

Research Article

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Business and Environment: The Agricultural Perspective

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Abstract

The study seeks to examine the business and environment from the agricultural perspective, ascertain the effects on farm land occasioned by oil exploitation, ascertain the impact of climate change on peasant farmers and to assess the contribution of government in combating environmental degradation. The study was carried out primarily through the survey method and interview of peasant farmers in the Agricultural sector at three locations namely Imo, Delta and Bayelsa State. Secondary data were obtained through books, journals, and internet. The study had population size of 684 out of which a sample size of 230 was realized using taro Yamene formula at 5% error tolerance and 95% level of confidence. Instrument used for data collection was primarily questionnaire and interview. The total numbers of 230 copies of questionnaire were distributed while 218 copies were returned. The survey research design was adopted for the study. Chi-Square statistical tool was used to test the three hypotheses using SPSS. Findings indicate that intensive exploitation of crude oil has played a major role in the degradation of the physical environment in the Niger Delta. The study shown that poor handling of waste pollutant by the oil companies relate to poor soil fertility that has adverse effect on the yield of crops. The study also examined the contributions of the government towards ameliorating the impact of the environmental degradation such as repositioning the research institutes to release improved seedlings that can adapt to the changing environment. The study concluded that there is a need to protract the existing legislations which will re enforce control of activities of companies in Oil Industry to comply with preserving the environment while carrying out their business activities and to involve farmers in policy implementation, this will assist the government to improve on the adaptive measures employed so far by the peasant farmers in moderating the effect of the environmental degradation on their farm land.

1 INTRODUCTION

The degradation of ecosystem clearly has implications for the long term viability of businesses that depend upon them. Annelisa, G (2009). It is however undisputable that ever since the discovery of oil in Oloibiri in 1956, the Niger Delta environment has known no relief Aaron, K., (2006). The Niger delta occupies a significant position of importance in the fisheries, farming and aquaculture development of Nigeria. The area is endowed with vast mangrove swamps and forest environment including marine and fresh water ecosystem. It offers valuable natural resources and is a potentially important food producing area.

There is presently wide public and scientific concern in understanding the effect business activities on the agricultural. The impact of oil spillage has adverse effects on subsistence peasant farmers, who depend directly on land resources. Large scale utilization and protection of this ecosystem would lead to sustainable income generation for the peasant farmers. In an effort to increase national income and encourage more business activities, national laws and regulations that protect the Nigeria Ecosystem have been relaxed (Comfort H, et al 2002).

Currently, business activities in the oil sector and its subsidiary in Nigeria have probably brought out both the best and worst of modern civilization in Nigeria. It has contributed enormously to the country's economic growth and on the other hand, has left profound adverse impact on the physical environment.

Without doubt, the Niger Delta is the nerve centre of Nigeria's oil industry, which has invariably, attracted industries. Crude oil serves as raw material for many chemical products, such as pharmaceuticals, solvents, fertilizers, pesticides and plastics (Asoya, 2010).

The economic benefit of crude oil exploitation in Niger Delta, have been so overwhelming that the adverse Socio-economic impact has been felt greatly on the environment. In spite of the immense wealth accruing from business activities that depend on crude oil, extensive damages of farmlands, streams, creeks and the persistent threat to health of the inhabitants of these regions have been ignored. Nevertheless, there is a perceptible increase in awareness that alternative source of revenue for the country such as Agriculture, need to be taken into account.

Climatic factors play an important role in the realization of higher or lower crop yield; as such knowledge of these factors is necessary to policy makers and the peasant farmers. Nigeria, like most parts of the world, is experiencing the basic features of climate change.

Bello et al.(2012) identify climate change as one of the environmental life- threatening to economic development and sustainability of man-kind worldwide. Business activities and human activities have contribute to an increase in the accumulation of heat-trapping "greenhouse" gases in the atmosphere thereby contributing to increase in temperature in the global climate - global warming(Bello et al., 2012).

The issues of climate change have become very threatening, not only to the sustainable development of socio-economic and agricultural activities of a nation, but also to the totality of human existence (Adejuwon, 2004; Bello et al., 2012).

Recognition of this importance has evolved with the global food security and with increasing awareness of the major social and economic role Farmers play in the survival and growth of their communities (Moffat, 1992).

Environmental Changes as a result of business activities in the Niger Delta of Nigeria are impacting both the physical environment and sustainability of other forms of livelihoods for farmers. This study will present the findings of the impact of business activities on the environment in which agricultural activities along with sustainable livelihoods of some selected rural farmers in Southern Nigeria oil producing States depend on.

However, a glance at the downward trend of Agricultural produce in Nigeria has shown that much has not been done to

combat environmental pollution as a result of business activities in southern oil producing communities, Yet it is this physical environment where the resources are harnessed, that constitutes the main livelihood of the peasant farmers in Niger Delta.

1.2 STATEMENT OF PROBLEM

Business activities in the oil industry has undoubtedly brought economic benefit to the Nigerian state but has left environmental pollution problems with visible Ecosystem degradation.

The negative impacts of business activities that undermine the agricultural production of peasant farmers includes low generation of income for farmers, reduction in market value of crops, Low land productivity, Reduction in crop yield as a result of fertile land turned barren, acid rain outcome of dirty emission from gas flaring, and destruction of soil microorganisms.

1.3 OBJECTIVE OF THE STUDY

- 1 To ascertain the effect to farm land occasioned by oil exploitation.
- 2 To examine the impacts of climate change on peasant farmers.
- 3 To asses the role government plays in combating environmental degradation.

1.4 RESEARCH QUESTION

- 1 what are the effect of intensive oil exploitation on farm land?
- 2 what are the impact of climate change on peasant agriculture?
- 3 what are the contributions of government towards combating environmental degradation?

1.5 HYPOTHESIS

This study is guided by the following hypotheses:

Hi: intensive oil exploitation has an effect on the farm land.

Ho: intensive oil exploitation does not have an effect on the farm land.

Hi: climate change has an impact on peasant agriculture.

Ho: climate change has no impact on peasant agriculture.

Hi: Government contributions ameliorate environmental degradation.

Ho: Government contributions do not combat environmental degradation.

LITERATURE REVIEW

2.1 CONCEPTUAL FRAMEWORK.

There have been different definitions of the concept of Environment. However, from whatever angle one perceives the term; Environment simply depicts what surrounds us. To Hagget, (1975), environment refers to the sum total of all

conditions that surround man at any point in time. According to Miller (1975), the term environment could be perceived as the aggregate of external conditions that influence the life of an individual or population, specifically the life of man and other living organisms on the earth's surface.

The word environment of which environmental is the adjective has been defined in many ways by various authorities: Chambers Concise Dictionary defined Environment as "surroundings, external conditions influencing development or growth of people, animals or plants (Catherine S. et al (1999).

Osibanjo, (1998), refers to the environment as man's immediate surroundings that is, water, air, land including associated living and non-living resources which provides life support system for mankind. This definition implies that the environment provides the natural resources on which national economies are built and sustained.

In the quest to examine the impact of business activities on the Environment most especially in the Niger Delta region, studies have been carried out, such as the study carried out by Odjuvwuederhie, et al., (2006), "The effect of oil spillage on crop yield and farm income in delta state", Nigeria. They established in their study that oil spill reduced crop yield, land productivities and greatly depressed the farm income as at 10% annually.

Environmental degradation issues are of topical concern to communities in the Niger Delta.

There are serious threats to the livelihood of the coaster communities by the operations of transnational companies in the Niger Delta region of Nigeria. The Niger Delta Ecosystem is degrading as a result of acid rain due to gas flaring, oil spills and hydrocarbon as well as poor

waste disposal by the oil companies. The long-term effect of oil pollution could not be over emphasized. Destruction of habitats, loss of biodiversity and water pollution has extensive implications on the people's livelihood, (Uduak .U, 2009).

The resulting impact on the communities is enormous but yet the amount of wealth generated from the oil exploration is enough to be reinvested in order to lesson these environmental impacts.

According to Leyira, (2011), Environmental degradation is largely caused by human activities. The result is that natural process of ecosystem is altered and possibly damaged irreparably. When the environment becomes degraded, all forms of life are threatened.

Egbe, (2010) notes that the Impact of business activities on crop production such as Oil spill causes great damage to the plants due to high retention qualities of oil on the soil, occasioned by limited transpiration and respiration. Oiled shoots of crops like pepper and tomatoes may wilt and die off due to blockage of stomata thereby inhibiting photosynthesis.

In fact the germination, growth performance and yield of these crops are stifled by oil spillage.

The environmental consequences of oil pollution on the inhabitants of Niger Delta are enormous. Oil spills have degraded most agricultural fertile lands in the State and have turned hitherto productive land into infertile lands. With increasing soil infertility, due to the destruction of soil micro organisms, farmers have been forced to abandon their land, to seek alternative means of livelihood (Chindah, 2000).

Oshwofasa, (2012) notes that meaningful development would be difficult to achieve in the absence of a conducive environment which has been traditionally defined as the total surrounding, which take account of natural and biological resources. However, with the current trend of sustainable development, the definition of the environment has been widened to include natural and human resources and their interactions with each other. Environment could be treated within the framework of natural human surrounding and activities, which include biophysical components and processes of natural environment of land, water and air.

It also includes all layers in the atmosphere, inorganic and organic matters (both living and nonliving), socio-economic components and processes of the human environment (Emmanuel and Alakinde 2006).

2.2 THEORETICAL FRAMEWORK

In the study of business and environment from agricultural perspective, several theories have been developed from different authors. However, for this study emphasis will be laid on four of such theories namely praxeological perspective, pollution haven hypothesis, an ecological perspective of change and development as well as environmental externalities.

praxeological perspective.

Economic analysis of the environment that starts from a praxeological perspective shifts the focus from maximizing the social value of output or equating price to marginal social cost, to efficient intra- and inter-personal plan formulation and execution, i.e., the internal consistency between the means that people use and the ends that they desire to achieve. Within this context, pollution problems that are indeed problems create an interpersonal conflict over the use of means and therefore obstruct efficient plan formulation and execution. Pollution is therefore not about harming the environment but about human conflict over the use of physical resources. A pollution or environmental challenges arises when individual or group A and individual or group B are simultaneously attempting or planning to use resource X for conflicting purposes. Humans cannot harm the environment. Instead, they can change the environment in such a way that it harms others who might be planning to harness it such as peasant farmers rely on land for cultivation. (Roy Cordato 2005).

Pollution haven perspective

The pollution haven hypothesis posits that, when large industrialized nations seek to set up factories or offices abroad, they will often look for the cheapest option in terms of resources and labour that offers the land and material access they require. However, this often comes at the cost of environmentally sound practices. Developing nations with cheap resources and labor tend to have less stringent environmental regulations, and conversely, nations with stricter environmental regulations become more expensive for companies as a result of the costs associated with meeting these standards. Thus, companies that choose to physically invest in foreign countries tend to relocate to the countries with the lowest environmental standards or weakest enforcement.

Three scales of the hypothesis

1. Pollution control costs have an impact at the margins, where they exert some effect on investment decisions and trade flows.
2. Pollution control costs are important enough to measurably influence trade and investment.
3. Countries set their environmental standards below socially efficient levels in order to attract investment or to promote its exports. (Elif Akbostanci ,2004)

Environmental externalities

Externalities arise when certain actions of producers or consumers have unintended external (indirect) effects on other producers or consumers. Externalities may be positive or negative. Positive externality arises when an action by an individual or a group confers benefits to others. A technological spillover is a positive externality and it occurs when a firm's invention not only benefits the firm but also enters into the society's pool of technological knowledge and benefits the society as a whole. Negative externalities arise when an action by an individual or group produces harmful effects on others. Pollution is a negative externality. When a factory discharges its untreated effluents in a river or on the land, the river is polluted and consumers of the river water bear costs in the form of health costs or/and water purification costs. In an activity generating positive externality, social benefit is higher than private benefit and in an activity generating negative externality, social cost is higher than private cost. Thus, in the presence of externalities, social benefits (costs) and private benefits (costs) differ.

The divergence between private benefits (costs) and social benefits (costs) results in inefficiency in resource allocation. Producers of externalities do not have any incentive to take into account the effects of their actions on others. In a competitive market economy, private optimum output is determined at the point where marginal private cost equals price. When a positive externality occurs, the marginal social benefit will be higher than the marginal private benefit (price) and hence the private optimal output will be lower than the

social optimal output. When a negative externality occurs the marginal social cost will be higher than the marginal private cost (price) and hence the private optimal level of output will be higher than the social optimal output. Government intervention is needed to internalize externalities in production and consumption decisions of individuals so that social optimal levels of outputs and private optimal levels of outputs will be the same. (Sankar. U, 2001)

An ecological perspective of change and development:

The perspective is associated with the works of Wilkinson and Boulding (1973). The theory is concerned with issues of change and development in contemporary societies, especially as they relate to environmental changes and/or ecologically related trends of population growth and the need to devise and sort out techniques of tackling development problems. The theory states that, as the population of a society increases in size, individual members of the society exert more pressure on scarce available resources such as land and other natural endowments for survival. They directly or indirectly carry out socio-economic activities that pollute the environment, and further cause harm (degradation) to the environment. The socio-economic activities, according to these theorists include subsistence agricultural. (Evelyn, M. I and Tyav, T.T.(2013)

2.3 EMPIRICAL STUDIES

Egbe, R. E. And Thompson .D. (2010) examines oil spillage as an environmental issue and considers its relatedness to farmers living in the Niger Delta Region. It further isolates types of oil spillage, overview of oil spills in the Niger Delta and causes of the oil spills. The environmental and economic effects of oil spills on the livelihood of the people are reviewed to include marine contamination, soil contamination, impact on crop production, and general socio-economic effects.

Egbe, R. and Thompson. D. (2010) then concludes that oil spill is harmful to the environment and thus, requires quick intervention. No remediation technique results in total removal of all spilled oil and there are substantial drawbacks for each method. Ultimately, prevention is the best method to limit oil spills.

Egbe, R. And Thompson .D. (2010) Recommends that Sabotage and oil bunkering can be Brought to an end through proper engagement and empowerment of the youth and women groups and also through proper and adequate monitoring of pipeline and oil installations/facilities.

Corrosion can be prevented by pipeline and flow line replacement, routine pigging and application of protection systems, which are regularly monitored and upgraded where necessary. Major flow stations should be stocked with first-line response materials (such as booms, absorbents and tanks) that enable field operators to respond promptly and effectively to spills.

EGBE, O.D. J. (2011) examines the impact of petroleum exploration on agriculture in the Niger Delta. The paper establishes that agricultural and environmental policies in Nigeria are deliberately structured against agriculture in the Niger Delta. This is demonstrated in political, physical, economic and social threats to agriculture in the region. These threats to agriculture persist knowing that aside food security, agriculture is a catalyst for peace as it guarantees a stable income and employment for the rural poor.

EGBE, O.D. J. (2011) Concludes that Agriculture remains a potent catalyst for peace in the Niger Delta. Policy documents such as the National Policy on Environment and Agriculture in Nigeria: the New Policy Thrust intended to enthrone sustainable exploitation of agricultural and natural resources in Nigeria and indeed the Niger Delta have not yielded the expected outcomes. This abysmal failure is often attributed to desire for oil profit at the detriment of the localities and farm land where petroleum is explored. The avidity for oil proceeds and the environmental degradation arising from oil exploration and exploitation activities often times precipitates oil company-community conflicts.

EGBE, O.D. J. (2011) recommends that regulatory agencies and policies be restructured to tame the tide of environmental destruction perpetrated by oil MNCs and by so doing give agriculture the pride of place it deserves in serving as a catalyst for peace, income, employment, etc, in the Niger Delta. By extension, the ongoing Amnesty Programme would not succeed if it only caters for the youths that have laid down their arms vis-à-vis the unabated environmental devastation against agricultural land and consequently the loss of livelihood sources of the Niger Delta people.

Asoya, S.I (2010) Her study attempted to investigate the impact of oil spillage on agricultural production on Ibeno Local Government Area of Akwa Ibom State in Nigeria . from the result of the study carried out, she found out that the primary cause of oil spillage in Ibeno LGA, was the vandalization of oil pipelines by the youths within the community who are presently displeased with the conducts of the chiefs and community leaders and also poor compensation from oil companies to the host community, for the massive reduction in agricultural returns, mostly from crop production. This had been caused by the said oil companies, who had taken over the community's farmlands and used them as dumping grounds for their equipment, industrial waste and machinery, causing massive destruction on the farm land.

Asoya,S.I. (2010) therefore concludes that oil spillage had given rise to unproductive soil, thereby killing the people's interest in agricultural activities, particularly crop cultivation and fishing. It also came to light that the oil spillage had affected the socio-economic activities of the people, thereby inducing an antagonistic relationship between the oil companies and the host community.

Asoya. S..I. (2010) recommends that permanent Disaster Management Institution should be established in this area, as none has ever existed there previously. This step is important

because the area (Ibeno LGA) is mostly affected by chemical hazards.

The second recommendation was directed specifically to the oil companies and stated that Community participation and involvement should be considered in matters affecting the Community and that they should ensure transparency with regard to the payment of compensations, gifts and contracts that are awarded to the community. This is particularly Important as it was the major cause of the vandalized pipeline, unrest and disharmony within the community, mostly among the youths and elders.

The third recommendation was directed to the Nigerian Government suggested that they should undertake a review of laws and policies affecting the relationship of oil companies with their host communities, which ought to include the Land Use Act, EIA Decree and Petroleum Production and Distribution Act, as well as other relevant laws.

2.4 ECOLOGICAL DEGRADATION

The activities of the oil companies are not without some undesirable effect on the Eco-system. Three such undesirable areas affected are mentioned by Odu (1981). They are:

- (1) Destruction of vegetation during intensive oil exploration.
- (2) The continuous presence of light, heat, noise and in some cases dirty emission from gas flaring.
- (3) Oil pollution of the environment through accidental blowouts, oil pipeline leaks, failure of storage tanks and effluents from refinery.

However, during commercial production of crude oil, which encompasses drilling, refining, transportation and marketing, add pollutant in the environment. The effect of oil spills on land is varied, depending mainly upon the geographical factors and the amount of spillage which has deleterious effect on farm land Odu, (1981).

2.5 WASTE DISCHARGE AND DISPOSAL

Refinery waste also contains very toxic chemicals, which constitutes potential land, water and air pollutants. Atmospheric contaminants from refinery operations include oxides of nitrogen, carbon and sulphur. Liquid refinery effluents usually contain oil and grease. These compounds contain organic chemicals such as phenol cyanide, sulphide-suspended solids, chromium and biological oxygen demanding organic matter, which on getting in contact with land and water pollute them.

On the other hand, oil pollution has destroyed nutrients in the soils where they have occurred, hence the quality of the soil is reduced and the toxic content is increased.

The growth of the country's oil industry, combined with a population explosion and inadequate enforcement of environmental regulations led to substantial damage to Nigeria's environment, especially in the Niger Delta region (Badejo and Nwilo, 2004).

Oil spills pose a major threat to the environment in Nigeria. If not effectively managed, it could lead to total annihilation of the ecosystem, especially in the Niger Delta, where oil spills have become prevalent. Life in this region is increasingly becoming unbearable due to the ugly effects of oil spills and many communities continue to groan under the degrading impact of spills (Oyem, 2001).

2.6 OIL EXPLOITATION THE IMPACT ON AGRICULTURE.

Agriculture initially, had been a strong contributor to the economic mainstay of the Niger Delta communities, which had witnessed downwards trend. The Federal Office of Statistics (F.O.S) (1985) stated that Crop farming and fishing activities account for about 90% of all forms of activities in the area. They also estimated that about 50%-68% of the active labour force is engaged in one form of agricultural activity or the other, including farming and fishing. The oil industry employs only 5% of the labor force (as opposed to 70% which agriculture once employed before the country became a single commodity export economy with crude oil production). In the past, Agriculture (farming) used to be the major occupation of the people which includes the planting of palm trees, rubber and raffia palm. Asoya. S.I. (2010)

Other crops found in the region include cassava, yam, plantain, banana, cocoyam, tomato, pepper, coconut, mango and avocado. The first three of these crops cassava, yam and plantain are the region's staple food items, grown even in the gardens of city dwellers. Locally fabricated cassava mills abound in many rural communities and in the towns providing one of the most potent avenues through which the crop shifts from its conventional category of food crop to commercial crop. It is in these mills, besides the home-based methods used by most rural dwellers, that large quantities of cassava tubers are processed into gari, which is arguably the most important food item in Southern Nigeria (Akpan, 2005).

2.7 SOIL CONTAMINATION

Oil spillage on the environment hamper proper soil aeration as oil film on the soil surface acts as a physical barrier between air and the soil. Oil pollution influences the physicochemical properties of the soil such as temperature, soil texture, nutrient status and pH, (Egbe, 2010).

2.8 THE ROLE OF GOVERNMENT IN COMBATING ENVIRONMENTAL DEGRADATION

At the policy-making level, the Federal Ministry of Environment of Nigeria (FMENV) set up a "Special Unit" on Climate Change. It was established in recognition of "importance attached to the issue of climate change and global warming, and in view of the enormity of activities required for the implementation of the Climate Change Convention. (FMENV 2010).

However, programmes, policies and activities of the Ministry on climate change do not seem to have specifically targeted

and involved farmers. Consequently, farmers as major stakeholders appear to have inadvertently been left out in the climate change debate and policy making in the Niger Delta by governmental authorities. Asoya. S.I. (2010)

In a related development, the climate change discourse in Nigeria received a big boost with a major conference that was organized by the Department of Geography, University of Nigeria (UNN) in 2009.

The conference whose theme was Climate Change and the Nigeria Environment touched on various facets of the climate change phenomenon including agriculture and food security, socio-economic development, vulnerability and adaptation to climate change, climate change education and awareness (Anyadike et al. 2010).

2.9.1 LAWS AND POLICIES

Laws and policies enacted towards managing oil business activities at the international and national levels. These laws and policies are given in the following sections.

2.9.2 OIL POLLUTION ACT (OPA) OF 1990

The Oil Pollution Act of 1990 (OPA 1990) is responsible for many of the nation's Improvements in oil spill prevention and response. OPA 1990 provides guidance for government and industry on oil spill prevention, mitigation, cleanup and liability.

The majority of OPA 1990 provisions were targeted at reducing the number of spills followed by reducing the quantity of oil spilled. OPA 1990 also created a comprehensive scheme to ensure that sufficient financial resources are available to clean up a spill and to compensate persons damaged by a spill. It also ensures that the federal response system is adequately prepared to manage the impacts of oil spills that do occur; and mandates that industry implement prevention and preparedness measures (Abdul, O. 2009)

2.9.3 THE NIGER DELTA DEVELOPMENT COMMISSION (NDDC)

To reduce the rate of oil incidents along the Nigerian Coast particularly as a result of vandalisation, the Federal Government through an act of the National Assembly in 2000 passed into law the Niger Delta Development Commission (NDDC). The Act among other things, established a Commission to carry out among other things the following tasks:

- A. Survey the Niger-Delta area in order to ascertain measures, which are necessary to promote its physical and socio-economic development.
- B. Prepare plans and schemes designed to promote the physical development of the Niger-Delta area
- C. Identify factors inhibiting the development of the Niger-Delta and assist the member states in the formation and

implementation of policies to ensure sound and efficient management of the resources of the Niger-Delta;

D. Tackle ecological and environmental problems that arise from the exploration of oil in the Niger-Delta area.

2.9.4 COMPENSATION FOR OIL POLLUTION DAMAGE, 1971

The Environmental Impact Assessment (EIA) decree No 86 of 1992 was promulgated to protect and sustain the Nigerian ecosystem. The law makes the development of an EIA compulsory for any major project that may have adverse effects on the environment Ntukekpo and Olagoke, (1996). It sought to assess the likely or potential environmental impacts of proposed activities, including their direct or indirect, cumulative, short term and long term effects, and to identify the measures available to mitigate adverse environmental impacts of proposed activities, and assessment of those measures Ozekhome, (2001).

2.9.5 NIGERIAN SAT 1

The Nigerian Sat 1 Satellite has joined the Disaster Monitoring Constellation, an international early-warning satellite network transmitting real-time information about drought, deforestation and man-made disasters observable from space. The Nigeria Sat-1, an Orbit Satellite for geographical mapping, would also help to check the perennial problem of oil pipeline vandalisation in addition to assist in combating and managing oil spill incidents. The Nigeria Sat-1 would contribute in monitoring oil spill by providing the spill position which would serve as input data into the oil spill model. It would also give the extent of coastal water and coastal areas polluted. These information are vital for quick clean up of oil impacted areas.

Fatai O. A (2006).

2.9.6 ENVIRONMENTAL SENSITIVE INDEX (ESI) MAPPING.

ESI maps are base maps that show the sensitivity of given locations or areas to a particular stress factor (such as exposure to petroleum products) on a scale of 1 to 10, 10 being most sensitive. The maps may contain physical and geomorphic features such as shorelines, biological features and socioeconomic features such as agricultural fields. Some ESI maps contain features of particular interest to oil spill planning and response, such as the recommended positions of booms or skimmers. The sensitivity of a given feature to a stress factor may be indicated by the color given the symbol or pattern used to represent it.

Jill P. (2002).

2.10 ADAPTIVE MEASURES FOR FARMERS TO CLIMATE RELATED ENVIRONMENTAL CHANGES

Adaptation to the adverse effects of climate change is a key issue for all countries, especially developing countries such as

Nigeria, which are often the most vulnerable. De Chavez and Tauli-Corpuz (2008) defined climate change adaptation as the process by which ecological, social, or economic systems adjust to actual or expected climatic stimulus and their effects or impacts.

Adaptation is widely recognized as a vital component of any policy response to climate change because it helps farmers achieve their food, income and livelihood security objectives in the face of changing climatic and socioeconomic conditions, including climate variability, extreme weather conditions such as droughts and floods, and volatile short-term changes in local and large-scale markets (Kandlinkar and Risbey 2000).

Studies show that without adaptation, climate change is generally detrimental to the agriculture sector; but with adaptation, vulnerability can largely be reduced (Easterling et al. 1993 and Mendelsohn 1998).

The degree to which an agricultural system is affected by climate change depends on its adaptive capacity. Adaptive capacity is the ability of a system to adjust to climate change (including climate variability and extremes) to moderate potential damage, to take advantage of opportunities, or to cope with the consequences (IPCC, 2001). Thus, the adaptive capacity of a system or society describes its ability to modify its characteristics or behaviour so as to cope better with changes in external conditions (Gbetibouo, 2009).

Adaptation to climate change requires that farmers first notice that the climate has changed, and then identify useful adaptations measures and implement them (Maddison 2006). Adaptation to climate change refers to any adjustment that occurs naturally within ecosystems or in human systems in response to climatic change that either moderates harm or exploits beneficial opportunities in response to actual or expected climate related environmental changes (IPCC Third Assessment Report, 2001).

The devastating effects of climate change can be reduced if appropriate adaptation measures are employed. Many agricultural adaptation options have been suggested in the literature. They encompass a wide range of scales (local, regional, global), actors (farmers, firms, government), and types:

- (a) micro-level options, such as crop diversification and altering the timing of operations;
- (b) market responses, such as income diversification and credit schemes;
- (c) institutional changes, mainly government responses, such as removal of present subsidies and improvement in agricultural markets; and (d) technological developments - the development and promotion of new crop varieties and advances in water management **techniques** (Smith and Lenhart 1996; Mendelsohn 2001; Smit and Skinner 2002; Kurukulasuriya and Rosenthal 2003).

2.11 MEASURES TO MITIGATE EFFECT OF CLIMATE CHANGE ON AGRICULTURAL PRODUCTIVITY.

The following strategies have the prospect to boost the country’s agricultural production.

1. Engagement on more irrigation schemes and proper water conservation strategies.
This will allow farmers raise crops such as cereals more than once annually, thereby, increasing agricultural productivity without depending much on natural rainfall.
2. Selection of genetically improved crops that will adapt to polluted soil and rainfall regimes of an area. Drought resistant crops, healthy seedlings, and disease resistant crops should be cultivated.
3. Farm operations should be properly timed especially in those areas where rainfall is erratic and undependable.
4. Re - organization of agricultural research institutions to be in tandem with modern realities of environmental degradation as well as climate change.
5. Adoption of best practices to minimize CO2 emission in the environment. These could be achieved by strict legislative acts that will minimize gas flaring, bush burning,

and excessive land clearing (Umeghalu, I.C.E. and Okonkwo, J.C. 2012)

3.0 RESEARCH METHODOLOGY

The study was carried out primarily through the survey method and interview of farmers in Agricultural sector from the selected Niger Delta states that has experienced environmental degradation. Delta, Imo, and Bayelsa State. Secondary data were obtained through books, journals, and internet. A sample size of 253 was obtained from the Population of 684 at 5% error tolerance and 95% degree of freedom using Yamane’s statistical formular. The questionnaire was designed in likert scale format. The researcher conducted a pre-test on the questionnaire to ensure the validity of the instrument. Data collected will be presented in frequency tables. Chi-Square statistical tools will be used to test the hypotheses.

3.1 DATA ANALYSIS AND DISCUSSION.

Research question one:

What is the effect of intensive oil exploitation on farm land?

Table 1:

| S/N | ITEMS | SA | A | UD | D | SD | TOTAL |
|-----|--|-----|-----|-----|----|----|------------|
| 1 | Dirty emission from gas flaring encourages acidic rain. | 76 | 60 | 73 | 8 | 1 | 218 |
| 2 | Soil aeration as oil film on the soil surface acts as a physical barrier between air and the soil. | 68 | 108 | 35 | 5 | 2 | 218 |
| 3 | Oil spillage aid soil infertility due to the destruction of soil microorganisms. | 69 | 127 | 18 | 3 | 1 | 218 |
| | TOTAL | 213 | 295 | 126 | 16 | 4 | 654 |

Source: Field Survey, 2013

Table 1. Shows that 213(33%) of the respondents Strongly Agreed that oil exploration cause Environmental degradation while 295(45%) of the respondents merely Agreed. The remaining 126(19%) were undecided, 16(2%)

only Disagreed, while 4(1%) of the respondents Strongly Disagreed. This implies that oil exploration cause Environmental degradation.

Ho: oil exploration has not led to environmental degradation in Niger delta

Table:2 Chi-Square Tests

| | Value | Df | Asymp. Sig. (2-sided) |
|------------------------------|------------|----|-----------------------|
| Pearson Chi-Square | 569.165(a) | 12 | .000 |
| Likelihood Ratio | 603.755 | 12 | .000 |
| Linear-by-Linear Association | 202.676 | 1 | .000 |
| N of Valid Cases | 654 | | |

Table 2 is the output of the computed Chi-Square values from the cross tabulation statistics of observed and expected frequencies with the response options of agree to disagree based on the responses of the research subjects from selected state. Pearson. Chi-Square computed value (X2c= 569.165) is greater than the Chi _Square tabulated value (X2t =21.03) with 12 degrees of freedom (df) at 0.05 level of alpha (X2c =569.165, p,< .05)

Decision Rule.

The decision rule is to accept the alternate hypothesis if the computed Chi- Square value is greater than tabulated Chi-Square value otherwise reject the null hypothesis.

Decision

Since the Pearson Chi- Square computed X2c= 569.165 is greater than Chi- Square table value X2t =21.03, the null hypothesis is rejected and alternate hypothesis is accepted. Thus, we conclude that oil exploration has led to environmental degradation in Niger Delta.

Research question two:What is the impact of climate change on peasant agriculture?

Table 3:

| S/N | ITEMS | SA | A | UD | D | SD | TOTAL |
|-----|--------------------------------------|-----|-----|----|----|----|------------|
| 4 | Reduced Market price. | 60 | 105 | 11 | 28 | 14 | 218 |
| 5 | Reduction in crop yield. | 76 | 111 | 18 | 9 | 4 | 218 |
| 6 | low generation of income for farmers | 128 | 72 | 9 | 3 | 6 | 218 |
| | TOTAL | 264 | 288 | 38 | 40 | 24 | 654 |

Source: Field Survey, 2013

Table 2. Shows that 264(40%) of the respondents Strongly Agreed that Environmental degradation affect Agricultural production 288(44%) of the respondents merely Agreed .From the remaining respondents, 38(5%) were Undecided, 40(6%) disagreed and only 24(4%) of the respondents

Strongly Disagreed to the statement. Thus it was concluded that the reduction in crop yield, market price as well as low generation of income for farmers as a result of poor quality of crop is the effect of Environmental degradation on agricultural production.

Ho: Reduction in crop yield and low generation of income for farmers are not the effect of environmental degradation on agricultural production.

TABLE 4 SPSS result of the effect of environmental degradation on agricultural production.

| Particulars | R | R ² | Adj. R ² | DW | Standard Coefficients | | F | Sig. |
|-------------|-----------------------|----------------|---------------------|------|-----------------------|---------|---------|-------|
| | | | | | Beta | T-Value | | |
| State | 0.-952 ^(a) | 0.905 | 0.905 | .487 | 0.-952 | -45.488 | 206.140 | 0.000 |

SOURCE: SPSS 2013

NOTE:

- R = Correlation Coefficient or Beta
- R2 = Coefficient of Determination
- Adj. R2= Adjusted Coefficient of Determination
- DW = Durbin Watson (d) test statistic
- T-value= Student t- test Statistic
- F = F- test statistic
- Model Equation ED = 0.306 + 0.884AP

The result indicate that there was a negative significant effect of environmental degradation on agricultural production as t = -45.488 and which is below the rule of thumb positivity of 2 and the coefficient of strategic management is (0.306). The variations from the model are explained by the model as indicated from the coefficient of the determination (r2) value of 95.2%.

Also the result indicates that there is a negative relationship between environmental degradation and agricultural production as indicated by r value of 0.-952 which is negative as shown by beta value of 0.-952.

Research question three: What are the contributions of government towards combating environmental degradation?

Table 1:

| S/N | ITEMS | SA | A | UD | D | SD | TOTAL |
|-----|---|-----|-----|-----|----|----|-------|
| 1 | Provision of drought resistant and genetically high yielding crops. | 69 | 127 | 18 | 3 | 1 | 218 |
| 2 | Provision of extension and Agricultural training. | 68 | 108 | 35 | 5 | 2 | 218 |
| 3 | Provision of irrigation and drainage facilities. | 76 | 60 | 73 | 8 | 1 | 218 |
| | TOTAL | 213 | 295 | 126 | 16 | 4 | 654 |

Source: Field Survey, 2013

Table 1. Shows that 213(33%) of the respondents Strongly Agreed that oil exploration cause Environmental degradation while 295(45%) of the respondents merely Agreed. The remaining 126(19%) were undecided, 16(2%)

only Disagreed, while 4(1%) of the respondents Strongly Disagreed. This implies that oil exploration cause Environmental degradation.

Ho: oil exploration has not led to environmental degradation in Niger delta

Table:2 Chi-Square Tests

| | Value | Df | Asymp. Sig. (2-sided) |
|------------------------------|------------|----|-----------------------|
| Pearson Chi-Square | 569.165(a) | 12 | .000 |
| Likelihood Ratio | 603.755 | 12 | .000 |
| Linear-by-Linear Association | 202.676 | 1 | .000 |
| N of Valid Cases | 654 | | |

Table 2 is the output of the computed Chi-Square values from the cross tabulation statistics of observed and expected frequencies with the response options of agree to disagree based on the responses of the research subjects from selected state. Pearson. Chi-Square computed value (X2c= 569.165) is greater than the Chi _Square tabulated value (X2t =21.03) with 12 degrees of freedom (df) at 0.05 level of alpha (X2c =569.165, p,< .05)

Decision Rule.

The decision rule is to accept the alternate hypothesis if the computed Chi- Square value is greater than tabulated Chi- Square value otherwise reject the null hypothesis.

Decision

Since the Pearson Chi- Square computed X2c= 569.165 is greater than Chi- Square table value X2t =21.03, the null hypothesis is rejected and alternate hypothesis is accepted. Thus, we conclude that oil exploration has led to environmental degradation in Niger Delta.

Findings of the study

Based on the research investigation through the data collected from the questionnaire the following findings were made.

(A) The study has shown that intensive exploitation of oil has played a major role in the degradation of the natural environment in the Niger delta.

(B) The study shown that business activities such as poor handling of pollutant relate poor soil fertility and pollution of the farm land which transmit to low generation of income for the peasant farmers and drop in market price of their farm produce.

(C) the study also examined the areas the federal government has contributed to ameliorate the impact of environmental degradation such as repositioning research institutes to release genetically improved seedlings that will adapt to the changing environment, provision of irrigation facilities that ill support farmers who are experiencing devastating effect of acid rain on their farm land.

Conclusion

Based on the findings of this study, the effect of oil business activities has an over bearing influence on the environment in which farmers depend on.

The study established that, business activities especially in the area of oil exploitation have contributed pollutant in the environment which reduced crop yield, land fertility and greatly depressed the income of the peasant farmers in the Niger Delta region of Nigeria. This issue poses a fundamental question on the climate change that can result as a consequence of environmental degradation caused by business activities that has direct contact with physical environment.

RECOMMENDATION

Based on these findings, some recommendations are hereby presented;

(A) A major challenge to researchers, civil society and policy makers in the quest for innovative approaches to food security and agricultural adaptation to Environmental changes in the region is to involve farmers and learn from the adaptive measures they are already practicing to moderate the effect of the environmental degradation.

(B) Business activities that lead to climate change are a real threat to lives and food production as well as to the environment. If the MDGs of food security are to be attained in the Niger Delta, then there is need for more robust collaboration among Stakeholders towards adopting innovative approaches and adaptive measures to tackle the environmental degradation in Nigeria.

(C) There is a need to look at the weakness of some policies that are meant to act as a proactive measure towards environment degradation. There is a need to protract the existing legislations which would be properly implemented in the control of activities of companies in Oil Industry.

(D) The roles and responsibilities of all the stakeholders in observing and controlling the business of oil exploration and exploitation activities in the Niger Delta region need to be clearly defined.

(E) Full utilization of the Nigerian Sat-1 need to be encouraged towards putting a check on oil spill by providing the spill position which would serve as input data into the oil spill model. It would also give the extent of coastal water and coastal areas polluted. These information are vital for quick clean up of oil impacted areas.

(H) In order to reduce the response time and bureaucracy in the environmental decision-making process, application of Geographic Information Systems (GIS) as an operational tool has been suggested to combat environmental degradation. It would go a long way to show Information on the exact position and size of the oil spill can be plotted on maps in GIS.

References

- Aaron, K. K., (2006), "Human Rights Violation and Environmental Degradation in the Niger Delta", in Elizabeth Porter and Baden Offord (eds), *Activating Human Rights*, Oxford, Barne, New York.
- Abdul, O.Y. (2009). Risk, Reaction, Corporation and the Law in an Oil Producing Country: Nigeria as an Example. Faculty of Law University of Ilorin, Nigeria. www.openmeeting2009.org
- Adejuwon, S.A. (2004). Impact of Climate Variability and Climate Change on Crop Yield in Nigeria, A Paper Presented at the Stakeholders Workshop on Assessment of Impact and Adaptation to Climate Change (AIACC) (2-8)
- Akpan, W.N. (2005). Between the sectional and the national: Oil Grass Root Discontent and Civic Discourse in Nigeria. Ph.D. thesis, Rhodes University. South Africa.
- Annelisa grigg (2009) Dependency and impact on ecosystem services unmanaged risk, unrealised opportunity:A briefing document for the food, beverage and tobacco sectors.
- Anyadike, R.N.C; Madu, I.A and Ajaero, C.K (2010). Climate Change and the Nigeria Environment. Conference Proceedings. Nsukka: Department of Geography, University of Nigeria.
- Asoya S.I(2010). "The impact of oil spillage on agricultural production," Masters in disaster risk management (mdm)
- Badejo, O.T and Nwilo, P.C. (2004). Management of Oil Spill Dispersal along the Nigerian Coastal Areas. ISPRS Congress. Istanbul, Turkey.
- Bello, O.B., Ganiyu, O.T, Wahab M.K.A, Afolabi, M.S, Oluleye, F., Mahmud J, Azeez MA, Abdulmaliq, S.Y. (2012). Evidence of Climate Change Impacts on Agriculture and Food Security in Nigeria. *Int. J. Agric. and Forestry*, 2(2): 49-55 DOI: 10.5923/j.ijaf.20120202.
- Catherine Schwarz et al.(1999). "Chambers Concise Dictionary," Chambers Harrap Publishers Ltd, Edinburgh, at pg 344
- Chindah AC., Braide S.A, (2000) The Impact of Oil Spills on the Ecology and Economy of the Niger Delta". In Proceedings of the Workshop on Sustainable Remediation
- Comfort, H., Olawoye, J and Nnadozie .K. (2002). Impact of International Trade and Multinational Corporations on the Environment and Sustainable Livelihoods of Rural Women in Akwa-Ibom State, Niger Delta Region , Nigeria
- Development Technology held at the Institute of Pollution Studies, Rivers State University of Science and Technology, Port Harcourt.
- Easterling, W.E. et al., (1993), Agricultural impacts and responses to climate change in the Missouri–Iowa–Nebraska–Kansas MINK region. *Climatic Change* V24.
- Egbe, R. E. And Thompson, D. (2010). "Environmental Challenges of Oil Spillage for Families in Oil Producing

- Communities of the Niger Delta Region,” Vol. 13, December, 2010, pp. 24-34
- Elif Akbostanci et al (2004) Pollution Haven Hypothesis. <http://ideas.repec.org/p/met/wpaper/0403.html>
- Emmanuel, A. A. and Alakinde, M. K. (2006). “Nature of Environmental Science”. Monograph of Department of Urban and Regional Planning, Federal University of Technology, Akure.
- Evelyn, M. Ityavyar¹ and Tyav, Terungwa Thomas² (2013) environmental pollution in nigeria: the need for awareness creation for sustainable development. journal of research in forestry, wildlife and environment. v4(2).
- Evelyn, M. Ityavyar¹ and Tyav, T. T. (2013) Theoretical Framework: An ecological perspective of change and development: www.ajol.info/index.php/jrfwe/article/download/84726/75830 Retrieved 16th October 2013.
- Fatai O. A. EGBERONGBE, P.C. NWILO and Olusegun T. BADEJO, (2006) Oil Spill Disaster Monitoring Along Nigerian Coastline. Nigeria Promoting Land Administration and Good Governance 5th FIG Regional Conference Accra, Ghana, March 8-11, 2006
- Gbetibouo, G. (2009). Understanding farmers’ perceptions and adaptations to climate change and variability: The Case of the Limpopo Basin, South Africa. Environment and Production Technology Division, International Food Policy Research Institute. Available from http://www.fao.org/fileadmin/user_upload/rome2007/docs/ifpri_limpopo_dp00849.pdf.
- Hagget, (1975). In S.M. Uchehgbu Environmental Management and Protection, Enugu, Precision Printers and Publishers.
- IPCC (2001). Climate Change (2001). Impacts, adaptation and vulnerability. (McCarthy J.J. et al (eds). Contribution of working Group II to the Third Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge: Cambridge University press.
- Jill Petersen, Jacqueline Michel, Scott Zengel, Mark White, Chris Lord and Colin Plank (2002) NOAA Technical Memorandum NOS OR&R 11 Environmental Sensitivity Index Guidelines. Hazardous Materials Response Division Office of Response and Restoration NOAA Ocean Service Seattle, Washington 98115.
- Kandlinkar, M and Risbey, J, (2000). Agricultural impacts of climate change: If Adaptation the answer, what is the question? Climatic Change V 45.
- Kurukulasuriya, P. and Rosenthal, S. (2003). Climate change and agriculture: A review of impact and adaptations. Climate change series paper no. 91. Environment Department and Agriculture and Rural Development Department, World Bank, Washington DC.
- Leyira, Christian Micah , Uwaoma Ironkwe, Olagunju , Adebayo (2013) Corporate Social Responsibility and Compliance with Regulations in Nigeria: journal of International Affairs and Global Strategy Vol 1
- Mendelsohn, R. (2001). Adaptation. In: Mendelsohn, R., Edward, E. (eds.). Global Warming and American Economy: A Regional Assessment of Climate Impact. UK: Cheltenham
- Moffat, L. (1992) The “Gender and Development” Approach As An Alternative to Women in Development Approaches in Gender and Environment: Lessons from Social Forestry and Natural Resources management A Sourcebook Published by Aga Khan Foundation Canada 8-11 pp. NDES (1997): Niger Delta Environmental Survey Phase One Report, Vols. 114.
- Odjuvwuederhie, .E.I. et al.(2006) the effect of oil spillage on crop yield and farm income in deltatate, nigeria: journal of central european agriculture vol 7(1)
- Ojimba, P. (2012). “Determining the effects of crude oil pollution on crop production using stochastic translog production function in Rivers State,” Nigeria. Journal of Development and Agricultural Economics Vol, 4(13), pp. 346-360, <http://www.academicjournals.org/JDAE>
- Oshwofasa, B. O., Anuta, D.E. and Aiyedogbon John O. (2012). “Environmental Degredation and Oil Industry Activities in the Niger-Delta Region.” African journal of scientific research Vol.9(1) ISSN 2220-9433,
- Osibanjo, O (1998). “ Industrial Pollution, workers health and the environment In poverty, ” Health, and the Nigerian Environment. A Oshuntogun Ed) FEDEN:Lagos
- Oyem, A.,(2001). “Christian call for action on Nigeria oil spill”. Sage-Oxford’s Christian Environmental Group
- [Roy Cordato](#) (2005) Theory of Environmental Economics: praxeological perspective <http://mises.org/daily/1760> retrieved 16th October 2013.
- Sankar.U. (2001) Environmental Externalities. coe.mse.ac.in/dp/envt-ext-sankar.pdf .retrieved 16th October 2013
- Smit, B. and Skinner, M.W. (2002). Adaptation options in agriculture to climate change: A typology. Mitigation and adaptation strategies for global change 7 (1) 85-114, DOI: 10.1023/A:1015862228270.
- Smith, J. B. and Lenhart, S. (1996). Climate change adaptation policy options. Climate Research 6: 193- 201
- Uduak, U.(2009). “Ecological degradation and environmental pollution in the Niger delta,” a direct impact of oil exploration: human rights issue?
- Umeghalu, I.C.E., Okonkwo J.C. (2012). Mitigating the effect of climate change on Nigerian agricultural productivity ;Scientific Journal of Agricultural 1(4)