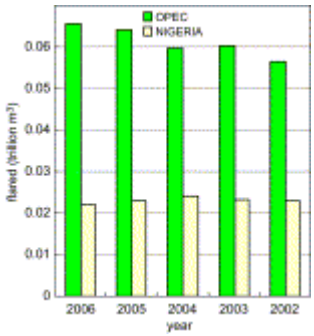
Other impacts may include health and based on WHO (2002) global estimates, about 2.5 million deaths each year result from indoor exposures to particulate matter in rural and urban areas in developing countries, representing 4–5% of the 50–60 million global deaths that occur annually. These effects may not be confined to the local area of production but extend at regional as well as global scales due to possibility of long transportation (Mitra and Sharma, 2002). Carbon monoxide is readily absorbed from the lungs into the bloodstream, resulting in competitive binding between it and oxygen to hemoglobin in the red blood cell, forming carboxyhaemoglobin and oxyhaemoglobin (O2Hb), respectively. The carboxyhaemoglobin causes decreased oxygen carrying capacity of blood, thus inducing toxic effects which are dangerous to health in man (WHO, 1999). Several health effects associated with NOX have necessitated a need for a threshold level in the atmosphere (WHO, 2000).

Previous studies show that the inability of stakeholders to resolutely address the adoption of routine flares in the upstream petroleum sectors on Nigerian shore at the commencement of operations about six decades ago accounted for why routine flaring is still in use today against the practice in many other members of Organization of Petroleum Exporting Countries (OPEC). While Nigeria produces about 7% of OPEC natural gas production (Fig. 2.8.1), it contributes about 40% of its flared gas (Fig.2.8. 2). If the need for the control of emissions of air pollutants from these thermal power plants is adequately addressed before operation, there may not be much difficulty in tackling whatever challenges that may be posed later during operation.



Full-size image (31K)

Fig. 2.8.1 OPEC natural gas production



Full-size image (32K)

Fig. 2.8.2 OPEC flared gas

According to the World Bank, by 2002 flaring in Nigeria has contributed more greenhouse gases to the earth atmosphere than all other source in sub-Sahara Africa combined and yet this gas is not being used as fuel, (Word Bank GGFR partners unlocked value of wasted gas- 14th, Dec 2009). Nobody benefits from the energy it contains. As such it is very serious but unnecessary contribution to climate change, the impact that already being felt in the region with food insecurity, increasing risk of disease and rising costs of extreme weather damage. According to climate change Law Organization, (Friends of the Earth International-Nov, 2009), local communities leaving around the gas flares – and many are close to villages and agricultural lands, rely on wood and candle for light, with such useful energy being wasted.

The flares also contain widely-recognise toxins, such as benzene, which pollute the air. Local people complain of respiratory problem such as asthma and bronchitis. According to the US government (EPA), the flares contribute to acid rain and villagers complain of the rain corroding their building roof. The particles from the flare fill the air, covering everything with a fine layer of soot, (Friends of the Earth International-Nov 2009). Local people also complain of the roaring noise and the intense heat from the flare, they leave and work alongside the flare with no protection. General flaring was made illegal under regulation in 1984, and only allowed in specific circumstances. None of these certificates has been made public, flaring needs to stop; this need is widely recognise a various commitment has to be made to fade out this practise. However, several reasons have been brought forward why flaring continues, including economic growth, commercial and technological. The Royal Shell group over statement of its reserves is also a part of the picture. Nigeria reserve made up the largest single contribution to group recent reserve "re-categorisation" and Shell concealment strategy to avoid disclosing the over estimate to the Nigeria government was base on increasing production and so increasing gas flaring.

2.8.1. Gas Flaring and Power Plants contribution to Global Climate change

Like many serious environmental issues, global climate change came to the attention of policy makers after decades of related scientific research. Climate change attracted virtually no public or political attention in the 1960s, and only a little during the energy policy debates of the 1970s. by the early 1980s, as it became increasingly clear that warming from green house gases was a serious concern, scientists and scientific organizations began trying to persuade governments to pay attention to climate problem. They had little success until 1988, when several events brought climate change suddenly onto the political agenda (Dessler and Parson, 2010). Base on the climate –energy dilemma by Hal Wilhite, we understand that 80% of CO2 emissions are from the energy sector (75% from burning of fossil fuels ;) in fact every form of energy production has an environmental consequence. There remain vast numbers of people in the world without basic services which are dependent on energy. Further, that the global distribution of energy uses and environmental interference is highly imbalanced between rich and developing countries. 15% of the global population account for 45% of CO2 emissions, while 30% of the population account for only 7% emissions. Thus, new forms for energy production or end of pipe environmental solutions will not diffuse fast enough to satisfy growing consumption

Gas flaring contributes to climate change, which has serious implication to Nigerians and the rest of the world. The burning of fossil fuel mainly coal, oil and gas, greenhouse gases- has led to warming up the world and is projected to get much, much worst during the course of the 21st century. According to the intergovernmental panel on climate change (PCC), this scientific body was set up in 1988 by the UN and the world meteorological organization to consider climate change. In its 2001 third assembly report, the IPCC said that the global average surface temperature increased by about 0.6 degree centigrade over the 20th century, that it was 66-90% confident that most of the observed warming over the second half of the century was due to increase of greenhouse gas concentrations, and projected that the temperature would increase from 1990- 2100 by 1.4-5.8 degree centigrade. It also stated that global means sea levels is projected to rise by 0.09 to 0.88 metres between 1990 and 2100, due primarily to thermal expansion and loss of mass from glaciers and ice caps.

In July 2003, Sir John Houghton, formally co-chair of IPCC scientific assembly working group and chief executive of the United Kingdom's Meteorological office said that; the impact of global warming are such that there are no hesitation in describing it as a weapon of mass destruction. In January 2004, the UK government chief scientist said that; climate change is the most severe problem we are facing today, more serious than the threat of terrorism. Climate change is particularly serious for developing countries, and

Africa as a continent is regard as highly vulnerable with limited ability to adapt. The IPCC identified 6 areas of concern for the continent as a whole all of which are relevant in some part of Nigeria. The six areas that are particularly important are;

* Water resources especially in international shared basin where there is a potential for conflict and a need for regional coordination in water management.

* Food security at risk from declines in agricultural production and uncertain climate.

* Natural resources productivity at risk and biodiversity that might be irreversible lost

* Vector and water-borne disease, especially in area of inadequate health infrastructure.

* Coaster zones vulnerable to sea level rise, particularly to roads, bridges, building and other infrastructures that are expose to flooding and other extreme event.

* Exacerbation of desertification by changes in rainfall and intensified land use.

According to Nigeria government (Min of Env), it is widely assumed that over the pass decade in West Africa, temperature has generally increased by 0.2 – 0.3 degree centigrade. Gas Flaring and power plants emissions are major contributors to Climate change in Nigeria, by burning of gas through flaring and power plants by oil producing companies, which leads to the emission of carbon dioxide, the main greenhouse gas. Venting of the gas without burning a practice for which flaring seems often to be treated as a synonym, release methane, the second main greenhouse gas. Together and crudely, these gases make up about 80% of global warming to date. The IPCC estimated in the third assessment report that about 60% of the radiative forcing (essentially, the measures of contribution to global temperature increase) due to increase of the well-mixed. Greenhouse gases from 1750- 2000 are from carbon dioxide and about 20% from methane. Ethane however have a much higher global warming potential than carbon dioxide even though it is shorter lived; after 20years, 1kg of methane is 62 times more powerful than 1kg of carbon dioxide, over 100years it is 23 times more powerful and over 500years it is 7 times more powerful, which are all included in the compositions from gas flares and power plants in Nigeria.

2.8.2. Impact of Gas Flares and Power Plant to Host Communities

According to friends of the earth- April 2005, the Toxic cocktail may have serious health impact in the form of respiratory illnesses, asthma, blood disorders, cancer, painful breathing, and chronic bronchitis etc. Flare gas has also been identified as a cause of acid rain that pollutes creeks and streams, damage

vegetation and corrodes roofs of homes. The acid rain result when sulphur and Nitrogen oxide miss with moisture in the atmosphere.

In the production process by oil companies facilities, water and crude mix is normally piped away through the trunk line to the export terminal "FORCADOS", but "occasionally the water is separated from the oil at the flow Station and disposed of locally into the rivers" (NEITI 2006b). The produced water contains varying levels of hydrocarbons (i.e. oil pollution), depending on the quality of the separation equipment. Other pollutants in this water are heavy metals and in some cases also radioactivity. In a narrow, onshore water system, the concentrations can become high, contaminating the ground water, where so many of the local population get their drinking water. Many villages also draw their drinking water directly from the streams. Other sources of groundwater pollution can be the chemicals being pumped down into the hole during drilling (a.k.a. drilling fluid). These come up again, and if not properly cleaned and recycled, they will spill out on the ground around the well and seep into the ground. The approximately 5,284 aforementioned wells drilled in the region, have very likely had a negative effect on the ground water from which the local population sources its drinking water. Local communities have many times protested against the environmental destruction, and because they gain so little from the value production taking place on their former agricultural land and fishing rivers, they are directly affected by their impacts. From the local community and NGO representatives' perspective, we understood that communities representatives are not properly involved by stakeholders in their decision making process and the compensation system contributed to the unrest. Farmers are compensated for the value of the crop on the land at the time of expropriation to petroleum activities, likewise fisher men. If there is no crop, they receive no compensation at all. Also when fields are destroyed by gas emissions particles and oil spills on rivers, the financial compensations tend to be very small. Protests are very often met with military force. Oil companies, like SPDC, Chevron and others have called in government military forces to protect the installations and workers, but these forces have been heavily criticized for excessive use of force, with a large number of people killed on several occasions. Human rights groups have also asked the oil companies to ask security forces to dampen the violence (HRW 2003b). Add to this, long standing ethnic conflicts between the larger ethnic groups and inter-communal and intra-communal conflicts, sometimes over use of "CSR"-funds handed over by oil companies in more or less successful ways, and you have an explosive mix. More details will be discuss of the impact of gas flaring and power plant to environment and socio-economic to host communities later in the discussion part of the paper.

2.8.3. Employment

The aggregate number of people employed in the petroleum sector of Nigeria seems hard to find. Of course you have the initial problem of delimitation, for instance upstream (prospecting and production) vs. downstream (refining, petrochemical, products marketing). What is common knowledge is that upstream petroleum does not create many jobs, at least not on-site. It seems many of the petroleum companies active in Nigeria are not so eager on telling, even not in their sustainability reporting – where one would expect job creation per country would be a pretty important parameter. Government or its subsidiaries did not seem to be so informative either; even the trade union representatives do not have clear details. Taking into account these contemporary problems and considering the current relatively low level of Nigerian content in service and goods deliveries, a very rough estimate would place direct employment in petroleum in Nigeria well below 100,000 workers (0.17 % of the available labor force). Even with a high level of Nigerian content, but depending on the success of the government's export strategy for petroleum equipment and services to other African countries. It is not very likely that the employment figures in the petroleum sector would exceed 200,000 not to say 300,000 in the foreseeable future, possibly not ever. This means that even though petroleum probably will be an important source of revenue and technological development in the future, it cannot in itself reduce unemployment in any significant way. This applies both to Nigeria as a whole, and to the Niger delta region. The revenues and technology build-up from petroleum can however, if used wisely, help in building activity and employment in other sectors, like non-petroleum manufacturing and services, where the bulk of jobs has to be created.

2.8.4. Barriers to Gas Flaring Utilization

According to the World Bank group private sector development, Franz garner, Bent Svennsson and Sascha Djumena (October 2004), most developing countries that produce oil and gas also flare and vent large volumes of associated gas, a blend of hydrocarbon released when crude oil is brought to the surface. This practise of burning gas or releasing it into the atmosphere not only harms the environment, including by adding significantly to greenhouse gas emissions. It also deprived developing countries consumers of an energy source that is cleaner and often cheaper than others available and reduces potential tax revenue and trade balances. The Word Bank estimated the annual volume of natural gas being flared and vented in Africa as (37 bcm), could produce 200 terawatt-hour of electricity, about half the power consumption of the continent and more than twice that of sub-Saharan Africa (excluding South Africa). Developing

countries account for more than 85% of gas flaring and venting, with Nigeria, Iraq and the Islamic republic of Iran each flaring or venting 10-20 bcm of associated gas annually.

In contrast, gas utilization is much higher in such countries like Norway, the United State, United Kingdom, which flare and vent less than 2 cubic meters of every barrel of oil. Flaring and venting of gas is an important safety measures at oil production facilities, safely disposing of gas during emergencies, power and equipment failures or other upset in oil production that might otherwise pose hazard to workers or near by residents. But in most oil producing developing countries the practise goes far beyond normal operation and safety levels. In theory, the economic of associated gas dictate that operators will reduce flaring and venting until the marginal cost of gas utilization in a field exceed the marginal benefits. But many other factors bear on operators decisions about what to do with associated gas. A recent study identified three main barriers to gas utilization, which will not be discussed in details due to limitation of the study.

- Lack of an efficient regulatory frame work
- Poor access to local and international energy market
- Financing constraints for projects that reduces gas flaring (GGFR 2002)

2.9. Environmental Management Theories

Base on these issues of pollution from gas flares and power plants discuss above in the Niger delta region, it is important at this stage of the paper to consider environmental management concept from different perspectives. First, I will summaries what environmental management is all about then I will discuss relevant theories from ecological and neo-classical economics paradigms, there will be strong need to formulate the most important principles and postulates of ecological theory as it consist obviously all environmental achievements that were advantaged through last and these centuries and its key differences from the neoclassical economics approach that is being applied for decades within the region of research. Finally, sustainable development concept and circulation economics as an integrative term that includes all the important aspects of the new perspectives in economics will also be discuss.

Environmental management consist of ‘’environmental’’, otherwise environment and management. According to Sayre (1996) environment – surroundings in which organization operates and the ecosystem at large, they includes; air, water, land, natural resources, flora, fauna, humans, and their interrelations. The environment in this context extends from within an organizational to global level. The word

‘’management’’ refers to executives in the organization, otherwise its leaders or managers, why the government are the rulers of the states and its natural resources. According to Sayre (1996), environmental management is part of the overall management functions of both the states and organization that develop, implement, achieve, review, and maintain the environmental friendly policy. Gray, Bebbington, walters (1993) consider environmental management as base on the recognition that it can not stand alone as a discipline, and that environmental thinking must be integrated with normal business practices. Moreover, a general goal of environmental management is to introduce system that leads to increased production and decreased amount of waste (Jakobsen, 2002). Summarizing, I should note that environmental management is essentially about change of both states and organizational actions influence managerial practice and system in the light of business implementation of environmental component. Furthermore, the environmental impact from all activities of organization, from planning to public relations to manufacturing and distribution, should also be analyzed from both ecological economics and neoclassical economics perspectives on: socio-economic and environmental pollution, waste from each activity, energy consumed for each activity and the impact on the community etc. According to Hutchinson, SWOT analysis (strengths, weakness, opportunities and treats) allows organization determine various strategies and deal with three perspectives:

- Help to reduce environmental impact with aid of illuminating issues that require immediate actions
- Can be possible by pollution minimization or waste effective re-cycling, new opportunities of business exploring like developing new more environmental friendly approach toward their operations, governmental environmental regulations and sanctions, competitors advantages etc.
- According to Hutchinson, before a business can change to a sustainable business, it is essential that a strategic approach is taken towards the environment. The very first phase of this is that all staffs at every level are enlightened of environmental awareness and training. Another important aspect is change organizational and states culture toward sustainable approach toward environment and society.

At this point, I will conclude that environmental management concept is very divas and broad. It involves issues that determine the former such as external environment obligations: governmental pressure, regulations and sanctions, green innovation, public opinion, green needs and preferences, increase of

social awareness of environmental and socio-economic impact. Environmental management certainly determines internal opportunities, policy, targets and strategy of states and organizations. Moreover, actions of organization plays very important role for environmental management implication. The main difference between environmental management and environmental management system was described by Woolston (1993), that environmental management system is the organizational structure, responsibilities, practices, procedures, process and resources for implementing environmental management. It is important to note here that ‘’environmental management system ‘’ is closely associated with environmental auditing. Sayre supplements to this definition apart from implementing words ‘’maintaining’’ environmental management that is essential for normal functioning of organizations which have already implemented environmental management. Thus, EMS is documented implementation of environmental management. EMS standard such as the European Union Eco-management and audit scheme and the international standard ISO14001 have been developed to provide organizations with a frame work to implement an EMS within their organization and these standards are based upon the principles of Total Quality management (Welford, 2004). The European community firstly introduced the environmental auditing scheme in 1993. The World Bank had been discussing the environmental management aspects since 1970s. Similarly, the environmental committee of the organization for economics co-operation and development (OESD) has been discussing the issue since the early 1980s (Warner, Joynt, 2002). Taking this into consideration I can argue here that not only cooperation management but also international organizations of various types and states strive to do something about the environment and socio-economic standards.

2.9.1. Sustainable Development Concept

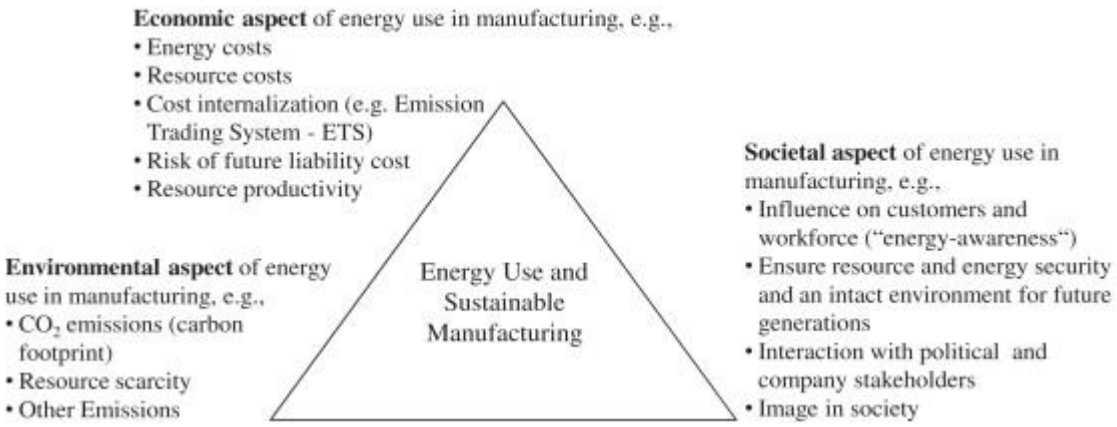
Sustainable development came into spread in 1987, when the world commission on environment and development (United Nations) published a report known as “Brutland Report” (Garriga, Mele, 2004). Base on the report, we can understand that “sustainable development meets present human activities without compromising the ability for the future generation to meet their own needs” (World Commission on Environment and Development, 1987, p.8.). Moreover, sustainable development requires the integration of social, environment and economic considerations to make balance judgments for the long term (World Business Council for Sustainable Development, 2000, p.2). Other definition for sustainability are, Daily and Ehrlich (1992) suggest to consider it as improving the quality of life while living within the long run carrying capacities of supporting biophysical and social systems. Jansson et al, (1994) proposes that the core of sustainability is rooted in ensuring that current human activities do not

shift costs or risk onto, or appropriate the property or resource rights of other human interests, today or tomorrow in the absence of appropriate compensation.

The relevant question appears here: what is about implementation this sustainable development concept in practice? On one hand I should illuminate implementation into environmental management systems; on the other hand there is a strong need to consider the advantages for states and organization if they face corporate ecological sustainability (Shrivastava, 1995; Stead and Stead, 2000). An introduction of ISO14001 should begin with Rio Declaration is known as Agenda 21, which was proposed by Rio Earth Summit in 1992. According to Sayre (1996), it is the best international example of what we must do to preserve and protect our global environment. Obviously, Rio Declaration did something unique, looking through we can note strongly recommended advice; both the states and the industries should begin to develop new technologies and techniques that may help to improve global economy toward sustainability (Welford, 2000). This means change in corporate culture and management has an important role to play. If organizations and states will implement an environmental management system in manner similar to that proposed by ISO 14001 will ensure human rights, human responsibilities, opportunities and obligations.

In the case of corporate ecological sustainability, **"Triple Bottom Line"** principles includes economic, social and environment issues of corporation as sustainable development argues (Jakobsen, 2002). Economic dimension argues profitability and productivity of organizational activities; social one- respect for cultural values and securing life quality, ecological or environmental component faces preserving ecosystems and maintaining the basis for natural life. Thus the triple bottom line principle considers sustainability within corporations and striving to investigate the balance between three dimensions. Note, that sustainable development concept stresses the interdependence between economic growth, social well being and environmental quality. It strongly recommended for both business and states to meet radical change in policy as growth of awareness in environmental area demands. At present, both the states and companies should investigate sustainable development theory and practice of environmental management in the Nigeria. Investigating this goal is important to implement efficient systems for recycling that the element of circulation economic consistence. Figure 2.9.1 illustrates the Triple Bottom Line principles.

Fig. 2.9.1: Contribution of energy efficiency to the three main aspects of sustainable manufacturing.



Source: Journal of Cleaner Production, April-May 2011

2.9.2. Sustainability as Ecological Ethics

Attempts to formulate environmental ethics have been made by Goodland and Ledec (1987) and a Swedish governmental study [Ministry of Agriculture (Jordbruksdepartementet, 198311. In Eastern European countries the term "ecologization" has been used, e.g. ecologization of the economy, ecologizing industry, ecologizing agriculture. Lester Brown is among the early users of the sustainability concept, e.g. sustainable production, a sustainable society (1981). Since the Brundtland report (World Commission, 19871, this term seems to be dominating the scene. One attractive (or dubious) feature of the term is that each scholars or other actor, can choose a meaning of sustainability which fits well into his or her pre-established world view. Growth enthusiasts can speak of sustainable development in the sense of sustainable growth. Neoclassical economists can choose a monetary interpretation of sustainability to make it fit as easily as possible into the dominant paradigm. I have suggested a set of "ecological imperatives for public policy" (Soderbaum, 1980, 19821, arguing that this particular environmental ethic is reasonably operational, i.e. useful in testing the "sustainability" of a particular course of action or a particular ongoing activity. The focus is on the non-monetary position (or state) of the environment at specific future points in time. For instance, will a specific development trend lead to a degradation or improvement in the state of the society and environment? A set of principles for resource management may be formulated in the following terms for decision situations concerning energy projects, transportation projects, forestry projects, etc., in the Niger delta region;

1) Alternatives which involve irreversible degradation of the natural resource base within the region should be avoided.

(2) Alternatives which involve irreversible degradation in the natural resource base in other regions and

globally should be avoided.

(3) In situations where there is uncertainty and knowledge is incomplete with respect to possible irreversible negative impacts on the future natural resource base (for instance a small probability of catastrophic consequences), a philosophy of cautiousness should be chosen.

(4) Wherever possible, alternatives with a positive or neutral impact on the future natural resource base should be chosen. If no such alternative is available, a search should be initiated to find new alternatives in terms of a different technology, new rules of the game, reconsideration of life styles at the individual level, etc.

The imperatives suggested may be further elaborated into behavioral rules of thumb concerning non-renewable resources, renewable resources, toxic materials with different characteristics, etc. The burning of non-renewable such as gases and fossil fuels, for instance, should not take place. Any activity based on such energy resources is clearly unsustainable according to the above definition. Some activities are difficult technically, or very costly in monetary terms to reverse, rather than irreversible. Where the borderline should be drawn between activities that should be avoided and those that can be accepted? This example indicates that some difficulties still remain for the judgment of decision makers or others concerned. The imperatives are deliberately limited to environmental impacts and therefore do not represent a complete ideological standpoint in relation to development. Social, cultural and monetary factors or impacts are often parts of ideological reasoning. Furthermore, the kind of ethics suggested is essentially anthropocentric and emphasizes three categories of social relations. One is between those living now in a specific region, the "we-category" for collective decision making, and future generations that will occupy the same region A. Secondly, there is the relation between the present generation living in region A and present generations in regions other than A. Finally, relations between the present generation in A and future generations in regions other than A are considered. Formulating environmental ethics represents an attempt to extend the ideological options available for politicians of different parties and other citizens. In a situation where the GNP-growth ideology (with its relative, the cost-benefit ideology) is already well articulated and some groups in society are concerned about environmental problems, it seems an urgent necessity to study the possibility of alternative development concepts of different kinds. Specific activities in a region such as Niger Delta, Uppsala or Sweden can be scrutinized in relation to the above formulation of ecological ethics.

In the energy sector, power plants, nuclear power nor fossil fuels qualify as sustainable. Wind power, solar energy and bioenergy have a better chance. Means of oil and gas production based on gas flares and power plants such are unsustainable in their present forms. Conventional agriculture influences the

future natural resource base negatively in more ways than one. Non-renewable resources are being used and pollution of air, water systems or changes in the soil structure may be difficult to reverse. So-called organic or alternative agriculture is an improvement, but even in this case something remains to be done, e.g. Gas flares should be re-use or power plants should be powered by bioenergy rather than fossil fuels, to qualify as sustainable. It may also be possible to say something generally about all activities, industrial, agricultural, tourism-related, etc., of the people in a specific region. As examples we may select countries that perform well according to traditional GNP indicators, for instance Japan. Is this country currently degrading the natural resource base of its own territory and/or contributing to degradation outside its own territory (cf. imports of timber from tropical forests). Countries such as Sweden or the USA, although currently less successful in terms of GNP growth, should be scrutinized in a similar manner. Is the life-style of the average Swedish, US or EC citizen a sustainable one? In Sweden, Social Democrats, Conservatives and Liberals all appear to support a strategy of economic growth (in private business and internationally) and unrestrained internationalization. Growth means more financial resources to dispose of for all kinds of needs, including environmental protection and education. At least two other parties in Sweden, the Center party and the green Party are skeptical about the simplified growth strategy. Members of these two parties have an Ecological Europe as their vision, rather than the Growth Europe of the original Treaty of Rome, and they believe that a strategy of self-reliance will do better than one of unrestrained internationalization. Further internationalization may be important in some sectors, such as those related to information, communications, cultural exchange and knowledge, but for physical commodities and strategic commodities such as food, some selective internationalization is considered preferable. Close contact between consumers and producers is believed to be important, and instead of the "Big is Beautiful" idea of the growth strategy it is suggested, with Schumacher, that there is beauty in smallness. In my judgment, the second strategy is more compatible with the environmental ethics suggested, in region like the Niger delta.

Each region or country should bear a direct responsibility for the kind of environmental deterioration caused by the life-style of, and commodities used by, its inhabitants. Wherever reasonable, possible environmental impacts should be internalized to the region (cf. the second ecological imperative). Unhampered growth of business companies, accompanied by reduced power to control development through parliaments and nation states, may lead us to a new kind of command economy in the form of multinational enterprises or cartels comprising multinationals, like what is being practice presently in the Niger delta, Nigeria. In addition, homogenization of the commodity supply internationally can be seen as

a threat to cultural diversity. The world will be a much less interesting place; therefore, there is need for change of business and states thinking toward oil and gas production process.

2.9.3. Cluster in Sustainability Economics

In respect to sustainability as ecological ethics discuss above, the two clusters that we identified can be described by sets of characteristic statements related to sustainability and economics. We derived these distinct 'opinion sets' using the framework of the representatives of the cluster either agreed or disagreed with the most, i.e. statements with a cluster score of more than + 1 or less than − 1. Since we found not only differing opinions but also a number of statements that both clusters share, we will present the common ground first.

2.9.4. Common ground of the Identified clusters

As common ground we consider those statements with rankings being not indifferent (that is, ranked equal to/higher than + 1 or equal to/lower than − 1) and showing in the same, direction' for both clusters (e.g., − 1.4 for cluster 1 and − 1 for cluster 2). We find that clusters 1 and 2 agree largely in their understanding of sustainability as a multidimensional concept (ecological, social, economic, and agree about a sustainability concept based on maintaining 'development potentials' for future generations. They also do not see economic growth as being the ultimate answer to distributional conflicts within and between generations. Broad consensus amongst sustainability researchers exists also in seeing sustainability as an important field of research in economics that needs to be approached with interdisciplinary methods. Furthermore, both clusters have a positive attitude towards applied economic research with a clear political outreach. Finally, both clusters are skeptical about the possibility to figure out what resources are indispensable for humankind for an indefinite time span.

All common ground statements are summarized in Box 1.

Box 1. Common ground of the clusters

Concept of sustainability: Sustainability means preserving development opportunities for future generations. Extending the sustainability concept to also include social and economic dimensions does not dilute the normative power of the sustainability concept.

Substitution and valuation of nature: It is not possible to determine for an unlimited time-horizon which resources will be indispensable for humans.

Sustainability policy: The basic conflict between efficiency and equitable distribution can ultimately be solved not only through economic growth.

Scientific concept: Sustainability is an important future field of economic research; sustainability research must overcome the disciplinary boundaries. The political outreach of economic analysis is not an obstacle to generate sound economic theory.

2.9.5. Cluster 1: "Ecological Economics"

As earlier stated in problem statement part of this paper, Ecological economics is a new transdisciplinary field of study that addresses the relationship between ecosystem and economic system in the broad sense. These relationships are central to many of humanity's current problems and to building a sustainable future (Robert Costanca 1997). It has a positive approach in it development of understanding of the physical, biological, and social structural and functional relations between economics and natural ecosystems. It is normative in addressing appropriate roles of human economics within natural economics and it is also prescriptive, in proposing institutions and behaviors compatible with sustainability norms (Faber and Bradley, 2008, p. 3).

Ecological economics appeared as absolute new way of thinking and doing business, anti-growth one, unlike the neo-classical economics, focus on growth. It could become in reality, because economic growth without considering the ecosystem is the depletion of the planet's natural resources, i.e. un-ethical procedure in oil production in the Niger delta region. Therefore, it is necessary to include eco-system into economic theory and practice. In light of economics and ecological interrelation, the law of nature gives an indication of the limits of ecosystems. These limit consist the frame of economic activity, both in relation to input and output factors, (Ingebrigtsen, Jakobsen, 2007). Continue below, are theories, principles and the characteristic of ecological economics perspectives on alternative ways of thinking towards the socio-economic and environmental pollution in the Niger delta region.

Ethics of Ecological man: According to this theory, we have reason to claim that virtue ethics is the obvious ethical fundament in ecological economics. The central concepts are virtue, practical wisdom and eudemonia. To posses a virtue is to be a person with given complex mindset. "The most significant aspect of this mindset is the wholehearted acceptance of a certain range of considerations as reasons for actions" (Stanford Encyclopedia of philosophy, 2007).

Characteristic of Ecological economics: The earth is like a living, evolving organism (Boulding, 1966), cooperation through decentralized collaborative networks perform better than what is possible through the enormous global power structures (Boulding, 1966). The true economic output is the enjoyment of life (an immaterial flux) (Georgescu-Roegen, 1977). We can not produce "better and bigger" cars, or planes without producing "better and bigger" waste control (Georgescu-Roegen, 1977). Production from local resources for local needs is the most rational way of life (Schumacher).

Ecological economics is base on the principle of relativity: Everything is related to everything else. The principle of relativity is saying that all entities are constituted by their relations to other entities. One important consequence of accepting the fundamental interrelatedness is reality is that the society (or the market) is not reducible to autonomous social atoms (it is a pattern of social relations). The relations between the social entities are of special important for understanding the change process. Thus, everything that has happen in the past has some impact on the present and everything that happens in the present has some impact on the events in the future (Robert Costanca, 1997), i.e. constant oil production in the Niger delta for growth, might affect available resources for future generation.

Organic Worldview: The living world is being fundamentally interconnected, highly complex, creative, and imbued with cognitive intelligence, (Leonardo da Vincy 1452-1519). It is based on a worldview of more stringent environment regulation, better business practices and more efficient technologies are also necessary, but not enough. We need a deeper systematic change, from networks of machines to organic networks, beyond purely economics aspect, extending to the culture and natural domains.

Organic dialog theory: Economic is part of the universe, there is need to change from competition to cooperation, change from mono-value to plural values, partnership in value in the market through communicative and corporate market.

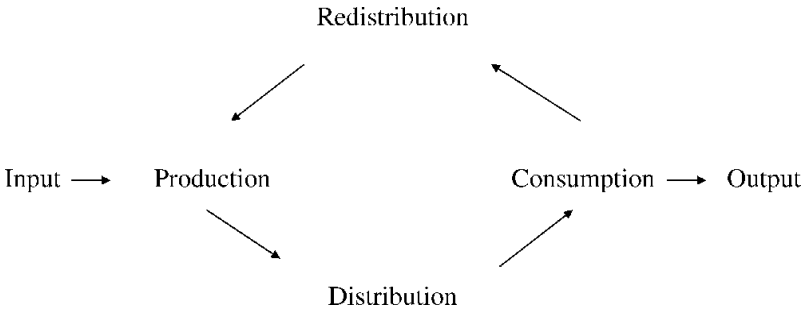
Stakeholder's theory: Firms is responsible not only on the interest of stakeholders, but also responsible for all their actions connected to people and nature. Good life, quality of life and well being, (Herman .E. Daly, 1968, p.147), argues that probably is more important to focus on well being than on growth of GDP, (Herman .E. Daly and Joshua Farley, 1968).

Gaia Theory: Is presented by (James Lovelock, 1979), a new look at life on Earth; he regards Gaia to be a functional unit consisting of the earth's crust, the oceans, the atmosphere and the biological constituents. Goals of Gaia are to regulate its climate for life and its living organism is the regulators.

Strong Sustainability: this principle of Eco-eco states that, they are numbers of services of nature that cannot, even in principles be replaced by man made capitals or human labor. Optimal use of natural resources is mostly anthropocentric, within eco-centrism all living creatures have some kind of intrinsic value to respect, and these creatures are more than economic resources with purely instrumental value. The relationship between human and nature is described beyond economic self interest and biological survival (Ayres, 2008, p. 291).

Circulation Economic Concept; We have to admit that global natural and cultural system are in danger, and force us to realize a need to develop a new economics- circulation economics. Hopfenbeck (1993) argues that recycling aims to make waste into useful outputs, which can be utilized as input to another system like utilizing of flared gas to other useful purposes. There are some important issues that companies should emphasize in the light of recycling implementation. According to Hopfenbeck (1993) these points are: it is more efficient to prevent a problem that to solve it afterwards and for consumers to change status from being an actor outside economics to being an important part of circulation economics. See diagram below;

Figure 2.9.2 Circulation Economy



Source: (Ingebrigtsen & Jakobsen 2007)

Circulation economics is an integrated creative thinking of material management system within re-use and material recycling which should be priority over disposal. The re-cycling values appear within this scheme as part of integrated waste management. Hopfenbeck (1993), further point out that integrated environmental protection means planning disposal within process of production and replacing "collecting and disposal" with "preparation and avoidance". This leads to conclude that both environmental oriented policy and strategic planning related with circular scheme influence the efficient use of natural resources i.e. reuse of gases being flared in the Niger delta to generate electricity energy.

Law of Thermodynamic: First law of thermodynamic states that, energy can only be transformed in one direction (against increasing separation), in close system. Which means any time energy is transformed; there is a loss of a part of the energy so diluted, that it can be used any more. Energy than can not be used is known as "Entropy", environmental destruction is an example of increasing entropy. Why second law of thermodynamic is the most economic related of all physical laws. Thermodynamic is better suited to economical reality then the laws of mechanics. (Leibuiz) states that, nothing takes place all at once, and it is one of my most important and best verified maxims that nature makes no leap; this is called law of "continuity".

Growth and Decline; Economic growth refers to an increase in the physical scale of the matter/energy throughput that sustains the economic activities of production and consumption of commodities (neoclassical economics). Growth is central characteristic of all life, a society or economy that does not grow will die sooner or later. But growth is not linear and unlimited, while some part of organism, or ecosystem grow, others decline, releasing and recycling their components which become recourse to new growth.

Green Growth: Assured that growing economies remain firmly attached to their ecological roots and assure that these roots are protected and nurtured so that they may support growth over the long term (Our common future 1987, p. 40).

Decoupling: Is breaking the link between environmental bads and economic goods (OECD 2002). It is cutting the link between economic growth and environmental degradation (Naess and Hoyer 2009, p. 64-84). Decoupling economic growth from the resource use and the negative environmental impact of products and services has been targeted as objective of European commission (European Commission 2009). Resource efficiency, material efficiency, and eco-efficiency have been highlighted by European commission as means to achieve decoupling. This concept can break the problem of the environmental kuznets curve from the neo-classical economics framework, it means that European commission does not fully belief in the Kuznets curve theory. Decoupling connects green growth, de-growth and qualitative growth through technology development.

Technological Development:

- Recycling
- Search for substitute- instead of using resources to pollute

- There is more than enough for everyone- compared to the Kuznets curve that market will solve the problems.
- Improving in production technologies
- Continuous increase in efficiency
- Go without or do with less

De-Growth: Downscaling of production and consumption. Reducing consumption does not require individual martyring and a decrease in well being (good thing to use less resource); rather maximize happiness and well being through non-consumptive means through social activities like music festivals etc. De-growth stands in sharp contracts to mainstream economy that consider the accumulation of capital and commodities a desirable end, (Ove Jakobsen, 2010).

Change in Different levels: At the individual level; voluntary simplicity (bottom-up) why at the global level: International agreements and regulations (top-down)

Qualitative Growth: This is growth which enhances the quality of life. Qualitative growth consists in an increase of complexity, sophistication (De-growth), and maturity. Qualities arise from processes and patterns of relationships among the parts, (connection of parts is more important than objective and products). Quantities, like mass or energy, tells us about the properties of the parts. Qualitative economic growth can be sustainable if it involves a dynamic balance between growth, decline, recycling and if it includes development, (Capra, Henderson 2009).

Ecological Economics Vision: of the Earth as a thermodynamically closed and non-growing system, limited to biophysical throughput. Vision of a sustainable planet and high quality of life for all its citizens that complex systems are irreducible and certain processes are irreversible and that institution and management should be proactive rather than re-active.

Corresponding with the common ground, representatives of cluster 1 strongly support an integrated concept of welfare, including not only economic but also ecological and social aspects. Further, the economy is seen as being dependent for its existence on the ecosystem. Nature appears to be substitutable by human-made capital only to a very limited extent and its services cannot be valued through monetarization. Creating private property rights over the environment is seen as being little suited towards achieving sustainable solutions. A concept of human behavior based on individual self-

interest (‘normative individualism’ in the sense of Hayek, 1948) appears to representatives of cluster 1 as not being suitable for studying issues of sustainability. They also support the idea of changing individual values as part of a strategy towards sustainability. Cluster 1 consequently disagrees with the idea of value-free economics. Rather, ethical dimensions should be part of economic thinking about sustainability.

The original statements that are particularly typical for the ‘ecological economics’ cluster are summarized in Box 2.

Box 2. Distinct statements of cluster 1 ‘ecological economics’

Conceptions of justice and sustainability: An essential conceptual element of sustainability is an integrated understanding of societal welfare (economic, ecological, and social).

Substitution and valuation of nature: Natural capital can be substituted by human-made capital only to a very limited extent. The economy is dependent for its existence on the interrelations in nature. The value of an intact environment cannot, as an approximation, be expressed in monetary terms.

Conception of human behavior: Questions of sustainability cannot be answered on the basis of a concept of self-interested human behavior.

Sustainability policy: Changing societal value systems is an important element for a strategy of sustainability. Economic growth as a goal can be questioned. Creating private property rights over the environment cannot largely solve the problem of overusing the environment.

Conception of science: Sustainability economics must deal with the question of how to make decisions in an intergenerational context. Economic science should not be value-free.

Based on our literature stated above, the ‘opinion set’ described so far (consisting of both common ground and distinct statements for cluster 1) can be assigned to the ecological economics school of thought.

2.9.6. Cluster 2: ‘Open Minded Neo-classical Environmental economics’

Jevons and Walras are often seen as inventors of Neo-classical economics; they established a demarcation line between classical and neoclassical economics in early 1870’s (Ekelund and Hebert, 2002, p. 197). (Marshall, 1920, I.II. 33) used concept of “economic man” but insisted that man should be deal as he is by

economist, not as an "economic man" but as man of flesh and blood. A man who is largely influenced by Egoistic motives in his business life, but who is also neither above vanity nor below delight in doing his work well for his own sake, or in sacrificing himself for the good of his family, his neighbors or his country, a man who is not below the love of a virtuous life for its own sake. The ethics behind these principles is **"Utilitarianism"** a consequentiality ethics (J. Benthm/J.S. Mill). Utilitarianism is a view of morality as agent, independence and criteria such as pleasure and pain are so good and bad things in human lives (Ethical hedonism) and the end can justify the use of means, neo-classical economics is base on a mechanic world view.

Sen formulate the principles of utilitarianism in the following way: "utilitarianism as a moral principle can be seen to be a combination of three more elementary requirements;

- 'Welfarism', requiring that the goodness of a state of affairs be a function only on the utility information regarding that state.
- 'Sum ranking', requiring that utility information regarding any state be assessed by looking only at the sum-total of all the utilities in that state.
- 'Consequentialism', requiring that every choice whether of actions, institutions, motivations, rules, etc., be ultimately determined by the goodness of the consequent state of affairs" (Sen, 1987, p. 39).

With Robins' generally accepted definition of economics as "the science which studies human behavior as a relationship between ends and scarce means which have alternative uses" (Robin, 1935, p. 10) it is even more obvious that utilitarianism and cost benefit analysis are situated right at the centre of neoclassical economics. But this is regarded as a limited view of man. Shown below are some of the perspective and principle of neoclassical economics.

Ethics of Social man: According to Etzioni, "the social man" characterizes neoclassical economics, a view also held by Marshall, as we have previously seen. "to conclude provisionally: economists study the action of individuals, but study them in relation to social rather then individual life; and therefore concern themselves but little with personal peculiarities of temper and character" (Marshall, 1920, I.II.30). The social man attempts to find solution leading to the highest possible utility for most people.

Mechanical Worldview; Mainstream economy is based on mechanical worldview; this theory indicate that to be healthy, the economy must constantly increase the amount of energy and raw materials that

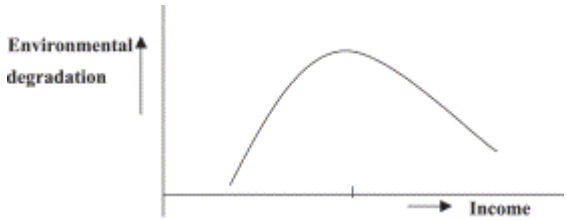
flow through it in order to generate ever greater wealth, and in order to be happy, people must have more and more of this wealth so as to have access to consumer goods. They see the Earth as just a machine to satisfy their own needs, the "greatest good for sufficient number or sufficient good for the greatest number" (Marshal 1920, I.II, 1).

Pareto optimality and cost benefit analysis; Neo-classical economics prefer "Pareto optimality" due to normative assumption of "cost benefit analysis", that a dollar of cost to one person can always be offset by a dollar of benefit to other person which individual enjoys greater benefits or suffer greater lost is not an issue in cost benefit analysis, (Eaton and Eaton, 1995, p.22). Pareto optimality does not identify the best possible social state and it is very difficult to come up with a solution where no one is worse off in one state than in the other and the consequence of this is that "A state can be Pareto optimal with some in extreme misery and others rolling in luxury, so long as the miserable cannot be better off without cutting into the luxury of the rich (Sen, 1987, p.32).

Weak Sustainability; Give no guarantee against the overuse of vital resources in ecosystems, only to certain limit can man made capital or technology substitute natural capital. Though there are controversial contradictions by mainstream economics between weak and strong sustainability, they argues that human ingenuity and manmade capital can indeed replace virtually all services, (Ayres, 2008, p. 291).

The Environmental Kuznets Curve; Conception of science: economic science should be objective. Neo-classical economics support the ideal of the Environmental Kuznets curve; it is an optimistic value that with time technology will solve the environmental degradation, through human solution.

Figure 2.9.3:



The Environmental Kuznets Curve: Golombek 2010

Though, neo-classical economics have this optimistic values that with time technology will solve the environmental problems, but resource efficiency, material efficiency and eco-efficiency that was highlighted by European Commission as a means to achieve decoupling, can break the problem of the

Kuznets curve. As previously stated above, this means that European Commission does not fully belief in the Environmental Kuznets curve theory.

Persons representing cluster 2 reject seeing intra-generational justice as being a prerequisite of intergenerational justice. They disagree with the 'sustainability concept' of non-declining utility over time (as outlined in Solow, 1993). Strong commonalities within this group are related to sustainability policy. Here, both fundamental changes of the economic system and restrictions of material consumption are rejected. Instead, representatives of this cluster support setting the 'right' prices for environmental goods (as a key element of sustainability policy), and they support international specialization as a means towards achieving the goal of sustainable welfare worldwide. Representatives of cluster 2 also support the idea of an objective economic science. Interestingly, we find no strong opinions, but rather indifference concerning the explicitly valuation-related statements in this cluster (related to nature, sustainability policy and the scientific conception of economics that we found for the first cluster.

Cluster 2 largely corresponds with neoclassical economics as described in the literature. Yet, considering both common ground and distinct statements for cluster 2, we find four important exceptions, most of them being conceptual. The cluster rejects a Solow-type sustainability concept based on non-declining utility, accepts a multidimensional sustainability concept ecological, social, economics, and agrees with sustainability concept based on maintaining development potentials. Treating issues of intergenerational distribution in a model of non-declining individual welfare over infinite periods and using a single-dimensional utility- or even money-based concept of sustainability is often seen as being typically neoclassical (Pezzey, 1992, Weimann, 1999), but is not shared by cluster1.

The cluster also rejects growth as the ultimate answer to distributive conflicts. Neoclassical **growth theory** is generally based on the assumption that economic growth increases social welfare and, thus, treats growth as a desirable macroeconomic goal. The underlying assumption is that if the whole economy is growing, in the end, the whole society is better off, and distributive conflicts will emerge to a much lesser extent. Thus, we could conclude that growth is a primary solution for reducing distributional conflicts. Yet, our neoclassical cluster does not share this view.

Statements that are particularly typical for cluster 2 are summarized in Box 3.

Box 3. Distinct statements of cluster 2 'open-minded neoclassical environmental economics'

Conceptions of justice and sustainability: Sustainability cannot be defined as non-declining utility for a representative individual over unlimited time. Intergenerational justice does not presuppose intra-generational justice.

Sustainability policy: Sustainability does not require restrictions on material consumption. Sustainability is achievable not only through fundamental changes of our economic system. The utilization of the environment can be restricted to a level that is sustainable by setting the 'right' prices. International specialization leads to long-lasting growth of wealth worldwide.

2.9.7. Key Divides between Cluster-1 Ecological Economics and Cluster-2 Neo-classical Economics:

Daly points out that Bentham's utilitarianism has a serious problem in that it contains an impossible double maximizing rule: "the greatest good for the greatest number" (Daly, 1996, p. 220). According to Daly, you cannot attain two "greatest", on the other hand you can attain either more people at a lower per capita good, or greater per capita good for fewer people. "Logically it would have to be either the "greatest good for sufficient number" or "sufficient good for the greatest number" (Daly, 1996, p. 220).

Ecological economics is based upon the idea that economy should be embedded in social relations, instead of what we find in capitalist societies "social relations are embedded in the economic system" (Daly and Cobb, 1989, p. 8). Daly and Cobb Jr. criticize the idea that society merely consist of statistical aggregations of individuals, rather arguing that a society is something greater than the sum of its parts. Despite their arguing that allocations are better affected in the market, they stress that the government should decide the market conditions and the overall size of the market. Moreover, they emphasize that concentration of power in few hands must be prevented. One of the most important hallmarks of ecological economics is that it is not restricted to the academic context governing neoclassical economics.

Kohlberg's theory: stage 3 and 4 at the conventional level of moral reasoning exceeds the limit of the ego and includes societal consequences. In other to decide what kind of behavior is morally right, we need to compare the social consequences of actions. **Pareto optimality and Cost benefit analysis** are example of this. The inherent to utilitarianism is **"Bentham's" –** (the greatest happiness principles). Thus, to produce the greatest happiness for the greatest number or to produce pleasure and avoid pains. Becker points out that the philosophical tradition goes a step further and describes human beings as "not only self-related, but systematically related to the community" (Becker, 2006, p. 19).

In order to identify the strongest differences, we selected those statements that received rankings going in opposite 'directions' (+, −) from both clusters, and of which at least one ranking is equal to/ higher than + 1, or equal to/lower than − 1. Furthermore, we set a minimum ranking 'distance' between the clusters of 1.5 (e.g., + 1 for cluster 1 and − 0.6 for cluster 2).

Based on these definitions, strongly opposed opinions between the clusters appear to be those regarding intra-generational justice, which is very strongly rejected as being the precondition for intergenerational justice by the neoclassical cluster, but is supported by the ecological economic cluster. A strong conceptual dissent also exists regarding the utilitarian conception of human behavior (homo economics), which is rejected by the ecological economics cluster and supported by the neoclassical cluster. Finally, clear differences in opinion exist with respect to many aspects of sustainability policy. Here, the neoclassical cluster strongly denies that fundamental changes of our economic system and material consumption restrictions are necessary for achieving sustainable development. On the contrary, the ecological-economic cluster favors exactly these approaches. Furthermore, the neoclassical cluster supports international specialization as a way towards more, sustainable welfare worldwide—an assumption deeply questioned by the ecological economic cluster. There is also a clear difference between the clusters regarding their conceptions of science. While the neoclassical cluster strongly demands an objective science, the position of the ecological-economics cluster is inclined towards a subjectivist methodology of science. The statements with the strongest differences in opinion are summarized in Box 4.

Box 4. Key divides between the clusters of 'ecological economics' and 'open-minded neoclassical environmental economics'

Conceptions of justice and sustainability: Intergenerational justice presupposes intra-generational justice.

Conception of human behavior: Questions of sustainability can be answered on the basis of a concept of self-interested human behavior.

Sustainability policy: Sustainability requires restrictions on material consumption. Sustainability is achievable only through fundamental changes of our economic system. International specialization leads to a long-lasting growth of wealth worldwide.

Scientific conception: Economic science should be objective instead of Subjective.

Shown below is a tabular illustration of the key principles of economics between ecological and neo-classical economics; (Table 2.9.1)

Mechanical	Organic
Economic man	Ecological man
Competition	Cooperation
Objective	Relations
Atomism	Network (Holism)
Structure	Processes
Linearity	Circularity
Top-down	Bottom- up

Source: Principles of economics, 1920, 8th edition.

Neo-classical economics view change is constant, it is a continue process. There is need to change from neoclassical thinking (economic man) to an ecological economics (ecological man) in other to achieved a sustainable economics. We need to change from linear thinking to circulation thinking, we have to be conscious of what can be used and what can not be re-use, there are lots of consumption and use but it is necessary to re-use. Shown above are some of the key differences between ecological and neoclassical economics perspectives that can be discussed in this section. We will further proceed to the methodological section.

CHAPTER 3: METHODOLOGY

3.1. Introduction

This chapter present the Methodological aspects that are related to gathering data which will be analyzed afterwards. According to Saunders et el. (2003, p. 481), methodology is the theory of how research should be undertaken, including the theoretical and philosophical assumptions open which research is based and the implications of these for the method or methods adopted' (Saunders et el, 2003, p. 481). Methodology chapter aims to link both theoretical framework and empirical finding in appropriate way. In this chapter, the choice of research design, method of data collections is presented. Also, qualitative methodology and sampling procedure will be observed. Further, there will be explained dependence of validity and reliability of the Master assignment on relevant methods of research.

3.2. RESERCH DESIGN

According to Bryman (1989) there are five major research designs within organizational context. These designs are represented with Table 3.2.1 below, with corresponsive methods of techniques and data collection.

Table 3.2.1 Chief Research Designs and Methods in Organizational Research, (based on and adopted from; Bryman (1989)

Designs	**Methods**
D1 Experiment (laboratory and field experiments; quasi-experiments)	M1 Self administered questionnaire
D2 Survey (including longitudinal survey design	M2 Structured interview
D3 Qualitative research	M4 Unstructured interviewing
D4 Case study	M5 Structured observation
D5 Action research	M6 Simulation
	M7 Archival sources

This study will make use of a case study design as well as a survey design. Firstly, I will employ the survey design to elicit information on the following: the household income of local residents before the pollution of the sea by oil and gas production. In the survey, the population distribution of the local residents will also be found out to determine their level of vulnerability in terms of their ability to work. The case study design will then be used to assess the decision-making process in resources production in order to find out the involvement of institutions and other stakeholders in the region. This will give a reflection of whether the livelihood of local residents will be jeopardized or not.

Why I have decided to implement exactly case study design? There are doubts about two research implementations: qualitative research and case study. Bryman (1989) illuminate reality of this uncertainty “it is often difficult to distinguish qualitative from case study research, because the format often take place in a single organization (Ibid, p.30). On the other hand, the same Bryman (1989) emphasizes, “Most qualitative research is in fact a form of case study” (Ibid: p.170). Thus, even survey research or field experiment that are conducted with one or small number of cases have little distinctions the case study from such quantitative investigations. In my opinion, case study provides deeper insight into the studied phenomenon in its context and therefore a comprehensive understanding (Gummesson, 2000).

3.3. METHODS OF COLLECTING DATA AND ANALYSIS

Primary data collection nature is taken in my data collection. Primary data, is data collected specifically for the research project being undertaken, (Saunders et el 2006). Primary data could be accumulated by way of interviews, questionnaires and general observations. Research has a road map that should be followed in order to gain credibility. Every bit of information gathered has to be analyzed using recognized procedures. Data has to be collected, analyzed and a conclusion has to be drawn. Bryman (2004, p.19) simply explains research strategy as "a general orientation to the conduct of social research". There are two major groups of research strategies, which can be illuminated as quantitative and qualitative. Quantitative methods are used when researcher systematically collects compatible data about many research expressed numerically (Selnes, 1988). According to Easterby Smith, Thorpe and Lowe (2002) qualitative method are simply devices whereby the researcher, once close to organizational members, can gain the sorts of insight into people and situations he or she requires. Silverman (2000, p. 88) also states that methodology is the "general approach to a research topic", this statement implies that every research work has to follow a kind of procedure. In view of the designs, both qualitative and quantitative methods would be used in data collection process in this research.

3.4. Interview

This data collected specifically for the research project being undertaken (Saunders et al, 2006). In this paper, my primary data collection involves the use semi-structured interview and questionnaires conducted with the following organization listed below:

- The Department of Petroleum Resources (DPR)
- Questionnaires for institutions (NGOs, Traditional authorities, Civil societies)
- Representatives of Oil companies (Shell, NNPC, Chevron, Statoil)
- Questionnaires for representatives of national institutions (Environmental protection agency (E.P.A.) Ministry of lands and natural resources, Min. of environment.
- Head of Communities settlement union within three communities being affected by Gas Flaring Niger Delta region.

An interview is a purposeful discussion between two or more people (Kahn and Cannel in Saunders et el. 2003). Interview can help a researcher gather valid reliable data that are relevant to the research

questions and objectives. The nature of any interview should be consistent with researcher's research question(s) and objectives, the purpose of one's research and the research strategy that the researcher has adopted. Interview can take the form of qualitative or quantitative. Qualitative interview are classified into two main forms, which are sole or group interview. Sole interview comprise of face to face and telephone interviews. On the other hand, one-to-many interview comprise of focus group interview (Saunders et el, 2003).

This research paper is conducted with qualitative interview and administered questionnaires, in which both face-to-face and telephone interview where used. Most of the interview I conducted where mostly telephone interview oriented than physical. The telephone interview took the form such as asking questions about issues I forgot to ask during the face-to-face interview period and also calling for appointment reservation. Prior to the interview conduction, introduction letter from Bodo Graduate Business School where sent to institutions, oil companies and communities leaders within Niger Delta region. Each face-to-face interview on the average, took between 30-45minutes at the premises of the respondent and conference locations on different occasion to the convenient of them.

3.5. Observation

From Saunders et el, (2003) perspective, participant observation is qualitative and derives from the work of social anthropology earlier in the twentieth century. Its emphasis is on discovering the meaning people attach to their actions. The other type of observation is structure observation and it is quantitative and is more concern with frequency of people's actions.

As my research is qualitative oriented, I chose the participant observation type where I took the stance of complete observer role in which I did not let the interview realised that I was observing their facial expression regarding the information they where unearthing to me. According to Saunders et el, (2003), a researcher who takes the complete observer role, which is part of the four roles a researcher can chose from, the other are; (complete participant, observer as participant, and participant as observer), has the complete significant advantage of not conditioning the behaviour of the research subject under study. During the interview, my observation revealed that the interviewee where refusing to give some information that was considered by them as confidential to the department of petroleum resources and ministry of environment they where operating at.

3.6. QUALITATIVE METHODOLOGY

Studies have shown that there is always room for knowledge production and research is the vehicle for acquisition of knowledge from somewhere by looking at a new phenomenon while combining the known and the unknown in a bid to produce new knowledge. One important decision which I have to make before conducting the field study is making a choice between qualitative and quantitative research approaches as the means of collecting data. Before making this choice, it becomes necessary to acquire basic knowledge of the two methodologies in order to differentiate between them. The search for not just knowledge but that which is relevant in today's context especially in natural resource management has been characterized by two different views of social science research: positivism and interpretivism. The qualitative methodological argument is based on the interpretivism tradition which mainly applies to the social sciences. Bryman (2004, p.11) contends that positivism is "an epistemological position that advocates the application of the methods of the natural sciences to the study of social reality and beyond". It is clear from this argument that the positivistic paradigm is characterized by numerical and measurable quantities and objectives and universal definitions, often much associated with the physical sciences. The assumption here is that the social world can be studied in the same way as the natural world.

In another vein and in contradiction to positivism, interpretivism argues along the qualitative paradigm, it is characterized by subjectivity, particularity and reflexibility. This is in sharp contrast to the positivist view which is often criticized for not recognizing the difference between natural objects and human-beings, people and their institutions (Bryman, 2004). As earlier discussed, this study will be situated mostly within the qualitative paradigm and hence requires an understanding of how human beings behave in given circumstances. This implies that I am looking at a particular case in order to gain an in-depth insight into the case. The insight that is gained here can be applied to instances with similar conditions. The qualitative methodology therefore, focuses on the meanings of social interactions and processes, emphasizing in various ways that reality is created and given meaning. It is therefore argued that human beings cannot be studied as natural objects since they interpret situations differently and give meanings as required (Silverman, 2006). Concerning epistemology, neoclassical economists remain innocent positivists, in spite of proposals for a more open attitude by philosophers of science (e.g., Caldwell, 1982), they tend to believe in value neutrality and objectivity and regard their arguments as "scientific", that subjectivity is bad and should be minimized or withheld. Ecological economists regard value neutrality, for instance in connection with environmental policy, as an illusion. "Values are always with us" in all stages of our research, as Gunnar Myrdal has repeatedly argued (1973, 1978). Some problems

are chosen for study rather than others, there is often a choice of perspective or methodological approach. A given approach may be applied in more than one way, etc. Choices of this kind are always made on the basis of beliefs and values. In these and other ways, subjective elements enter into the research process.

Responses from interviews can serve as a huge source of knowledge. Despite the fact that Silverman (2001, p.1) affirmed the proposition that human perceptions and behavior are better studied using the qualitative research approach, there are situations where it becomes exceedingly complex to decide on the use of either the qualitative or quantitative research approaches especially when investigating a social issue like human behavior which could be dealt with by either of the approaches or both simultaneously. However, a decision to choose one methodology can be influenced by a consideration of how to handle the complexity involved in finding answers to the research questions guiding the study as well as the resources available. A clear knowledge of what my research wants to uncover will guide me to choose the right approaches to use. Hence, it is my belief that the answers I will be seeking will be obtained from both qualitative approach through questionnaires, interviews, observations and documentary analysis. During interviews notes will be taken in addition to tape recordings which would be done with approval of the interviewee.

Table: 3.1. The Major features of Qualitative Method

Aspect	**Qualitative**
Sample	Actively involved
Interview length	Between 30mins- 1hr
Questioning	Following respondent reaction
Objective	Expansion of existing data
Analysis	Content analysis
Report base on	Tables, Theories and Motivation
Reliability and Validity	Can rarely be determined (subjective natural of research

Source: Field work, 2010.

3.7. SAMPLING PROCEDURE

There are various ways of determining the number of respondents to use in a study. For this study, I will use the simple random sampling technique to test the validity and reliability of the questionnaire items. In order to minimize sampling error, a probability sampling technique would be used in the localities to know those who solely depend on fishing and farming for their livelihood and the effect of green house

emissions within the communities identified. In other cases, the stratified random sampling would be used when administering questionnaire to opinion leaders from the institutions and communities. Out of the total population of three communities, a sample of 10% will be used.

3.8. ETHICAL CONSIDERATIONS

In this study, I will seek the consent and approval of the Niger Delta District Assembly, people in the communities who will be interviewed and the Environmental Protection Agency as well as environmental officials of the Shell Petroleum Development Company. To clear any misconceptions about the intentions of the study, an explicit overview of what the research entails and how the results will be utilized, will be given to the respondents. I will promise to offer privacy and confidentiality to the informants in order to gain confidence from them.

Data gathered through in-depth interviews require the researcher to protect against interviewer misperceptions and to avoid informants that are out of the ordinary, or who lack credibility. In order to ensure that interview data are consistent with the researcher's conclusions, constant checking with informants during and after an interview will be done. To help address any inconsistencies, lines of communication will be left open between me and the informants throughout the study. Much as there are no perfect measures and principles, I will try to keep all minor transgressions in check to make the findings authentic.

3.9. DATA EVALUATION

The possession of reliability and validity characteristics or consideration is required to ascertain good quality of a research.

3.9.1. Introduction

Reliability and validity in reference to a research assignment are of distinct meanings. Both are influence by the respondent's ability to answer a question accurately. In the case where respondent is not informed on a topic or exhibits poor memory recall relating to the topic, the accuracy of responses will be impeded. In such a situation, the reliability and validity of the question is in doubt (Proctor, 2003).

3.9.2. Reliability

According to (Proctor 2003), it is the extent to which measures are free from random error and give consistent results. Reliability objectives in research work is to be sure that if a later investigator follows

the same procedures as described by an earlier investigator and conducted the same case study all over again, the later investigator should arrive at the same findings and conclusion (Yin, 2003).

Base on Proctor view, reliability reflects weather asking the same question of the same person on a subsequent occasion will elicit the same response. The goal of reliability is minimize the mistakes and biases in a case study (Yin, 2003). According to Easterby-Smith at el. (2002), reliability is primarily a matter of stability which means that if an instrument is administered to the same individual on two different occasions the question is, will the result be the same?

Some degree of treat is likely to be encountered by an investigator in research work and Robson (1993) hereby believes that there may be four different threats to reliability in a research project. They are listed as: Subject error, subject bias, observer error, observer bias. These for treats are therefore discussed briefly to understand more about these treats.

1. Subject error: This threat occurs when different circumstances influence the results of study, thus leading to different conclusions. The researcher of investigator should try as much to neutralize such influence by choosing the correct environment for the study (Robson 1993). In this my project, data were collected from environmental ministry in their public offices and from communities secretariat, that are being affected by gas flare within Niger Delta region. Thus, it gave me a convenient environment to undertake my interview with them with out any external influence from third party.

2. Subject bias: This threat may also occur in scientific studies, in my case study, there was the likelihood of some restraint or bias in the information granted to me from the department of petroleum resources (DPR) and Ministry environment due to the nature of government agreement with oil production companies for fear of breaching the agreement. Due to certain secrets, not all required information was released to me.

3. Observer error: This threat was at its minimum level, since I conducted the interview my self as a single individual as compared to the case of several researchers with different manner of observing phenomenon. However, introducing a high degree of structure to the interview schedule lessened this threat to reliability (Robson 1993) of the ascertainment of my data from field work exercise.

4. Observer bias: This threat was also a minimum level as I undertook the interpreting of data alone as compared to with difficulty to a group of researchers' interpretation who might have found it uneasy to come to agreement as each of them has his or her way of data interpretation (Robson, 1993).

The position I chose as a complete observer in the cause of my research, meant that I did not influence the outcome of the information that I received from the respondents and for that matter the results of my analysis base on the data acquisition are very reliable.

An interview guide which absolutely focuses on the research problem in chapter one was prepared by me and each potential respondent was given a copy. My recording equipment was used to undertake the recording at the respondent premises and the hand written notes (transcript) that I embarked on during the interview was compared with the recordings and the difference was sorted out.

The respondents (i.e. oil company representatives, institutions and communities representatives) that I interviewed were individual of high position in their organization, thus gave me assurance that the data collected was coming from reliable sources. I usually cross-check after every meeting of information given to me by a respondent so as to make sure that the information certainty is highly assured devoid of misrepresentation of fact. There is feedback given to me by telephones or email, after respondent has reviewed the interview process at his or her leisure time prior to our next meeting.

In fulfilling the requirement of research reliability, I believe it would be an easy repetitive interview process by a potential researcher who may decide to use the same procedure I used to ascertain data in a similar research from units like mine.

3.9.3. Validity

Validity is the extent to which instruments measure that which they are intended to measure of research findings reflects (Proctor, 2003:530). Validity is a question of how far we can be sure that a text or instrument measures the attribute that is suppose to really measure. It is not too easy to ascertain validity for reason being that if one already had a better way of measuring the attribute, there will be not need for new instrument (Easterby-Smith et el, 2002).

According to Saunders et el. (1997), validity is concerned with weather the findings are really about what they appear to be about. Proctor (2003:186) emphasised that 'validity reflects weather you are

ascertaining through a question what you think you are ascertaining'. In as much they are threats to reliability, there are also threats to validity and the researcher should be aware of them. A research design should be chosen in a way so as to reduce the potential lack of validity.

The information I gathered during the interview was in line with the research problem of this work under consideration. The respondent gave answers with particular attention to the structure of the question on the interview guide and also took a verbatim glance with answers to each question simultaneously to make sure they did not deviate from the core of the interview process. This action therefore contributed to the validity of the data ascertainment from institutions and host communities where oil production and gas flaring takes place within Niger Delta region Nigeria.

According to Proctor (2003), External validity relates to the extent to which research findings can be generalised to and across population of interest in different situation and at different levels. In the case of Easterby-Smith et el (2002), external validity involves defining the domains to which the results of the study may be generalised; with this kind of validity, case study rely on analytic rather than statistical generalization.

CHAPTER 4: PRESENTATION, ANALYSIS AND DISCUSSION OF THE FINDINGS

4.1 Introduction

The previous chapter discussed the methodology for data gathering. This chapter discusses the presentation and analysis of the data. The analysis took into account the probable outcomes of the perceptions expressed by interviewees and questionnaire using statistical representations and theories in explaining the outcome. These data are gathered from the local communities being affected by gas flaring representatives and a scientific data from Ministry of Lands and Natural Resources, Ministry of Environment, Science and Technology, Ministry of Energy and Environmental Protection Agency and regulatory department of petroleum resources (DPR) and make conclusion with inductive approach for oil production system situation in Niger Delta region Nigeria.

Table 4.1 List of some Gas Flare Stations (Niger Delta communities) and their operators (Oil production Companies)

Gas Flare Stations	Operating company
Batan Community	Shell Petroleum Development Company
Odidi Community	Shell
Escravos Community	Chevron and Shell
Ekpan Community	Joint venture between Nigeria government and oil producing companies (NNPC/WRPC)
Otumara Community	Shell
Sagara Community	Shell Petroleum Development Company
Eket Community	ExxonMobil

Source: Field work, 2010.

4.2 OIL COMPANY ACTIVITIES

A number of oil companies are involved in the Niger delta oil production but one was selected based on the percentage shares it has in the oil field. The results of the questionnaire administered to the company are summarized in Table 4.2 below.

Table 4.2: Oil company's responses to issues on its operations

Corporate Social Responsibility (CSR)	Sustainable CSR	Relationship with Local people	Company's Environmental Assessment	Local Residents' reception
Yes	Positive	Cordial	Needs Improvement	Warm

Source: Field work, 2010.

Table 4.2 shows the responses one oil company gave on its activities in the Niger delta. The company stated it has its own responsibility package it would implement to help not only the local communities under discussion but also others who may be affected by their operations. Programs to be considered include provision of portable water, school buildings, micro credit facilities and development of recreational parks. According to the company, the corporate responsibility holds a positive prospect. It also stated it has a positive working relationship with the local people.

However, concerns role by stakeholders on the relationship between companies and local people show a different thing. In line with ecological economics, it is based upon the idea that economy should be embedded in social relations, instead of what we find in capitalist societies "social relations are embedded in economic system" (Daly and Cobb, 1989, p.220). Daly and Cobb Jr. criticize the idea that

the society merely consist of statistical aggregations of individuals, rather arguing that a society is something greater than the sum of its parts. According to Blowfield (2005:173) CSR is failing at a time it is demanded to be taken serious. This does not mean companies are mandated by law to draft a CSR and get it implemented. It is rather an avenue for companies to build a good relationship with the people living close to their operations sites. The relationship between business and society in general has not been cordial over the years though most companies seem to be talking about how responsible they are to the needs of society. By law, every company in the extractive industry is mandated to do an impact assessment of its operations. In response to this questionnaire item, the company contended the impact assessment it did needs improvement since over time, some indicators that were used may change. By alluding to this, the company has supported an assumption that the implementation of CSR is undefined. The lack of a clear definition makes it difficult to access the truth or otherwise of what companies seem to be professing and the likelihood of failing to deliver on their promises becomes high. In this light, the warm reception the local communities have extended to the companies would only be short-lived, as shown in the situation today by militancy in the Niger delta region. In response to a number of issues concerning the environment, Testando International Nig Limited, published what it considers big issues to deal with in their HSE assessment capability.

- ***Discharges***

  Routine discharges {such as waste water from the FPSO} and drilling wastes will be treated to accepted standards prior to discharge. Non-routine discharges {such as chemically treated hydrotest water} will be collected in a closed system and treated to meet Nigeria and international standards. The selections of fluids will take into account the potential environmental impacts.

- ***Air and water Quality***

  Impacts from emissions to air are unlikely to have a direct impact on local communities. Our operations will provide GHG emissions but we are working to minimise these through the use of state-of-the-art equipment, application of our EHS policy, EMS and toes. Flaring will be avoided wherever possible with the stated intention to flare only in specified situations. Water discharges from the FPSO and support vessels will all be treated prior to discharge to ensure that they meet both Nigeria and industry standards.

- ***Waste Management***

  The scale and nature of waste produced will vary depending on operations that are being carried out. Some wastes, such as macerated food waste, can be treated and disposed of at sea in

accordance with MARPOL, the International Convention for the Prevention of Maritime Pollution from ships. Other non-hazardous waste will be brought ashore for treatment, recycling and disposal. Hazardous waste will be transported ashore for disposal at appropriate facilities.

- ***Oil Spills***

  In case of oil spill, we have put in place a comprehensive OSCP to ensure that in the event of a spill we are ready to take appropriate action.

- ***Fishing***

  We are working closely with the Nigeria Fisheries Agency and fishing community to alleviate any concerns and issues around the presence of the FPSO. This includes both direct and indirect assistance ranging from compensation procedures, to assistance with locating alternative fishing grounds. Tastando Nigeria is also working to educate the fishermen about potential safety issues caused by fishing close to our operation.

- ***Community Support***

  The Niger delta crisis discussions also helped us to understand the most pressing needs of the coastal communities of the Niger delta Region and to identify the most appropriate Social Enterprise and social investment projects for the area. The drilling of water wells in the region and our support of programme to eradicate river blindness were the first direct outcomes of the process (Testando HSE assessment 2009).

4.2.1: Dealing with Environment, Health and Safety

The oil companies in Nigeria's oil business have a track record of maintaining an average level of environmental, health and safety record and are doing everything possible to improve on this standard. In responding to how this would be done the company representative had this to say:

> *"The records are there to proof our commitment to what we have been saying. I think it is fair to refer to our past operations not only in Shell Nigeria but also in other oil servicing company i.e. Chevron, to justify whatever claim we make. Our company will make sure the negative impacts of our operations are minimized in order to gain credibility from all our partners".*

In addition to what the company's representative said, there are well established procedures by which environmental problems arising from petroleum operations are dealt with. Various seminars and forum have been organized to clarify the position of the operations of all the companies in order to erase any doubt about their commitment.

4.2.2. Change Oil company's actions; During the various both external and internal processes, organizations are changing. As shown in table **4.2** above, oil company's actions might be differently

classified in a theoretical framework, i.e. in relations to local people and environmental assessment, to share ideals for clearer understanding their future environmental performance and socio-economics standards concerning ecological issues implementation.

Economic behavior; In this perspective, is both multi-faced and context- dependent, this is in accordance with Kohlberg's description of stage 7, where individuals identify themselves with moral principles based upon a cosmic perspective. It is important that stakeholders in the region change from neoclassical economics mechanistic thinking "that see the earth as a machine", to ecological economics organic thinking, which is base on the concept of culture as a collective phenomenon, not as some individual. Therefore, it is important that operations by stakeholders in the Niger delta change from the concept of economic man to ecological man, that is base on theory of virtues ethics.

4.3 NATIONAL INSTITUTIONS AND THE OIL INDUSTRY

Four national institutions were contacted to seek responses on the roles they are expected to play in making sure the oil production will be sustainably managed. These include the Ministry of Lands and Natural Resources, Ministry of Environment, Science and Technology, Ministry of Energy and Environmental Protection Agency, access was limited to Department of Petroleum resources (DPR). Shown below are details of their response;

Table 4.3.1: Level of involvement in environmental law

National Institutions	Involvement in Environmental Regulation
Ministry of Lands and Natural Resources (MLNR)	Actively involved
Ministry of Environment, Science and Technology (MEST)	Actively involved
Ministry of Energy (MOE)	Actively involved
Environmental Protection Agency (EPA)	Very Actively involved

Source: Field work, 2010.

Table 4.3.1 shows the responses given by four national institutions concerning their involvement in the formulation and implementation of environmental laws for not only the oil companies operating in the

country but also companies in the extractive industry as a whole. Three institutions (MLNR, MEST and MOE) responded they are actively involved in environmental regulation while the EPA said it is very actively involved. As sectorial ministries and an agency, they have specific roles they play in the formulation, implementation and monitoring of all activities related to their area of jurisdiction. The three ministries most often coordinate in the planning and implementing of policies.

However, the mere claim of active involvement in environmental law making and implementation may not ultimately reflect in the implementation. The implementation of a policy or law in a country requires power and a political will which cannot be influenced. Transnational corporations which include oil companies sometimes defy national laws and escape prosecution as a result of the power they wield.

They are able to use their influence to lobby for how bills dealing with their operations are formulated. For example, Shell Oil Company has been flaring gas in the Niger delta; the Nigerian government has not been able to bring Shell to order (Friends of the Earth, 2009), as stress by Daly, 1996, p. 220), that government should decide the market condition and the overall size of the market, they emphasize that concentration of power in few hands must be prevented. One of the most important hallmarks of ecological economics is that it is not restricted to academic context governing neoclassical economics; it addresses all issues related to the economy, society and nature from a broad sense. Base on this, it is important stakeholders in Nigeria oil industry expressed their concerns over the situation for government to strengthen its position on the enforcement of laws to curb pollution and destruction of ecosystems.

Table 4.3.2: Presence and state of Environmental Law

	Frequency	Percent	Valid Percent	Cumulative Percent
YES	4	100.0	100.0	100.0
Total	4	100.0	100.0	100.0

Source: Field work, 2010.

This study also sought to ascertain the presence and state of Nigeria's environmental laws, as shown below. All four national institutions responded in the affirmative, the presence of environmental law in itself is inadequate. Its state and effectiveness in curbing anthropogenic effects on the environment is equally essential, the current environmental law in Nigeria does not adequately address issues on oil extraction related to economic, social and nature dimension. In view of this government has now laid a bill in parliament to be passed into law. The absence of this law gives oil companies a breather and an

opportunity for irresponsible behavior

Table 4.3.3: Medium of communication

National Institutions	Medium of communication with Local resident on benefits
M.L.N.R	Through assembly members/ chiefs
M.E.S.T	Chiefs/opinion leaders
M.O.E	Through Assembly member
E.P.A	Through assembly members and chiefs

Source: Field work, 2010.

Table 4.3.3 explains how communication is expected to flow to the local level stakeholders. The national institutions interviewed stated that the medium through which the communities will be receiving information are through the District Assembly members or the chief/opinion leaders or both. This shows the important role these people play in community development. According to (Boulding, 1966), cooperation through decentralized collaboration networks perform better than what is possible through the enormous global power structure. Therefore, cooperation as a requirement for sustainability (Kohlberg, third hallmark theory), is impossible without sufficient communication between stakeholders, (Siebenhuner, 2000). Thus, cooperation by all stakeholders should be the approach to communication in the Niger delta to bring better understanding of the practices in the region in other to achieve a sustainable future. The interaction between all stakeholders (society, economic and nature) can be in the spirit of "Cosmic man" being coordinated within a framework of a "communicative arena" from ecological economics paradigm, even though it is impossible to incorporate the goals of all agents in one goal. This point follows that, if the coordination of operations among several actors and groups of actors is to function, it is necessary to implement measures of coordination based on communicative decision making system.

Table 4.3.4: Effective monitoring and implementation of environmental law

National Institutions	Responses
M.L.N.R	Satisfactory
M.E.S.T	Satisfactory
M.O.E	Satisfactory
E.P.A	Very satisfactory

Source: Field work, 2010.

Table 4.3.4 represents responses elicited on the degree of effectiveness with regards to the monitoring of environmental laws in Nigeria. M.L.N.R, M.E.S.T and M.O.E were of the view that there would be a

satisfactory monitoring while E.P.A intimated monitoring will be very satisfactory. These responses give an indication that these institutions have the needed mandate and capacity to prosecute any company that does not comply with the country's environmental laws. Despite this assurance, the bill on oil exploitation is yet to be passed and any irresponsible behavior by any of the oil companies at present may not be subjected to retrospective legislation. On the other hand, according to Thomas Kuhn, they maybe more stringent environmental regulation laws, better business practices and more efficient technology to protect the environment on the neoclassical economics kuznets curve theory, but even if these laws are implemented, they are not enough to achieve a sustainable future, we need a deeper systemic change.

During the traditional resource intensive management or mainstream economics, organizations were closely associated with such features of functioning for profit. These times have already passed away. Nowadays business reality operates within multi-dimensions development. It is not enough to make business successful by meant of earning money or economic growth, then you will just become uncompetitive. According to ecological economics there are a lot of built-in problems in classical and neoclassical economics, as long as resources are assume to be interchangeable; "the bequest to the future of man made capital is thought to more than compensate for the depreciation and liquidation of natural capital" (Daly, 1996, s.221). Companies can win the "war for markets" only taking into consideration social, economic and environmental factors as a base of sustainable development in long run.

4.3.1. TRIPLE BOTTOM LINE principles. Thus, as shown in table **4.3.1, 4.3.2, 4.3.3** and **4.3.4** above, all national institute must be actively involve in the environmental regulations in other to achieve the triple bottom line principles. Therefore, in the involvement in environmental law, communication and implementing and monitoring environmental law in the region, they have to switch from the theory of **Competition to cooperation;** in other to coordinate the interaction between actors on the market and to integrate values from economy, nature and culture, it is necessary to supplement competition with an arena for communicative interaction. We maintain that a sustainable economics must be based on cooperation and active relations between stakeholders on the market and spokesmen representing other interest and sectors in society i.e. NGO's. Communicative arena is a means to coordinate planning, implementing and behavior in the circular value chain. It is a forum from ecological economics paradigm that can open up dialog between economic actors and spokesmen representing other sectors in society, including nature and culture. In other words, **Atomism to Holism;** change from atomism to holism in circulation economics is partly argued on the basis of similarity between economic and

ecological system. Holistic perspective tries to predict the problems arising from simple problem solving and tries to identify more satisfactory structural solutions. As a consequence of this understanding, economics can no longer be studied as competition among separated actors. Thus, the road against sustainability depends on a view on economics that implies an integrated and active attitude from all stakeholders. Everything is related to everything else, the relations between the social entities are special importance for understanding the changing processes.

Table 4.3.5: Educating Local people on oil activities

National Institutions	**Responses**
M.L.N.R	Through Local representatives
M.E.S.T	Peer education/local representatives
M.O.E	Seminars by oil companies
E.P.A	Seminars and Peer education

Source: Field work, 2010.

One main factor that would promote a warm relationship between the local residents and oil companies has to do with the level of knowledge and awareness of what the whole project is about. The four institutions interviewed gave responses ranging from a combination of seminars, dissemination of information by local representatives and peer education. The presence of this arrangement gives an indication that there might be a good working environment within the area.

As shown in table **4.3.5;** Educating local resident of oil activities, both oil companies are an integrated part of the society as they have consumers and operate within various levels of controlling. Furthermore, as society's entities they should provide information balance between their "inputs" and "outputs" through transformation or educational process to locals. In the environmental management sense, open system approach emerges from correlation change. "Entrance" and "exits" of an organizational system means here more fluent and wide range of collaborations. According to ecological policy investigation, companies will have to organize all levels of manufacturing with transparency, thus, critical business thinking with continual improvement seem to be new efficiency. Thus, (Cobb Jr) does not accept state socialism as an alternative to global capitalism as an alternative to **Top-down** development programs of both global capitalism and state socialism, he proposes bottom-up. Instead of viewing person as individual atoms related to one another through contracts and market transactions, we view people as people in community valuing relations that constitute community. **Bottom-up;** Act of autonomously within a context of meaning, share knowledge rules of conduct and collective identity in constant change. Further more, it is also important that information's in the area of air pollutants from thermal

plants should also be opened to all stakeholders involve in other to dialog for the best approach to controls its emissions and impact to the environment and ecosystem.

Table 4.3.6: Calculated levels of criteria air pollutants from thermal power plants in Nigeria

	Emission (ton/annum)				
	CO	NO_X	PM	SO_2	VOC
Ogun	8681.1	14,516.7	326	166.4	100.8
Ondo	5080.5	8495.65625	190.7994514	97.37549059	58.98976
Lagos	15,217.5	25,446.99774	571.5006664	291.6683322	176.6917
Imo	1468.9	2456.400182	55.16699279	28.15476118	17.05606
Abia	5510.7	9215.13441	206.9578309	105.6220035	63.98547
Edo	1960	3277.622728	73.61039571	37.56744761	22.75824
Delta	24,607	41,148.33677	924.1287372	471.6338988	285.7143
Cross River	2438.1	4077.042905	91.56415076	46.73023971	28.30903
Rivers	13,142.3	21,976.78742	493.5650479	251.8934846	152.5963
Bayelsa	977.8	1635.177636	36.72358988	18.74207475	11.35389
Akwa Ibom	2120.8	3546.518606	79.64938604	40.64947768	24.62532
Kogi	3363.8	5625.011067	126.3291492	64.47273714	39.05738

Source: Field work, 2010 (Ministry of Energy)

As shown on table **4.3.6** above, uncontrolled calculated carbon monoxide emissions range between 978 and 24,607 ton/annum and for NO_X, PM, SO_2, and VOCs, the ranges of anticipated uncontrolled emissions are 1635–41,148, 37–924, 19–472, and 11–286 ton/annum, respectively. Since emissions are directly proportional to the volume of a gas required for combustion, among other factors, Bayelsa State with the least daily natural gas consumption in electric power generating units is expected to release the minimum air pollutants while Delta State which has the maximum daily natural gas consumption in the electric power generating units, will be the highest emitting State. These two States' contributions of air pollutants from gas flaring and electric generation in thermal plants are estimated to be about 1% and 18%, respectively, of the total anticipated from their activities.

Further, in relation to the clusters clear differences in opinion exist with respect to many aspects of sustainability policy. Here, the neoclassical cluster strongly denies that fundamental changes of our

economic system and material consumption restrictions are necessary for achieving sustainable development. On the contrary, the ecological-economic cluster favors exactly these approaches. Though electric power generation from natural gas combustion in thermal plants is an identified strategy for the elimination of routine flares and provision of sufficient electric power in Nigeria, adoption of uniform distribution of the power plants across the geo-political region as suggested by Sonibare and Akeredolu (2006) may assist in the reduction of burdens of associated air pollution in a particular region. In other words, if this system is adopted, natural gas consumption will be reduced and development will improve in terms of power supply. In theory, there is need to change from **Linear thinking-;** in economics often implies problem reaching sustainability; waste of energy and raw materials, throw away products and unconscious use of water, air and garbage can, to **Circulation economics;** preserve of resources, complete use of input factors, minimize contamination and extensive re-use. Circulation economics defines the main functions in a circular value chain, it develop a structure that makes it possible to coordinate the different functions in a way that forces actors to make sustainable decisions (Ingebrigtsen and Jakobsen 2007). Therefore, instead of continue use of thermal plants to generate electricity, they can invest to reuse of the energy being flared or switch to other renewable source of powers such as solar energy or wind power.

4.4 LOCAL LEVEL AND COMPANY ACTITITIES

A number of institutions were identified as partners who will be involved in the activities of the oil production. Table **4.4.1** shows the responses given by three of the institutions I interviewed to determine their level of involved in the oil production.

Table 4.4.1: Involvement of local institutions in CSR implementation

Name of Institution	**Involvement CSR implementation**	**Opportunity for negotiations**
An NGO	Unclear role	Not very specific
District Assembly	Yes	Not well defined
A Traditional Authority	Unclear role	Partially involved

Source: Field work, 2010.

All three institutions seem not to have a common role. While the District Assembly representative responds positively to its involvement in the implementation of any CSR activity, the NGO and a traditional authority indicated that their role is unclear. All three institutions are seen as stakeholders at

the local level. On the opportunities for any form of negotiations between stakeholders at the local level and oil companies, all three institutions expressed misgivings. The traditional authority stated a partial opportunity for direct negotiations with companies while the NGO and the District Assembly representative could not specify their roles. This gives an indication that there are no laid down procedures to follow in an event of any form of agitation by local residents. In addition, the responses given above turn to create doubt as to whether the companies are in constant consultations with the local people to be able to assist them in finding alternative sources of livelihood.

4.4.2 Alternative sources of Livelihood to be provided to local residents

The District Assembly, the Non-Governmental organization and the traditional authority interviewed were strongly of the view that the provision of a source of portable water, cash payment as compensation for loss of source of livelihood, provision of school blocks and offering of non-fishing related employment have been on the agenda of both the central government and the oil companies. From the stakeholder's response, it seems they are getting convinced the local people will not be worse off by production process in their localities, but it is not certain if the locals feel the same way.

Base on the analysis of the air pollutant within the geopolitical region in Nigeria, one can see that the right conceptual element of sustainability is not being integrated in the societal welfare in the Niger Delta region. Also, in the area of local level and company's activities, **table 4.4.1;** shows that all stakeholders are not actively involved in the CSR implementation, which means the view of the multi-dimension perspective, is not well established in CSR implementation. Thus, ecological economics argues that competition and cooperation are different principles that do not exclude each other but rather complement each other. Therefore, to be able to develop suitable, integrated economic circles based on cooperation; communicative network is forced to be established. This means, it is important that all stakeholders should be involve in CSR implementation, including the local representative to provide information's for alternative sources for their livelihood to be better off in other to achieve sustainable environment and society in CSR implementation in the region.

4.5 COMMUNITIES HOUSEHOLD BASIC STATISTICS

A total of 25 respondents from the three communities were interviewed to elicit information on the impacts of the oil production activities on their lives. The focus was on the men whole are directly involved in fishing and farming as well as heading households and communities representative/leaders. The definition of household used in this context implies a group of people who are blood-related and living under one roof and under the care of a family head.

Table 4.5.1: Number of residents by Communities

Communities	Number of responses	Percentages (%)
Batan	11	44
Odidi 1 and 2	7	28
Escravos	7	28
Total	25	100

Source: Field work, 2010.

This study used 25 respondents from the three communities. Eleven representing 44 percent are from Batan community while 7 each are from Odidi and Escravos communities. This selection was base on the proximity to the production and drilling site. Batan is the closest hence more people were selected from there.

4.5.1. Batan community: is considered as one of the top oil production facilities within Niger Delta region. It is one of the oil flow station facility jointly operated by Shell petroleum Development Company and Nigeria government. According to the Batan community 11 representative, the community indigenes are from the Ijaw ethnic group within the Niger Delta region. They said that the most outstanding sight in the tiny fishing village of Batan is the 10-metre-high flame that burns continuously from a vertical pipe at the edge of the flow station (gas flare) at the community operated by shell. They continue that the flame pales in bright sunlight, but at night its orange glow dominates the village and surrounding skies over a 15-kilometres radius. This flame is fed by the natural gas given off during the production of crude oil at the station and burnt away as waste. They further continue that Batan has known no darkness since Shell set up in the community more than 20 years ago. According to Batan community ex-public relation officer (PRO), Batan surrounding vegetation has withered while the health of the inhabitants has deteriorated. Inhabitant of Batan community complains of health problems, mainly respiratory- as well as damage to wildlife, homes and vegetation for their farms and fishing mode for survival. Indeed, the Niger Delta as a coaster area is among the places most likely to become vulnerable to the effect of global warming due to the intensive heat in this region cause by greenhouse gas emissions from gas flares and power plants. Particular concern is also the likely impact of rising sea levels, such as tidal waves and flooding due to unpredicted rise of river levels and watching away of their vegetation were also complains by other settlers in the region.

4.5.2. Odidi community: is also one of Shell major production facility located within the Niger Delta

region. It is occupied by the Ijaw and Isekiri ethnic group and located within the same region as Batan community, about 50km by boat. The community is round about 15,000 to 20,000 inhabitant within the 2 different faze of the community where oil production and Gas flaring take place at Shell facility known as Odidi 1 and Odidi . Their represnetative, gave their opinion on gas flaring and pollution within the community, they thinks that the situation of the environment is very bad and little attention is being given to the livelihood within the regions. They claims that for so period now, they community representatives have tried a lot to inform the operating companies like Shell and other sub-contractors like Nextoil, Testando, Michhary etc, to operate in an environmental friendly way and to integrate the community's in their affairs, but instead they where kept away. They believe that the operating oil servicing companies does not comply to the standard environmental policies such as ISO-14001 and OSHAS 18009, base on the present condition of their environment. These conditions they referred to as the land and water condition, constantly miss with oil particles and carbons from gas flares and power plants, which are not conducive for fishes and other sea/river creatures. Therefore, their fishing business has been rendered useless and their farm land has also been badly polluted that it is no longer suitable for agriculture. Another dimension of the condition of the Odidi community is the contribution of the flare to acid rain and villagers complain of the rain corroding their buildings roofs. The particles from the flare fill the air, covering everything with fine layer of soot. Local people also complain about the roaring noise and the intense heat from the flares they live and work alongside with no protection.

4.5.3. Escravos community: is the biggest location of Oil production within the Niger Delta region. Chevron American company has their biggest tank farm located in this community and Shell also have two of their production facility within this region know as Escravos flow station and Sagara flow station. From the perspective of Escavos community representatives, they stated that apart form the constant noise and heat from the Gas flare on livelihood in their community, that it also affect their wildlife, thou no comprehensive study is known to have been carried out into the impact of gas flaring on wildlife in Niger Delta region. However, they highly believe that the flaring and oil spills has led to very serious pollution of air and drinkable water, destruction of flora and fauna, properties and lives and have also cause regional crisis in the areas. Even in the absence of such study of the impact of gas flaring on wildlife within Niger Delta, it is clear that flaring and oil spill harms people, wildlife and environment, (Friends of the Earth 2009). Chief Ayeri of the community, further stated that many forms of oil generated environmental pollution where evidence throughout the region. Their source of income has deprecaited due to limited sources to farming and fishing activities, base on oil and gas pollution to their

rivers and lands. Drinking water has become scarce, malnourishment and disease appears common among the locality. He also said the remains of dead birds where found close to oil spill and polluted surface water, bunt birds habitant and next where also seen close to gas flares. Lastly, that it is common to see woman drying their local food called Kpokpo garri and fish at flares sites, bearing the searing heat and reaping a benefit of snacks dried by the infernal flames. The oil corporations may count this as an economic benefit to the people but the truth is that the products of these processes, the kpokpo garri and the dried fish are all poisoned by carbons from the flares and harmful to human health.

The impact and pollution of gas flaring and power plants emissions are glaring and the Nigeria oil industry joint venture partners can not claim to be ignorant of it. From the above data ascertained from the representative of three communities being affected by gas flaring in the Niger delta by oil and gas operations, it may be witnessed that gas flare exposure is similarly characterized by all three communities' representatives. Gas flaring impact and pollution on all three communities are focus on the same three areas, which are analyzed by the **Triple Bottom Line principles:** which includes; economic, social and environment issues of corporation as sustainable development.

4.5.4. Cultural dimension (Social-Health): The health impacts of air pollution spread across all three communities and those who rely on locally produced food, either from their own production of bought from market- risk contamination. When nitrous and sulphur oxides from the flare mix with atmospheric moisture the result is acid rain by the perspective of all three communities representatives. The true economic output is enjoyment of life (an immaterial flux) (Georgescu- Roegen, 1966), not for acid raid wreak havoc on the environment – destroying crops, roofs and impacting human health. According to (Schumacher), production from local resources for local needs is the most rational way of life, not to worsen their well being. Etzioni, (1988) also stated that, we receive economics as an essentially normative discipline that cannot be dissociated from ethical considerations. Thus, in theory, triple bottom line principle considers sustainability within corporation as striving to investigate the balance between the three dimensions identified above. Therefore, in practice, the stakeholders in the Niger delta region should respect and protect all cultural value, quality of life and well being within the area of their operation.

4.5.5. Economic dimension: Apart from release of greenhouse gases into the atmosphere, gas flares are set to release some 45.8 billion kilowatts of heat into the atmosphere of Niger Delta everyday. As a result of this incineration of the environment, gas flaring and power plants has raised temperatures and

rendered large areas uninhabitable. As earlier stated in section two of this paper, about 2.5 billion SCF of gas is being flared. This is equal to about 25% of the UK gas consumption. Report from word bank estimated that flaring represent an annual economic loss to Nigeria of about US $2.5billion. On the other hand, base on the triple bottom line principles, which investigate the balance between the three dimensions mentioned above, it is important to note that sustainable development concept stresses the interdependence between economic growth and environmental quality. Thus, these gases can be reuse, as agued by Hopfenbeck (1993), that recycling aims to make waste into useful outputs, which can be utilized as input to another system. Thus, such reuse can improve the Nigeria economy and development in a sustainable process through circulation economics. This is an integrated creative thinking of material management system within re-use and material recycling which should be priority over disposal, (Ingebrigtsen, Jakobsen, 2003). Hopfenbeck (1993) further stated that, integrated environmental protection means planning disposal within process of production and placing collecting and disposal with preparation and avoidance. This leads me to conclude that both environmental oriented policy and strategic planning related with circular scheme influence the efficient use of natural resources.

4.5.6. Nature-(Climate change) dimension: At the global scale, the emission of carbon dioxide and methane from Nigeria's flare makes substantial contribution to climate change and the cost will mainly fall mostly heavily on the poor village people. Generally, climate change impacts are more pronounce on low-lying coastal areas such as the Niger Delta. These areas are prone to freak weather events, flooding and coastal erosion and are the first to be affected by sea level rise. Due to raise temperatures, climate change favors proliferation of pest and spread of disease. As mentioned earlier, they also seriously affect agricultural productivity. Having these climate change aiding gas flares located in Niger delta, one of the most vulnerable parts of Nigeria, is indeed a double tragedy. Action must be taken for the protection of the global environment, tackling climate change and for human survival. Therefore, it is also important that stakeholders in the region operate in line with the triple bottom line principles to protect and respect both economic, society and ecological values and their level of existence and maintain good ecological footprints. Finally, as the bearing of this work is toward looking at the impact of green house gas pollution by flaring and power plants to the socio-economic and environment of the Niger Delta region, it will be benefiting if organization operating in the region, practice method of circulation economy as re-distribution and reuse of output produced. Thus, the triple bottom line principle that argues achievement of the balance in three dimensional perspective: economics, ecology and society, are stress as relevant within organizational performance.

Table 4.5.2: Distribution of Educational Level of Respondents

Educational Level	Number of responses	Percentage (%)
Primary	13	52
JHS/MSLC	5	20
SHS/Vocational school	2	8
Training College	1	4
Tertiary	-	-
None	4	16
Total	**25**	**100**

Source: Field work, 2010.

Table 4.5.2 presents the educational background of the local residents I interviewed. More than half (52%) of them only had education up to the primary level while 16% had none at all. Five and two people representing 20% and 8% respectively had education up to the JSS or MSLC level and SSS/Vocational School level. None had education up to the tertiary level but one completed a training college. The educational attainment of the respondents has a great implication to the level of their skills development. It is no wonder that fishing and farming has been their best employment opportunity not only because of their lack of education but also what their parents introduced them into at a very early stage in their lives.

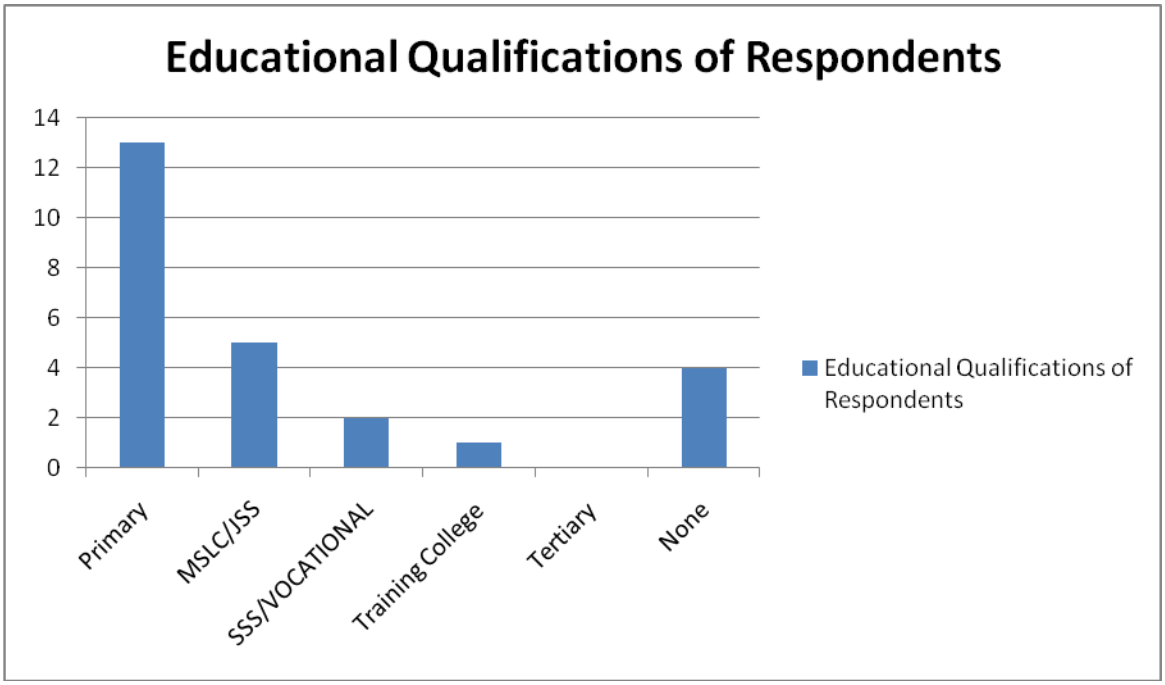


Figure 4.1: Educational qualifications of respondents.

If this statistics is to be used as the background information for deciding on an alternative means of livelihood, then education should be one of the most important considerations. The provision of classroom blocks and other logistics for them becomes imperative for the youth to acquire knowledge and skills in other fields to become employable and not follow in the footsteps of their preceding generation who are battling with the less opportunity for fishing currently being experienced. This state of affairs implies that even a chain of employment opportunities the oil industry may create will be inaccessible to them. As shown above in **table 4.5.2;** the educational standard needs to be improved in other for locals within the region to have more knowledge about the impact of oil production to the environment and global climate change and also to have the required qualification for employment. Stakeholders within the region need to embrace a qualitative growth theory; which enhance life quality, qualities which arise from processes and patterns of relationship among the parts. According to qualitative economic, from the ecological economic paradigms, growth can be sustainable if it involve dynamic balance between growth, decline, recycling and if it includes development in terms of learning and maturity, i.e. educational standard of local, (Capra, Henderson 2009). Unlike the neoclassical economics quantitative theory, that treats growth as a desirable macroeconomic goal, that is focus on mostly on the quantitative expansion in the scale of the physical dimension of economic system and not most human development, which is not sustainable and is what is being practice in the Niger delta.

Table 4.5.3: Impact of oil operations on Environment/livelihoods

Impact of oil operation on livelihoods	**Respondents**	**Percentage (%)**
Very negative	9	36
Negative	5	20
Positive	3	16
Very positive	1	4
Indifferent	6	24
Total	**25**	**100**

Source: Field work, 2010.

The study sought to find out from respondents about their perception on how the oil and gas operations would affect their environment and chances of living. While a total of 14 respondents (56%) expressed a negative influence, 6 (24%) were indifferent and could not tell how exactly they are affected, maybe this is due to lack education and understanding of the pollution impacts. However, 5 respondents (20%) were of the view that the oil activities would eventually have a positive effect on their lives and increase their

chances of a better life due to growth and development, from a neoclassical quantitative theory perspective. From this presentation, the popular perception shows that the residents are not very certain whether continuing oil and gas production would affect them positively but base on the present condition of their lives and environment they foresee a negative influence on their livelihoods and environment. Further more, as shown at **table 4.5.3**; the negative respondent are high, which means an alternative means of oil production has to be put into consideration in other for the locals to be better off. **De-growth principle** from the ecological economics paradigm, is seen as a good approach to these negative situation of oil production in the region, through; downscaling of production and consumption, reducing consumption does not required decrease in well being, rather maximize happiness and well being through non-consumptive means (Ove Jakobsen, 2010). Consuming less, while devoting more time to art, music, family, culture and community in other to increase the complexity, sophistication and maturity through qualitative growth. At individual level- voluntary simplicity why on global level- re-localization of economic activities in other to end humanity's dependent on fossil fuel and to enable institutions improve their standard of **ecological footprint**. De-growth stands in sharp contrast to mainstream economy, which consider the accumulation of capital and commodities to meet a desirable end and therefore has negative impact to the environment and society.

Table 4.5.4 Net income declared by fishermen in the last years

Net income (in Nigeria Naira)	**Respondents**		**Percentage difference**
	Before Pollution	**During Pollution**	
1,000-3,000	2 (8%)	12 (48%)	40%
4,000-6,000	7 (28%)	11 (44%)	16%
7,000-9,000	9 (36%)	2 (8%)	28%
Above 10,000	7 (28%)	- -	-
Total	**25 (100%)**	**25 (100%)**	

Source: Field work, 2010.

The net income of fishermen in the year before the increase in river pollution by oil and gas production was analyzed. 8% of the respondents made a net income ranging between 1,000-3,000 Nigeria nairas before the inception of pollution. This figure rose to 48% after the institution of environmental pollution began. 7 people (28%) made a net income of 10,000 Nigeria naira before increased in river pollution but during pollution, none could make that income. This clearly shows how the purchasing power of the

fisher folk has been weakened. This is having a direct consequence on the payment of school fees for their wards, medical expenses and even having a decent meal in a day. Thus, in theory, this is not in correspondent with the economical aspect of the triple bottom line principles.

Table 4.5.5: Sources of finance for fishing activities

Sources of finance for fishing	Respondents	Percentage (%)
Financial institution	4	16
Individuals	5	20
Credit union	2	8
Self-financing	11	44
Family	3	12
Total	**25**	**100**

Source: Field work, 2010.

Over the years, the fishermen have been depending on a number of sources of finance for their fishing operations. Sources of financing coming from individuals, self and family, making a total of 86 % are internally generated while 14% are from lending institutions. The fact that the net income base of the fishermen (Table 4.5.5) has dwindled gives cause to worry since their ability to continue financing fishing has been dealt a big blow. The fishermen were unanimous in their explanation that this statistics is for the peak season and not the lean season. People who are employed in fishing-related activities expressed worry over their future since most of them have not had only their incomes reduced in the last six months but also the very availability of employment is eluding them.

Table 4.5.6: Income from fishing-related activities from family members (household)

Type of work	Who in family	Net income
Net mending	Son	2,000 Nigeria naira/season
Fish smoking/mongering	Wife and Daughter	6,000 Nigeria naira/season
Fetching firewood	Son	1,000 Nigeria naira/ season

Source: Field work, 2010.

The loss of opportunity for fishing did not only affect the fishermen directly but also those who are employed in fishing-related activities such as mending of nets, boat-making, fetching of firewood for fish smoking and fish mongering. Of the 25 respondents, each had a member of family involved in a fishing-related activity. The unemployment that is being created does not only rest on the fishermen but their entire households.

Table 4.5.7: Coping and Survival strategies

Coping Strategy	Respondents	Percentage (%)
Engaged in non-fishing activities	4	16
Sold assets	3	12
Used bank saving	2	8
Used income from family businesses	5	20
Received help from friends and relatives	1	4
Reduced household expenditure	7	28
Borrowed money	3	12
Total	**25**	**100**

Source: Field work, 2010.

Following the increasing loss of source of livelihood for people engaged in farming, fishing and fishing-related activities, the people living in the three communities have adapted some kind of survival strategies. In addition, some have shifted more attention to other businesses to generate some income. Table 4.5.7 shows the means by which the respondents had income to live on as a survival strategy. Seven people (20%) had to reduce their household expenditure as a means of conserving money. This implies that some essential services like medical care had to be sacrificed for education and food, but such strategies will not last them for long if actions are not made by stakeholders toward a qualitative change of a physical no-growing economic system in dynamic equilibrium with the environment, through development to improve the well being of resident livelihood being affected.

Table 4.5.8: Number of Dependants on each fisherman/ Household size

Family size per household	Respondents	Percentage (%)
2-4	8	32
5-7	11	44
Above 8	6	24
Total	**25**	**100**

Source: Field work, 2010.

In order to determine the weight of responsibility on the respondents, the study sought to find out the number of people in each household. This gives a reflection of the responsibility placed on the shoulders of each fisherman. As shown in Table 4.5.8, six respondents (24%) said they have eight or more people in their households while 11 (44%) have between 5-7 people. The least number in a household is between 2-4 people. In respect to income and survival strategy as shown in **table 4.5.4 - 4.5.8**, the principle of corporate citizenship from the ecological economics paradigms have to be implemented in

the region, to improve both the economic and society standard. Business have to take account of its social and environmental as well as its financial footprint, thus, they have to provide alternative means for survivals for those being affected by the oil and gas production, instead of focusing just on profit maximization and cost benefit analysis from the neoclassical paradigm. It should also be part of their package, to presented in a stakeholder agreement, to improve the quality of life, well being and provide other sources of income for settlers in the region. Firms are responsible not only on the interest of stakeholders but also responsible for all their actions connected to people and nature. As argued by Daly, that probably is more important to focus on well being than on growth and GDP.

Table 4.5.9: Awareness of Ecological and Neo-classical Economics Paradigms (communities)

Communities	**Ecological Economics**	**Neo-classical Economics**
Batan Community	0 out of 12 asked	4 out of 12 asked
Odidi 1	2 out of 12	5 out of 12
Odidi 2	0 out of 6	2 out of 6
Escravos	3 out of 12	6 out of 12
Total	**5 out of 42**	**17 out of 42**

Source: Field work, 2010.

In order to also determine the awareness of the two schools of thought of the ecological and neo-classical economics clusters identified in this thesis, the study sought to find out the numbers of communities people in each oil and gas production location that has awareness of these two paradigms. As shown in Table 4.5.9, zero out of 12 communities workers response at Batan community have any awareness of the concept of ecological economics (qualitative growth), why 4 out of 12 have heard about neo-classical economics (Quantitative growth).

At Odidi 1 location, 2 out of same 12 have awareness of ecological economics, why 5 have heard of neo-classical economics, this is a pretty bigger station and have more educated workers. At Odidi 2, which is a very small station, 0 out of 6 have heard about ecological economics and also 2 out of same 6 have heard of neo-classical economics, which are the supervisors of the facility. At Escravos community, which is also a very large location, 3 people have heard about ecological economics concept why 6 have heard about neo-classical economic concept out of 12 people asked. This goes to show that, little knowledge of the trasdisciplinary field of ecological economics is known in oil and gas production by industries operating in the Niger delta region.

Table 4.5.9.1: Awareness of Ecological and Neo-classical Economics Paradigms (Oil Companies)

Oil Companies	**Ecological Economics**	**Neo-classical Economics**

Shell-Batan Location	1 out of 10 asked	7 out of 10 asked
Shell- Odidi 1 and 2	2 out of 10	8 out of 10
Shell-Escravos	2 out of 10	7 out of 10
Chevron-Escravos	2 out of 10	9 out of 12
Total	**7 out of 42**	**31 out of 42**

Lastly, to also determine the awareness of the two schools of thought of the ecological and neo-classical economics paradigms identified, the study also sought to find out the numbers of oil companies workers in each production location that has awareness of these two paradigms. As shown in Table 4.5.9.1 above, 1 out of 10 oil workers asked at Shell flow station at Batan community have awareness of the concept of ecological economics, why 7 out of 10 have heard about the practices of neo-classical economics concept. At Shell flow station Odidi 1 and 2 locations, 2 out of same 10 workers have awareness of ecological economics, why 8 have heard of neo-classical economics. At Shell Escravos station, which is a very small station, 2 out of 6 workers have heard about ecological economics and also 7 out of same 10 have heard of neo-classical economics. At Chevron Escravos Tank farm, which is a very large location, 2 workers have awareness of ecological economics concept why 9 have heard about neo-classical economic concept out of 10 workers asked. In total, 7 out of 42 have awareness of the practices of ecological economics why 31 out of 42 have awareness of neo-classical economics paradigm.

Most of the workers asked at these stations shown above are junior workers, this is due to limited senior workers at the stations and the few coordinators at the location are usual not available to be interviewed. The response at these 3 stations goes to show that little knowledge of ecological economics approach is know in their practices. Therefore, base on the low level of ecological economics paradigms awareness in the region, as shown at table **4.5.9 and 4.5.9.1.;** the stakeholders have to provide means to orientate and educate everybody involved and being affected by their operation of the theories and principles of new transdisciplinary field of ecological economics, that addresses the relationship between ecosystem and economics system in broad sense. It is also base on organic world view; this can be done through educational program, presentations, seminars, workshop and implementation of the principle of the triple bottom line and circulation economics in the corporate policies. If such changes can be implemented, to shift from mechanistic to organic world view in production process, it will provide all stakeholders with knowledge to approach the problems they are encountering from oil and gas production today. This will bring about a clearer understanding if the main stakeholders would come up with better answers to the problems connected to oil drilling and production in the Niger delta, if they used a framework based on

ecological economics to address the findings shown above instead of the neo-classical paradigm. So far, the frame work base on neo-classical economics paradigm, which is being practice in the region, is really not solving the socio-economic and environmental pollution problems they are facing at present.

CHAPTER 5:

5.1. Conclusion

To illuminate the conclusion, I work through this study guide by necessity of answering research question. The thesis was about the impact of Gas flaring and power plant emissions to the socio-economic and environment in the Niger Delta region and the adequate approach to address these practices. Thus, the study is meant to find out if the main stakeholders would come up with better answers to the problems connected to oil drilling and production if they use the framework based on ecological economics instead of the neo-classical paradigms that is presently in practice in the region.

As I noted in the theoretical framework, there are many various theoretical dimensions, which can give understanding of these phenomenon. In relations to neoclassical economics, it was developed in the nineteenth and the present century for purposes other than that of handling environmental problems. A modified version of this theory in the form of neoclassical environmental economics is therefore not necessarily the best option if one wants to handle these problems. Neither neoclassical nor institutional theory can claim value neutrality. Rather a relationship of interdependence seems to hold between those who demand economic theory, e.g. politicians and business leaders, and those of us at the universities and elsewhere who supply economic theories. Neoclassical economic theory, for instance, seems to be an excellent theory for those who want to focus attention on markets and downplay the importance of social and environmental impacts of different-kinds. In a similar manner, conventional accounting practices in terms of GNP, consumption, investments, savings, exports and imports are excellent if you want to avoid thinking in environmental terms. The same can be said about monetary accounting practices in business. Existing calculation practices in business, estimating present values or internal rates of return, are also well suited to those who have not internalized environmental values. At the societal level, monetary cost-benefit analysis can be used, for instance, to rationalize the construction of new motorways and strengthen the power of road planning agencies. So, present mainstream theory fits well into the world views and ideologies of many actors on the public scene and economists will continue to respond to these demands. In fact, scholars not only respond to external demands. Through education and contributions to

public debate, economics departments can be seen as propaganda centers for specific theories. We actively influence what is being observed. The thinking habits and views of progress of politicians, business leaders and other actors are largely the result of indoctrination. I do not think that such indoctrination can or should be avoided. My main point is that economics is always political economics and that the economist is not only an economist but also an actor among other actors. Economics is ideology in important respects, which makes some pluralism and competition a necessity. In this way the consumers of economic theory will expand their choice from the one-commodity world of neoclassical theory to a multi-commodity world of ecological economy theory. But is it possible to break the cartel of neoclassical economics? Again, the hope lies in the above-mentioned heterogeneity within each actor category and network building. Neoclassical economists are not all alike and some of them realize the need for pluralism in economics and society. And when consumers of economic theory realize that they are not free to choose (cf. Friedman, 1980), they will most likely raise their voices. This in turn may contribute not only to a situation of workable competition, but also to improved chances of sustainable development.

Though there are lots of similarities between the 2 clusters identified in this study: Ecological Economics and Neo-Classical Economics, but in the situation of Niger Delta region, I will recommend they adopt the multi-dimensional approach from the Ecological economics paradigm. It is important that the industries in the region move from a quantitative approach to qualitative, they should be more focus on cooperation and communication instead of competition. Iin other to achieve a sustainable economics, there should be cooperation and active relation between stakeholders on the market and spokesmen representing different interest group and sectors in the society i.e. communities representatives and NGOs in a (Communicative arena). To coordinate the interaction between actors on the market and to integrate values from economy, nature and culture (Triple bottom line) principles, environmental problems that are often irreversible and must be solved through preventive measures.

From the foregoing discussion from the available data of the impact of gas flares and power plants in the Niger delta region, it important to add to the conclusion of this study, that the present distribution of gas flares and thermal plants in Nigeria will cause elevated emissions of air pollutants, base on the unevenly distributed within the country. The environmental and health impacts of these pollutants indicate that something drastic must be done to see that as Nigeria is moving towards achieving self-sufficiency in electric power generation, the air pollutants associated with self-sufficiency must be appropriately tackled. To accomplish this, it is suggested that through a communicative arena framework from the

circulation economy principles, the present natural gas pipelines in Nigeria be expanded to cover the entire nation to ensure that natural gas can be easily tapped in any part of the country. The National electricity regulation commission of Nigeria should suspend further approval of gas flares and thermal plants for the south–south region of the country while investors should be encouraged to invest in thermal plants in both the north-east and north-west regions. Furthermore, the institutions and regulators of the environment in Nigeria should actively be involved in the decision process to ensure that both emission inventory and emission dispersion modeling of anticipated air pollutants from all the gas flares and thermal plants are carried out to determine the "danger zone" around potential host communities. If these regulators can ensure that appropriate and practicable mitigation measures are put in place to tackle anticipated air pollutants from all gas flaring/thermal plants in the country, it is likely that sustainable development in the electric power sector can be achieved. A good example is adapting the policy that pollutant pays: presuppose irreversible damage, accept environmental problem as real and serious, the purpose to ensure that damage is repaired by (the company causing the problem). In the second place, they are other ways to generate useful energy without producing carbon dioxide, ranging from nuclear electricity to windmills, solar, tides, water power and photovoltaic (PV) electricity or even PV hydrogen (by electrolysis of water).

Further, the regulators of the environment in Nigeria should ensure that appropriate and practicable environmental management plan (EMP) is put in place for all the gas flares and thermal plants in the country while impact mitigation monitoring is thoroughly executed for the plants as and when due. Due to the current danger of the global natural, cultural and ecosystem situation, it will also be recommended that Nigeria and other natural resources producing nations should move from linear thinking in neoclassical economics paradigm and adopt the new economics – circulation economics prioritize; preservation of resources, complete use of input factors, minimizing contamination, extensive re-use. This ecological economics approach will enable them to develop a structure that makes it possible to coordinate the different functions in a way that forces actors to make sustainable decisions. Finally, as earlier stated in this paper, there is need for all stakeholders in the Niger delta oil and gas production sector, to address the relationships between ecosystems and economic system in the broad sense, through the triple bottom line principles. These relationships are central to many of humanity's current problems and to build a sustainable future (Robert Costanca 1997).

5.2. Limitation of the study

The study has been provided in exploring the impact of Gas flaring and power plant emissions to the socio-economic and environment in the Niger Delta region and the adequate approach to address these practices. The most obvious weakness is the limited awareness of stakeholders in the region of the ecological economic paradigms. If researchers investigate more cases of the impact of gas flares and power plants emissions from the ecological economics principles, the broad picture of the study will be as a result, and obtained understanding could be deeper.

Finally, data collection method that was mostly questionnaire, which would have been more detailed with interviewing respondent, but this, was not possible due to some hermeneutical danger. Otherwise misinterpreting the answers of respondents according to own opinion or ways of thinking. Indeed, more accurate data collection and more extensive checking of the respondents could be helpful. Unfortunately, this limitation seems to be reality due to access to heads of industries and deeper insight of host communities and also time and resources limitations.

5.3. Proposal for further Research:

Some proposals logically follow from the previous part- limitation of the thesis; first of all, future research should be possibly to consider more industries that have awareness of the ecological economics paradigms within the Niger delta region. Also, further researchers in the impact of gas flares and power plants green house gas emissions to the environment and health problems to humans. It could also be interesting to cover more cases and theories or different contexts in order to explore other areas that have not been considered by this present research.

However, an exploratory study can leave many unanswered questions and expected findings. This means I ask more questions than answered. It is appropriate to understand what is research? Is it the process of finding answers and possible solutions to the problem formulated? Or is it the process of investigating and asking relevant questions? Could researchers be just postulator of problems or he/she should implement problems components in the practical level of realization? Maybe all noted above allows providing more interesting and mysterious thesis in the future. I hope this actual theme appears to be broad and promising with future studies and opportunity.

REFERENCES

- A Proposed Comprehensive Model for Elevated Flare Flames and Plumes, David Shore, Flaregas Corporation, AIChE 40th Loss Prevention Symposium, April 2006.
- Ayres, R.U., 2008. Sustainable economics: where do we stand? Ecological economics 67, 281-310.
- Atzioni Amitai (1988) The moral dimension towards a new economy
- Becker, C, 2006. The human actor in ecological economics: philosophical approach and research perspective. Ecological economics 60, 17-23.
- Boulding, K.E., 1966. The economics of the coming spaceship earth. In: H. Jarret (Editor),
- Brown, L.R., 1981. Building a Sustainable Society. Norton, New York.
- Bromley, D.W., 1989. Economic Interests and Institutions. The Conceptual Foundations of Public Policy. Basil Blackwell, New York
- Bryman, A (2004) Social Research Methods. Oxford: Second Edition. Oxford University Press.
- Caldwell, B., 1982. Beyond Positivism. Economic Methodology in the Twentieth Century.
- Chambers, R & Conway, G Sustainable Rural Livelihoods: Practical Concepts for the 21st Century, IDS Discussion Paper 296, IDS, Brighton, UK, February, 1992.
- Cosby, P.C (2007) Methods in Behavioral Research. Ninth edition. New York: McGraw-Hill Palley, Thomas I .Lifting the Natural Resource Curse. Foreign Service Journal Dec. 2003: 54-61.
- Costanza, 1991 Costanza, R. (Ed.), 1991. Ecological economics. The Science and Management of Sustainability. Columbia University Press, New York, Oxford.
- Daly H, Cobb, J.B., 1989. For the common good- redirecting the economy toward community, the environment and sustainable future. Beacon Press, Boston.

- Daly H, 1996. Beyond growth- the economics of sustainable development. Beacon Press, Boston.
- Daly, H.E, 1968. On Economics as a Life Science. Journal of Political Economy 76, 392-406
- Daly, 1992 H.E. Daly, Allocation, distribution, and scale: toward an economics that is efficient, just, and sustainable, Ecological Economics. 6 (1992), pp. 185–194.
- De Volkskrant, opinion "Fakkels" Shell spokesman Wim van de Wiel, 6 August 2009, <http://www.milieudefensie.nl/actueel/nieuws/schone-schijn>, (15 April 2010)
- Earth Observation Group, NOAA National Geophysical Data Center, report "Improving Satellite Data Estimation of Gas Flaring Volumes, Year Two Final Report to the GGFR, August 2009, <http://www.ngdc.noaa.gov/dmsp/interest/flare_docs/NGDC_flaring_report_20090817.pdf> (15 April 2010), p. 42.
- Ekelund Jr., R.B., Herbert, R.F., 2002. Retrospective. The origin of neoclassical microeconomics. Journal of economic perspectives 16 (3), 197-215 (summer).
- Environmental Quality in a Growing Economy. John Hopkins, Baltimore, pp. 3-14.
- Environmental Rights Action/Friends of the Earth Nigeria, fact sheet: harmful gas flaring in Nigeria, November 2008. <http://www.foe.org/pdf/GasFlaringNigeria_FS.pdf>, (15 April 2010)
- Etzioni, A., 1988. The moral dimension- toward a new economics. The free press, London.
- EPA, 1995 EPA, 1995. Compilation of air pollutant emission factors, vol. I: Stationary point and area sources, fifth ed. Research Triangle Park NC, USA: United States Environmental Protection Agency, Office of Air Quality Planning and Standards.
- Environmental Right Action/Friend of the Earth Nigeria- November 2008
- Faber, M., 2008. How to be an ecological economist. Ecological economics 66, 1-7.
- Friedman, M., 1980. Free to Choose. A Personal Statement. Penguin, Harmondsworth.
- Friends of the Earth Netherlands (Milieudefensie), fact sheet "The people of Nigeria versus Shell, the case: step by step", 2009/March 2010.

- Franz Gerner, Bent Svensson and Sascha Djumena, GGFR (Global Gas Flaring Reduction Public-Private Partnership). 2002 "Report on consultations with Stake Holders" Word Bank-GGFR-Report 1. Washington D.C.
- Gas Flaring in Nigeria-A Human Right Environmental and Economic Monstrosity
- Georgescu-Roegen, N, 1977. Inequality, limits and growth from a Bioeconomic Perspective. Review of social Economy XXXV, 361-375.
- Global, Regional, and National CO_2 Emissions. In *Trends: A Compendium of Data on Global Change*, Marland, G., T.A. Boden, and R. J. Andres, 2005, Carbon Dioxide Information Analysis Center, Oak Ridge National Laboratory, U.S. Department of Energy, Oak Ridge, Tennessee.
- Goodland, R. and Ledec, G., 1987. Neoclassical economics and principles of sustainable development; Ecol. Modeling, 38: 29-46.
- Havens et al., 1993 K.E. Havens, N.D. Yan and W. Keller, Lake acidification: effects on crustacean zooplankton populations, Environmental Science and Technology 27 (8) (1993), pp. 1621–1624.
- Hayek, 1948 F.A. Hayek, Individualism and economic Order, University of Chicago Press, Chicago (1948).
- House of Representatives of the Federal Republic of Nigeria, "votings and proceedings", 13 January 2010, <http://www.nassnig.org/house/votes.php?page=2>, (15 April 2010)
- Ingebrigtsen, S., Jacobsen, O., 2007. Circulation economic- Theory and practice. Peter Lang Publ., Oxford.
- Jakobsen, O. (2002). Circulation economy. Economy in context of nature and culture. Paper presented at the ethics, ecology and business seminar, Bergen, 03 September.
- John J McKetta, Editor (1985). *Encyclopedia of Chemical Processing and Design*. Marcel Dekker. p. 144. ISBN 0-8247-2491-7.
- Kapp, K.W. 1970. Environmental Disruption: General Issues and Methodological Problems.

- Kapp, K.W., 1976. The nature and significance of institutional economics. Kyklos, 29:209-232.
- Kirzner, I.M., 1989. Discovery, Capitalism, and Distributive Justice. Basil Blackwell, Oxford.
- Kohlberg, L. 1973. Continuities in child and adult moral development revisited. In: Baltes, P.B, Warner, S.K. (Eds), life span development psychology academic press New York.
- Kohlberg, L, 1964. The development of moral character and moral ideology. In: Hoffman, M, Hoffman, L, (Eds). Review of child development research Russell Sage foundation, New York.
- Lieffering et al., 2004 M.L. Lieffering, H.M. Kim, K. Kobayashi and M. Okada, The impacts of elevated O2 on the elemental concentration of field-grown rice grains, Field Crops Research 88 (2-3)
- Lovelock, J, 1988. The ages of Gaia- A biography of our living Earth. Oxford University Press, Oxford.
- Lutz, M.A. and Lux, K., 1988. Humanistic Economics. The Bootstrap Press, New York. Myrdal, G., 1973. Against the Stream. Critical Essays on Economics. Random House, New York.
- Mamman et al., 2004 A.B. Mamman, J.O. Oyebanji and S.W. Petters, Nigeria: A People United, a Future Assured. Survey of States vol. 2, Gabuma Publishing Co. Ltd., Calabar, Nigeria (2004).
- Marshall, A, 1920. Principles of economics, 8th edition. Macmillan and Co, ltd London.
- Maslow, A.H. 1971. The further reaches of human nature. Penguin compass, New York.
- Milton R. Beychok (2005). *Fundamentals of Stack Gas Dispersion* (Fourth edition ed.). Self-published. ISBN 0-9644588-0-2. www.air-dispersion.com See Chapter 11, Flare Stack Plume Rise.
- Myrdal, G., 1978. Institutional economics. J. Econ. Issues 12: 771-783.
- Naess, A, 1989. Ecology, community and lifestyle. Cambridge University press, Cambridge.
- NERC, 2008 NERC, 2008. Nigerian Electricity Regulatory Commission, www.nercng.orgright pointing angle bracket Accessed on January 10, 2008. Left angle bracket.

- New Petroleum industry Bill for Nigeria- Debbie Legall
- Norgaard, R.B., 1985. Environmental economics: an evolutionary critique and a plea for pluralism. J. Environ. Econ. Manage., 12: 382-393.
- NPC, 2007 NPC, 2007. 2006 population census of the Federal Republic of Nigeria: analytical report at the national level. National Population Commission, Abuja, Nigeria.
- Olson, M., 1965. The Logic of Collective Action. Public Goods and the Theory of Groups
- Ove Jakobsen November 2010, Ecological Economics- Well-Being and Sustainability
- Robbins, L, 1935. Ann Essay on the Nature and significance of economic science. Macmillan and Co, ltd, London.
- Sachs, I., 1976. Environment and styles of development. In: W.H. Matthews (Editor), Outer Limits and Human Needs. Dag Hammarskjijld Foundation, Uppsala, pp. 41-65.
- Scoones, I Sustainable Rural Livelihoods. A framework for analysis. IDS, Working Paper 72, IDS, Brighton, UK, June, 1998.
- Silverman, D (2006) Interpreting Qualitative Data. Third Edition. London: Sage Publications.
- Silverman, D (2006) Eds. Qualitative Research. Theory, Method and Practice. London: Sage Publications.
- Sen, A, 1987. On ethics and economics. Basil Blackwell ltd, Cambridge.
- Siebenhuner, B, 2000, Homo sentinens- towards a conception of humans for the science of sustainability. Ecological economics 32, 15-25.
- Smith, A, 1759/1997. The theory of Moral sentiment. Regnery publishing Inc. Washington D.C.
- Smith. A, 1976/1994. An inquiry into the nature and causes of wealth of nations. The modern library, New York.
- Soderbaum, P., 1973. Positionsanalys vid beslutsfattande och planering. Ekonomisk analys pi tvarvetenskaplig grund. (Positional Analysis for Decision Making and Planning. An Interdisciplinary Approach to Economic Analysis.) Esselte Studium, Stockholm (in Sweden).

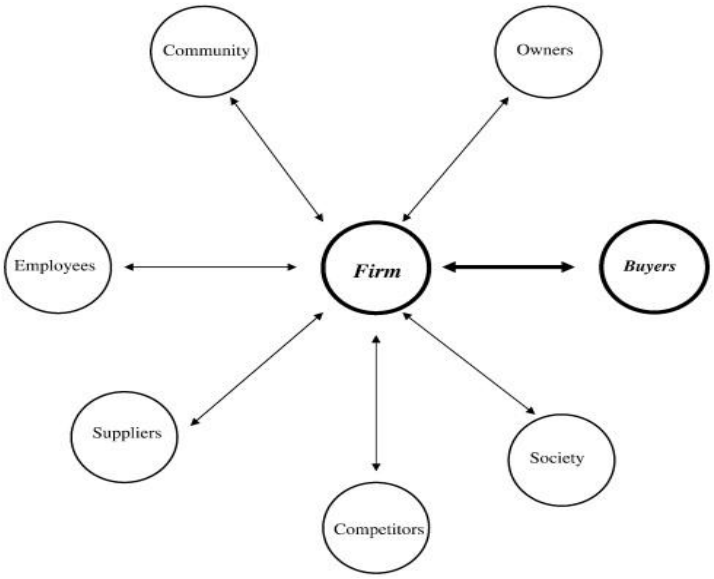
- Soderbaum, P., 1982. Ecological imperatives for public policy. Ceres. FAO Rev. Agric. Develop., 15: 28-30.
- Soderbaum, P., 1987. Environmental management: a non-traditional approach. J. Econ. Issues, 21: 139-165.
- Solow, 1993 R. Solow, An almost practical step toward sustainability, Resources Policy 19 (1993), pp. 162–172.
- Stanford Encyclopedia of philosophy, 2007. Virtues ethics.
- Swaney, J.A., 1987. Neoinstitutional environmental economics. J. Econ Issues, 21: 1939- 1979.
- The Climate Law Organization, Friends of the Earth International. (Page Not Found, 2009 Nov 19)
- The World Bank, *World Bank, GGFR Partners Unlock Value of Wasted Gas"*, World Bank *14 December 2009. Retrieved 17 March 2010.*
- UNDP (2006) Human Development Report http://hdr.undp.org/
- United Nations Development Programmed, "Niger Delta human development report", 2006, <http://web.ng.undp.org/reports/nigeria_hdr_report.pdf> (15 April 2010), p.11.
- Vanguard, "Nigeria loses $150 bn to gas flare in 36 yrs", 15 July 2008, statistics released by the President of the Nigerian Gas Association (NGA).
- Vatn, a (2005) Institutions and the Environment. Cheltenham, UK: Edward Elgar Publishing Limited.
- Whitehead, A.N. 1920/2000. Concept of nature. University press, Cambridge.
- Wilber, C.K. and Harrison, R.S., 1978. The methodological basis of institutional economics: pattern model, story telling and holism. J. Econ. Issues, 12: 61-89.
- WRI, 2003 WRI, 2003. World Resources Institute, Earth Trends Environmental Information, (http://earthtrends.wri.org). Accessed on June 2, 2008.

- WHO, 1999 WHO, Environmental Health Criteria 213: Carbon Monoxide (second ed.), World Health Organization, Geneva (1999) 464.
- WHO, 2000 WHO, WHO Regional Publications, European Series, No. 91: Air Quality Guidelines for Europe (2nd edition), The World Health Organization, Copenhagen (2000) 277
- WHO, 2002 WHO, 2002. The Health Effects of Indoor Air Pollution Exposure in Developing Countries. Publication of the World Health Organization, Geneva, Switzerland. WHO/SDE/OEH/02.05.
- Zadek, S. 2001. The civil Corporation- the new economy of corporate citizenship. Earthscan publication Ltd, London.
- http://news.yahoo.com/s/afp/20070919/sc_afp/russiaclimateenvironmentenergygas_070919174655
- http://www.boston.com/news/world/europe/articles/2007/06/21/russia_top_offender_in_gas_flare_emissions/ The Boston Globe: Russia top offender in gas-flare emissions
- 2004a Regulation of Associated Gas Flaring and Venting: A Global Overview and Lessons from International Experience. "Word Bank-GGFR Report 3. Washington D.C.
- 2004b. "A Voluntary Standard for Global Gas Flaring and Venting Reduction." Word Bank-GGFR Report 4. Washington D.C.
- http://www.worldbank.org/ggfr.
- <http://www1.milieudefensie.nl/english/publications/Timeline%20Shell%20courtcase.pdf> (14 April 2010)

Appendix 1: Kohlberg's Stage of Moral Development

		7. Moral principles based upon a cosmic perspective
III.	Post-conventional, Autonomous Principled morality	6. Morality of individual principles of conscience 5. Morality of contract, of individual rights, and of democratically accepted law
II.	Conventional, Conforming morality	4. Authority maintaining morality 3. Good boy morality of maintaining good relations, approval of others
I	Pre-conventional.	2. Naïve instrumental hedonism 1. Punishment and obedience orientation

Appendix 2: Stakeholder Model; Communicative Arena



Appendix 3: The international Chamber of commerce business chapter for sustainable development (April, 1991)

1. Corporate priority; To recognize environmental management as among the highest corporate priorities and as a key determinant to sustainable development; to establish policies, programs and practices for conducting operations in an environmentally sound manner.
2. Integrated management; to integrate these policies, programs and practices fully into each business as an essential element of management in all its functions.
3. Process of improvement; to continue to improve corporate policies, programs and environmental performance, taking into account technical developments, scientific understanding, consumer needs and community expectations, with legal regulations as a starting point; and to apply the same environmental criteria internationally.
4. Employee education; to educate, train and motivate employees to conduct their activities in an environmentally responsible manner.
5. Prior assessment; to assess environmental impacts before starting a new activity or project and before decommissioning a facility or leaving a site.
6. Products and services; To develop and provide products or services that have no undue environmental impact and are safe in their intended use, that are efficient in their consumption of energy and natural resources, and that can be recycled, reused, or disposed of safely.
7. Customer advice; To advise, and where relevant educate, customers, distributors and the public in the safe use, transportation, storage and disposal of products provided; and to apply similar considerations to the provision of services.
8. Facilities and operations; to develop, design and operate facilities and conduct activities taking into consideration the efficient use of energy and materials, the sustainable use of renewable resources, the minimization of adverse environmental impact and waste generation, and the safe and responsible disposal of residual wastes.
9. Research; to conduct or support research on the environmental impacts of raw materials, products, processes, emissions and wastes associated with the enterprise and on the means of minimizing such adverse impacts.
10. Precautionary approach; to modify the manufacture, marketing or use of products or services or the conduct of activities, consistent with scientific and technical understanding, to prevent serious or irreversible environmental degradation.
11. Contractors and suppliers; To promote the adoption of these principles by contractors acting on behalf of the enterprise, encouraging and, where appropriate, requiring improvements in their practices to make them consistent with those of the enterprise; and to encourage the wider adoption of these principles by suppliers.

12. Emergency preparedness; To develop and maintain, where significant hazards exist, emergency preparedness plans in conjunction with the emergency services, relevant authorities and the local community, recognizing potential transboundary impacts.
13. Transfer of technology; to contribute to the transfer of environmentally sound technology and management methods throughout the industrial and public sectors.
14. Contributing to the common effort; to contribute to the development of public policy and to business, governmental and intergovernmental programs and educational initiatives that will enhance environmental awareness and protection.
15. Openness to concerns; to foster openness and dialogue with employees and the public, anticipating and responding to their concerns about the potential hazards and impacts of operations, products, wastes or services, including those of transboundary or global significance.
16. Compliance and reporting; To measure environmental performance; to conduct regular environmental audits and assessments of compliance with company requirements, legal requirements and these principles; and periodically to provide appropriate information to the Board of Directors, shareholders, employees, the authorities and the public.

Appendix 4: Interview Guide for the Institutions, Oil Companies, Local communities, NGO's

Questionnaire for institutions

Questionnaire for representatives of NGOs, District Assembly officials, Traditional Authorities, etc

1. Name of Institution.....
2. Position of responsibility.....
3. What are the problems created by green house gas emissions due to gas flares and power plants activities in the Niger Delta region?
4. Is your department actively involved in negotiations and implementation of any alternative livelihood programme? Yes No ☐ ☐
5. If yes, please explain your role
6. Are there provisions made in terms of alternative livelihood means to cushion the local residents from loss of their livelihood source? Yes ☐ No☐
7. If yes, what are these livelihood sources?

Source of livelihood	Tick
Education and Training	
Payment of monetary compensation	
Offering of non-fishing employment	
Other (Specify)	

8. Are you satisfied with how these alternative livelihood means are being implemented?
   Yes ☐ No ☐ give reasons.....
9. In your opinion, would the right beneficiaries be catered for? Yes ☐ No ☐
10. If no, give reasons.....
11. What do you think the government and the oil companies need to do to foster cooperation with the local residents?
12. How would you rate the involvement of community leadership in negotiations on alternative sources of livelihood?

    Very bad ☐ Bad ☐ Good ☐ Very good ☐
13. Are there any government/NGO-sponsored programs already running? Yes No
14. If yes, what is the focus of the programs?

    ☐ Increasing and diversifying on and off farm income generation
    ☐ Increasing community-based tourism enterprises
    ☐ Developing rural small and medium scale enterprises
    ☐ Increasing access to rural financing

Questionnaire for Representatives of National Institutions {Environmental Protection Agency (E.P.A), Dept. of Petroleum Resources (DPR), Min of Environment, Science and Technology, Min of Energy}

1. Department (Please state).....
2. Is there any environmental law in the country regarding oil production activities at the moment?
   Yes or No
3. If yes, what is the present environmental law on oil activities in Nigeria at the moment?
4. Is there any strong collaborator efforts being made between your outfit and the oil companies in minimising potential environmental hazards? Yes ☐ No ☐
5. How has your outfit/department been involved in drawing a regulatory framework for oil companies?
   Very actively involved ☐
   Actively involved ☐
   Not actively involved ☐
   Not involved at all ☐
6. Has your outfit got the necessary mandate or capacity to ensure that oil companies observe environmental laws? Yes ☐ No ☐
7. If yes, what measures will your department adopt to enforce the environmental laws?
   .....

8. How effective will the monitoring be?
   Very satisfactory ☐
   Satisfactory ☐
   Relatively Satisfactory ☐
   Not sure ☐
   Comments.....
9. How will your outfit ensure that adequate compensation is given to local residents who are negatively affected by the activities of oil production?
   .....
10. How will the local people get information on beneficiary packages?
    Through Assembly member ☐
    Through chiefs ☐
    Using the mass media ☐
    Personal contacts ☐

11. Are there well established and accessible media through which local residents whose rights are abused may channel their grievances? Yes ☐ No ☐

12. How are the local people being educated on activities connected to oil production?

    Through their local representatives ☐
    Seminars organised by oil companies ☐
    Peer education ☐
    No education at all ☐
    Other (specify) ☐

Questionnaire for Representatives of Oil companies

1. Name of company.....
2. Position in company.....
3. How many communities are affected by green house gas emissions.....?
4. Is there any comprehensive corporate social responsibility package put in place for the benefit of local residents? Yes ☐ No ☐
5. If yes, what programmes are in the package?
   .....
6. How sustainable are these programmes?
   Very positive ☐ Positive ☐ Not sustainable enough ☐ other ☐

7. Local residents are complaining they may not reap the benefits of the oil revenue. What is your opinion on this?

   .....

8. What is the relationship between company executives and community leaders?
   Very cordial ☐ Cordial ☐ Uncooperative ☐ Don't know ☐

   (Additional Comments)

   .....

9. How would you describe the company's environmental impact assessment framework?
   Very good ☐ Good ☐ Needs Improvement ☐ Other ☐

10. What has been local residents' reception of the oil companies operating around Niger Delta region? Very warm ☐ W warm ☐ Indifferent ☐ other ☐
    Other comments:

    .....

Sustainable Development

1. Have you heard about the "Triple bottom line" principles?
2. What kind of postulates have place in your industry?
   - To be profitable as possible
   - To maintain a strong competitive position
   - To maintain a high level of operating activity
   - A successful firm is defined as one that is consistently profitable.

Ecological Economics Perspective

1. Do stakeholders within the region know about the paradigms of ecological economics?

2. Does your company:
   - Recognizes and respects new ethical and moral norms adopted by society
   - Prevent ethical norms from being compromised in order to achieve corporate goals
   - Assists voluntary those projects that enhance a community's "life quality"