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Environmental implications of oil exploration and exploitation in the coastal region of Ondo State, Nigeria: A regional planning appraisal

Olujimi Julius Ajilowo Bayode¹, Emmanuel Adebayo Adewunmi^{1*} and Sogbon Odunwole²

¹Department of Urban and Regional Planning, School of Environmental Technology, Federal University of Technology Akure, Ondo State, Nigeria.

²Department of Urban and Regional Planning, Faculty of Environmental Studies, Rufus Giwa Polytechnic Owo, Ondo State, Nigeria.

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Oil exploration and exploitation in Nigeria have evolved through a long history. However, they have left trail of woes in their path with so much damage to the ecosystem and problems to human life in the exploration region. In the light of this, the paper appraises the implications of oil exploration and exploitation in the coastal region of Ondo State. Data used in the paper were obtained through physical verification, regular observations, constant monitoring, documentation and records of oral history and administration of questionnaire in some selected settlements in the region. The paper highlighted several direct environmental and associated problems that emanated from oil exploration and exploitation in the region. The problems identified among others include large-scale environmental pollution and degradation of agricultural land which serves as source of income for the people coupled with social unrest arising from unpaid claims of compensation and lack of concern for the people in the exploration area. The paper advocates for oil spill management plan, control and clearance of spills; giving concessions to indigenous oil companies during bidding process by granting licenses to operate in the Niger-Delta region; adoption of long-term monitoring and surveillance mechanism; continuous provision of infrastructure for the host communities by prospecting oil companies; and development of national oil spill contingency plan among others with a view to guarantee sustainable development of the environment in the region.

Key words: Exploration, exploitation, coastal region, Niger-Delta, and environmental pollution.

INTRODUCTION

The exploration and exploitation of the environment dates back to the existence of man on earth (Ekundayo, 1988). His exploration and exploitation activities continue to reveal complex implications in spite of improvement in the technology adopted in carrying out these activities. Oil exploration and exploitation are few of such activities which started at different times in different parts of the world. Oil and gas related operations are the most obvious industrial activities in the coastal region of Ondo

State. Oil and gas resources account for over 98% of the country's export earnings and 83% of the government's total revenue (Wikipedia, 2006). Even when serious efforts are being made at different quarters to diversify the Nigerian economy, her dependence on oil is bound to continue for a long period of time. Petroleum exploration has triggered adverse environmental impacts in the Delta region of Nigeria through incessant environmental, socio-economic and physical disasters that have accumulated over the years due to limited scrutiny and lack of assessment (Achi, 2003).

In Nigeria, immense tracts of mangrove forests have been destroyed as a result of petroleum exploitation in the mangroves (Diop, 1993; Wikipedia, 2006). These have

Corresponding author. E-mail: bayoemmanuel@gmail.com. Tel: +234 806 246 1642.

not only caused degradation to the environment and destroyed the traditional livelihood of the region but have caused environmental pollution that has affected weather conditions, soil fertility, waterways aquatic habitats and wildlife. This inhuman situation continues to attract the interest of environmental observers and calls for regular evaluation of the exploration and exploitation activities in the coastal areas of the country. Since Ondo state has the longest coastline among the oil producing states in Nigeria, this paper evaluates the environmental implications of the exploration and exploitation activities in the coastal region in the state with a view to promoting sustainable development in the region.

LITERATURE REVIEW

Definition of development

Mabogunje (1981) views development as that which includes economic growth, modernisation, distributive justice and socio-economic transformation. By the end of the early 1960s, development began to be seen not as only increasing the per capita income but more importantly, reducing the poverty level among the masses or, as it was better put, satisfying their basic needs.

Development and economic development have been used interchangeable mainly because much of development has to do with economic issues and then social/welfare matters. The assumption has always been that other aspects of development will not be very functional without and cannot be isolated from economic matters and vice versa. This establishes a give and take scenario; just as it is the case of increased real income per capita in relation to improvements in health and nutritional status, educational achievement, access to resources, a 'fairer' distribution of income and increase in basic freedoms.

As stressed by Sada (1988), development goes beyond issues of per capita income and Gross National Product to include a socio-economic context which includes issues of human welfare.

The socio-economic context of development implies modernisation, "a process whereby a society is reoriented in its structure, institutions, values, and patterns of behaviour. Modernisation is said to be a complex human relations as well as the generation and utilization of technological resources to change the quality of human life. Mabogunje (1988) also conceived development as distributive justice which comprises the nature of goods and services that government must provide; the need for goods to be accessible to all members of the society; and attempts at controlling, eliminating or sharing the burden of development usually referred to as "externalities". All these take place within the human environment.

Environment – The home of man

The word "environment" is traditionally defined as the total surrounding which includes 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. The World Bank (1991), therefore defines the environment as the natural and social conditions surrounding all mankind and including future generations.

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 non-living), socio-economic components and processes of the human environment. These components and processes include social, economic, technological, administrative, cultural, historical, archaeological components and processes. Land and associated resources, structures, sites, human health, nutrition and safety are also inclusive (Emmanuel and Alakinde, 2006).

In the above context, the environment is seen as the natural habitat of man with several components and within which series and various levels of activities and processes take place. These components and activities or processes, in most cases, reflect the level of development in the environment that needs to be protected in all ramifications.

The link between environment and development

McEachern (1997) identified keys to development to include level of labour productivity, technology and education, level of efficiency in the use of labour, presence of capital, infrastructure and availability and richness of natural resources among other things. These components of development target productivity which if not properly managed (especially the available natural resources) will lead to a degenerated environment, unfit for both man and the ecosystem at large. This situation brings into focus the consciousness that development can no more be sustained without conserving the environment and the concept of sustainable development becomes the operational framework.

Sustainable development as defined by the World Commission on the Environment and Development (1987) in its report entitled 'Our Common Future' is the development that meets the needs of the present generation without compromising the ability of future generations to meet their needs. This report has advanced the understanding of global interdependence and the relationship between economic development and the environment. Therefore, sustainable development

Table 1. Yearly distribution of oil spills in Nigeria (1976-1983).

S/No.	Year	Number of oil spills	Net volume spills (Barrels)
1	1976	128	20,023
2	1977	104	31,144
3	1978	154	97,250
4	1979	157	630,405
5	1980	241	558,053
6	1981	233	22,840
7	1982	213	33,612
8	1983	130	32,467
Total		1,360	1,425,794

Source: Nwankwo (1984).

dwells on the capacity to improve the quality of human life while living within the carrying capacity of the supporting ecosystem. Development is real only if it makes our lives better in all ramifications; and sustainable development becomes a balancing act and sometimes compromise between efficiency (economic sustainability), equity (social sustainability) and conservation (environmental sustainability) (Olujimi, 2010).

The concept of development and the quality of the environment postulates that there is a negative relationship between exploration activities and the environmental quality of man and this becomes relevant to resource management in Nigeria because it involves reckoning both negative and positive externalities from the spatial *inter-temporal* and inter-regional perspectives. This cannot be neglected in the evaluation of impacts of oil exploration on man and the Oil producing coastal environment of Ondo State, Nigeria.

OIL EXPLORATION (WORLDWIDE): DEFINITIONAL APPROACH

Exploration refers to mining or exploitation of mineral resources from the land and sea using technological know-how. According to Nigerian Environmental Study/Action Team (1991) as highlighted by Mba (1995), there are three (3) categories of mineral resources namely fuel mineral, metallic mineral and industrial minerals and their exploration processes differ. Fuel mineral exploration activities involve exploration, extraction, processing and transportation as well as storage and consumption of petroleum, natural gas, coal, lignite and uranium. Similar activities which involve iron, gold, columbite, cassiterite and tantalite is referred to as metallic exploration while those that involve limestone, marble, feldspars, gypsum, gravel and sand among others come under industrial exploration. Fuel exploration is done basically for harnessing energy that is latent in

the minerals, metallic exploration is carried out for the purpose of industrial and economic undertakings while industrial exploration is for the use of the minerals in construction.

Benefits of oil exploration

Benefits of oil exploration abound. The amount of income generation by oil producing countries of the world is not secret to persons or organisations outside the sector. For instance, the discovery of oil in Nigeria in the late 1950s led to the temptation to give little or no attention to the other sectors of the economy thereby leading to a mono-economic nation. The data reported by the Central Bank of Nigeria (1994), and Opuenebo and Nnah (1995) revealed that the total revenue from oil rose from 7,253 million naira in 1983 (69.02% of the Total National Revenue) to 106,155.4 million naira in 1993 (76.44% of the Total National Revenue). The subsequent years never revealed a contrary trend in the income generated from oil by the nation. The revenue from the Oil Sector has been the mainstay of the Nigerian economy as it is ploughed into other sectors for developmental purposes. The erroneous attitude of the policy-makers towards oil exploration has been such that the oil deposit will never be exhausted. However, efforts are made in part towards developing other sectors in order to increase the country's revenue from the sectors. Nonetheless, the on-going activities in the oil sector are associated with problems that deserve attention.

Associated problems of oil exploration

Environmental degradation resulting from oil production

According to Nwankwo and Ifeadi (1988), various materials released into the environment in the course of oil production operations include Drill cuttings, drilling mud, and fluids used for stimulating production; Produced fluids, oil and water, and chemicals injected into them to control corrosion or assist the separation of oil from water; and general industrial waste.

Despite careful precautions, accidents do occur periodically in the drilling and exploitation of crude oil. These accidental discharges resulted from equipment failure and human error. It is known that the majority of oil spills during 1976-1980 occurred through accidental discharges attributed to equipment failure to malfunctioning, age, overloading, and corrosion or abrasion of machine parts. Nigeria recorded 1,360 oil-spill incidents during 1976 – 1983 and the total quantity of oil released into the environment was 1,426 million barrels (Nwankwo, 1984). The occurrence of oil spill incidents and the corresponding volume within the period 1976 - 1983 are shown in Table 1.

Significant pollutants or pollution indicators for selected sources in the oil industry include drilling mud and cuttings, oil and grease, chlorine, sulphides, turbidity, suspended solids, heat, pH (acidity/alkalinity PH), heavy metals, Biochemical Oxygen Demand (BOD), and Chemical Oxygen Demand (COD).

Environmental impact of oil spills in Nigeria

Several “blow-outs” at prospecting sites coupled with spillage as a result of damage to pipelines have been reported from time to time in different sites in the oil producing areas of Nigeria (Olaniyan, 1985). Depending on the level of contamination, natural rehabilitation may take 1 to 25 years. A great percentage of those spills indicated in Table 1 occurred in sensitive environment in onshore and offshore areas of Nigeria. The effects of these spills have been catastrophic in many respects depending on the oil dosage, the type of oil, metrological conditions, physical geography of the area and the biota (Nwankwo and Ifeadi, 1988). Statistics have shown that during 1976-1980, the majority of oil spill incidents occurred in the purely mangrove swamp zones and the offshore areas of the Niger-Delta, which constitute the most productive biological areas. Within six (6) months, mangrove vegetation started dying in the contaminated waters. Crabs, molluscs and periwinkles died while associated fire hazard spreading to about 25 ha of land occurred. Worse still, re-pollution of the top soil from below was noted about two years after the incident while water table was affected across 15.1 ha. From the above analysis, oil pollution whether it is due to a spillage or discharge of crude oil or refined petroleum products may damage the environment in various ways.

In water, oil film on the water surface could prevent natural aeration and lead to the death of trapped marine organism. In some cases, fish may ingest the spilled oil or other food materials impregnated with oil and as such become inedible and unpalatable.

Oil spill on the land could lead to retardation of vegetation growth for a period of time and in extreme cases, to destruction of vegetation. It could also create potential fire hazard, as in the Oyakamo oil pipeline spillage which render the soil unfit for cultivation and polluted about 360 km of salt marshes as reported by Royal Society of London in 1982. It was said that some shell-fish population may require 5 to 10 years to recover from the impact of the spill due to a decrease in the number of reproductive-age shell-fish stocks and an increase in the mortality of larvae setting on the oiled sediments.

There were worries on the handling of drilling mud and cuttings, with respect to prohibited points of discharge, handling and disposal of oil-based mud at onshore and offshore locations, handling and disposal of cuttings and methods of sampling and analysis. These environmental

problems seem to be well articulated by people in the oil-producing Niger-Delta; for instance Ikporukpo (1988) in the study of two (2) small communities around the Forcados Oil Terminal, 86% of the respondents in one (Odimodi) identified problems consequent on oil exploration, report oil pollution, among four broad groups of problems as the most important while the corresponding percentage for the other 6 community (Ogulagha) is 45%.

In the light of the identified consequences of oil exploration and exploitation in the reviewed literature, there is an urgent need for the appraisal of the current situation particularly in the coastal area of Ondo state that harbours the longest part of Nigerian coastal region with a view to promoting sustainable development of the region.

CONCEPTUAL FRAMEWORK

The concept behind understanding the investigation involved in this study and the premise in validating the conclusion reached is based on the following scientific theories:

Mangrove ecosystems are environmental media that exist in a balanced complex and in a state of flux (Awosika, 2006). This balance can however be disrupted when there is an application of force or a stressor agent or perturbation in the form of impact, to an excessive degree or to such an extent that it pushes the functioning ecosystem beyond its ability to restore homeostasis. Thus, when certain thresholds of tolerance are exceeded, recovery is problematic or at least difficult.

A disruption in the natural vegetation dynamics normally occurs when a forest ecosystem experiences fluctuating pollution impact over a long period of time (Imevbore and Odu 1985). Usually there is a bio-concentration of hydrocarbons in several organisms such as plants, invertebrates and birds, when the marine environment experiences chronic exposure of petroleum or its derivatives. These are the concepts on which this work is based.

An integrated resource management approach, such as Integrated Coastal Zone Management (ICZM), is required to address the broad range of social and environmental issues (World Bank, 1995) in the Niger Delta as a whole and move the region towards sustainable development.

COASTAL REGION OF ONDO STATE, NIGERIA: THE STUDY AREA

Geographical setting

The study area is at the extreme southern part of Ondo state. It consists of Ilaje and Ese-Odo Local Government



Figure 1. Map of Nigeria showing the location of Ondo State within the country.

Source: http://prisonpastor.com/images/the_new_map_of_nigeria.jpg, Retrieved Tuesday October, 26, 2010.

Areas. It shares boundaries with Okitipupa Local Government Area in the north; the Atlantic Ocean in the south; Ijebu Waterside Local Government Area (in Ogun State) in the west and Delta state in the east. It consists of over five hundred settlements spreading over 3,000 km². The area boasts of over 180 km long shoreline thereby making it the longest coastline in Nigeria. The study area falls within latitudes 6° and 6° 30' north of the equator and longitudes 4° 45' and 5° 45' east of the Greenwich Meridian. The area is positioned within the equatorial evergreen swamp forest. Figures 1 and 2 shows the location of Ondo state within Nigeria and the location of coastal region of Ondo state (the study area) within Ondo State respectively.

Oil exploration in the coastal region of Ondo State

Oil exploration and production started in the study area in the 1960s. It was then initiated by Gulf Oil Company. However, construction began in the area in 1977. The initial locations of the exploration exercise in the region

were Awoye, Ojumole, Odofado, Molutehin and Oba-nla. By 2005, there were six Oil companies exploring at the region namely Chevron-Texaco Nigeria Limited, Shell Petroleum Development Company, Cronicle, Express Oil, Consolidated Oil and Allied Energy. Due to the presence of these several oil companies, a wider area has been covered by some physical development compared with what used to be in the 1960s and 1970s. Presently, there are several oil fields within the study area out of which 14 belong to Chevron-Texaco Nigeria Limited (Awobajo, 1981). These are:

- Opuekeba Oil field – onshore
- Maren I oil field – offshore
- Maren II oil field – offshore
- Opolo Oil field – offshore
- Parabe Oil field – offshore
- Ishan Oil field – offshore
- Ishan west oil field – offshore
- Malu Oil field – offshore
- Ewan Oil field – offshore
- Okagba Oil field – offshore



Figure 3. The arrival of Awoye inhabitants from fetching water due to the pollution of water by oil spillage in the area.

The residents in the localities are considered as one of the major stakeholders. For the administration of the questionnaires on the residents, ten (10) communities were randomly selected based on their population size and functions in the coastal area. Stratified random sampling was employed to select the household-heads that were interviewed. In the 10 selected settlements, 20% of the residential buildings in each residential quarters were randomly selected and a household-head was selected for interview. Data collected were qualitatively analysed and presented in simple percentages in tables and reported in the paper.

RESULTS

Major environmental implications of oil exploration in the coastal areas of Ondo State are discussed below.

Environmental pollution

Generally, the notable sources of pollution in the Niger-Delta are seismic surveys, canalisation, poor waste disposal, oil spillage, and gas flaring. Pollution is the primary negative impact of oil exploration in the study area. This pollution ranges from water to land and air pollution.

Water pollution has been caused by oil spillages and chemical discharges which has led to the destruction of aquatic life and ill health among residents. This has

resulted from increased Chemical and Biochemical Oxygen Demand (COD and BOD) in the case of death of aquatic life while diseases such as hyperactivity and risk of high blood pressure, heart attack and stroke coupled with kidney problems have been reported by Okitipupa Division Development Association to the Bitumen Committee in 2000. Food crops have been contaminated. The reason is not far-fetched as the people consume the same water since there is no other source of potable water for consumption. The most affected communities include Awoye, Ubanla and Ogungbeje. This significantly accounted for the reason why inhabitants of Awoye community travelled for several kilometres on the sea to the creeks in search of potable water during the 2004 oil spillage in the region (Figure 3). Based on the people's perception, the magnitude of the impact is shown below in Table 2.

Pollutants in form of emitted hydrocarbons caused by unburnt crude oil and partially burnt hydrocarbons are sources of pollution in the study area. Additionally, gases such as nitrogen oxides, tetraethyl lead and carbon dust particles pose problem to human health. Ground level ozone accumulation and carbon-monoxide also cause respiratory problems. Often times, the problems manifest in cardio-vascular and neuro-behavioural deficiencies that may result to lung problems. Our survey revealed that 10% of the sampled respondents had suffered from

Table 2. Magnitude of negative impacts of oil exploration and exploitation in the coastal region in Ondo State.

Magnitude	No of respondents	Total (%)
Very high	920	76.7
High	109	9.1
Fairly high	163	13.6
Not high	8	0.6
Total	1200	100

Source: Authors' Fieldwork, 2009.

lung related health problems. Due to occasional oil spills in the study area, lands have been polluted (Figure 4). Consequently, the agricultural lands available to people have been damaged. Lands lost their nutrients while plants and crops have been contaminated followed by other ecological damages and destruction. This has greatly hindered the implementation of rural development projects in part of the region.

Agricultural land degradation

Agricultural land degradation results from many identified sources such as shoreline erosion and landscape destruction resulting from oil and gas exploitation activities. Large chunk of coastal land have been rendered uncropable, particularly the right of way created for pipeline thereby worsening the existing economic hardship being experienced.

Survey revealed that a large portion of land especially in Awoye area has been despoiled. This despoliation resulted from the deposition of the earth crust removed from the production wells, which is toxic in nature and consequently affected the immediate environment. Soil degradation in the region has deleterious effects on the forest resources. The coastal region in Ondo State suffered a major problem of deforestation particularly reduction in mangrove species. This is leading to other problems such as soil erosion, siltation of streams and reservoirs. Several farmlands and multiple of coastal fauna species were confirmed lost to oil spillages in the region. Figure 5 reveals part of the damages done to the ecology of the region during the 2004 oil spillage in the region.

Displacement of some communities from their original locations

Survey revealed that intensive oil exploration and exploitation activities in the region were responsible for the increasing rate of coastal recession that led to the

incessant displacement of some of the settlements from their original locations. In the process, some communities were completely watched away and suffered loss of lives and properties.

It was confirmed that Awoye which served as the artery between the Ilajes of Ondo state and the Zions of Edo and Delta States and the commercial nerve of the region in the 1980s now lies in the ocean. Survey revealed that Awoye is now some 2 km into the ocean and now at its sixth point of settlement (location) after suffering from serious coastal erosion and land submergence. About 60% of the sampled respondents in the region confirmed that they were affected by displacement of their settlements due to coastal erosion as indicated in Table 3.

Loss of human and marine lives

The premature death of marine lives and human beings in the region had been partially attributed to oil exploration activities in the region due to the consumption of polluted water particularly caused by fresh spill that was yet to be clearly revealed in the water bodies. Fishing is an important component in Nigeria agricultural sector, comprising about 20% of Gross Domestic Products (CBN, 1994) but in some cases, fishing grounds have been abandoned due to this problem.

Ondo state water front is one of the most productive water bodies for fisheries and a critical nursery for offshore and upstream ecosystems. Destruction of mangrove forests and pollution of water bodies resulting from oil spills affect fish habitats negatively and result in reduced fish production in the region (Figure 6). Survey revealed the presence of Persistent Organic Pollutants (POP) which causes bio-accumulation in shellfish to a level that is even hazardous for human consumption in the region. Acidification of surface water and reservoir through plant smelters have also jeopardised marine lives in the region.

Derived implications

Communal clashes on claim over exploited land

Several communal clashes have resulted in the region on the claim of ownership of certain portions of land where exploration activities are carried out. As a result of this, several lives and properties which worth billions of naira have been lost. The intervention of the state government had only been useful to douse such tension and apprehension in the atmosphere over communal clashes on such claims

Obstruction of occupational activities

Since the major occupation of the inhabitants of the



Figure 4. Land degradation and pollution through oil spillage in the region.

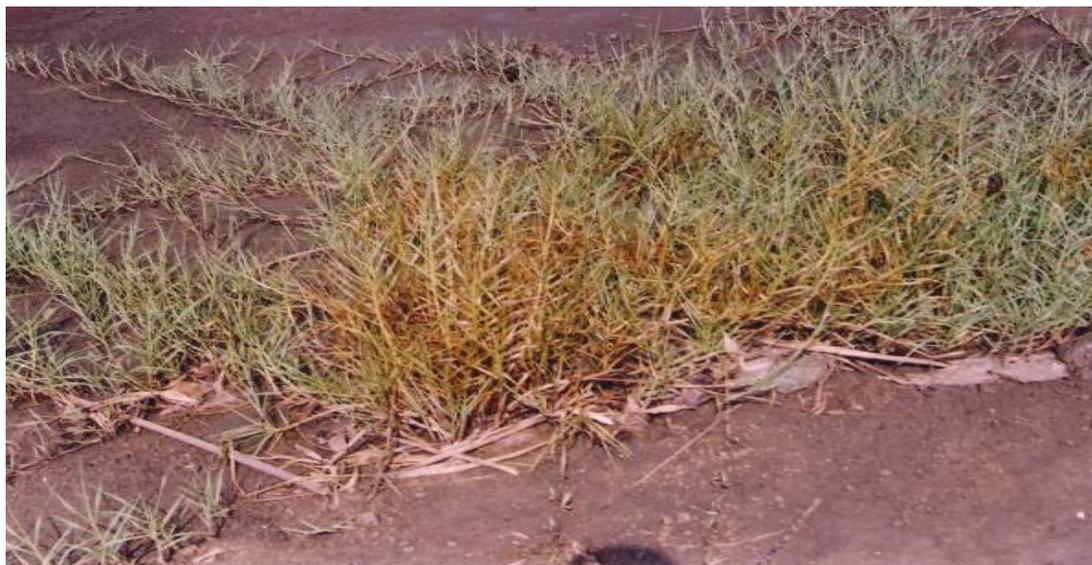


Figure 5. Devastated farmland through oil spillage in the region.

Table 3. People affected by the displacement of settlement (settlement re-location) due to coastal erosion or land submergence in coastal region of Ondo State.

Effects	No. of respondents	Total (%)
Experienced displacement	720	60.0
Never experienced displacement	480	40.0
Total	1200	100

Source: Authors' Fieldwork, 2009.

region is fishing, occurrence of spillage at any time jeopardises their means of livelihood as fishing materials were damaged and the fishes were poisoned leading to their death (Figure 7).

For months, many were thrown out of jobs and this had resultant negative effects on fishing business in the region. There was reduction in catch and quantity of fishes available for sale at Igbokoda Fish Market. This resulted to low income during for several months after any oil spillage in the region.



Figure 6. Crabs and other aquatic animals which died from the oil spillage in the region.



Figure 7. Destruction of the economic base of the people in the region through oil exploitation activity.

RECOMMENDATIONS AND CONCLUSION

'Oil drips' occurs during production process and transportation. Sabotage which has been identified as one of the causes, due to either penchant for making quick money by affected persons or as a means of venting anger on the oil producing companies, and the need to be given attention both by the Oil companies and the government. The people could feel that there has not been a commensurate or effort worthy development in the oil-producing area. Additionally, the weakness of legislation in terms of inadequacy and unwillingness or incapacitation on the part of the government to enforce such legislations has made them quite ineffective. Hence, the need for provide adequate legislations which are properly implemented in the control of activities in Oil Industry.

The Oil Spill Management Plan which involves investment in projects for the monitoring, control and clearance of spilled oil is very vital. Ondo State Oil Producing Area Commission (OSOPADEC) should be technically and financially equipped for the clearing of spills, monitoring and controlling pollution arising from oil spills while the Oil Companies working in the region should form 'Clean-Up Cooperative Partnership' to monitor, control and clean oil spills whenever it occurs. Ondo State Government should put in place a legislation to back up the partnership.

The roles and responsibilities of all the stakeholders in the monitoring and control of oil exploration and exploitation activities in the region must be clearly defined. OSOPADEC should embark on aggressive enlightenment campaign by educating every stakeholder with a view to know and carry out their expected responsibilities.

In addition, the communities through 'Oil Spill Monitoring and Control Committees' should educate their people on the need to stop 'sabotage induced spills' by making them realise that any damage to the environment is a damage to oneself; which can never be fully repaired. However, any offender caught should be prosecuted according to the provisions of the law of the land.

Another approach is to ensure that indigenous oil companies should be given priority in securing licenses to operate in the Niger-Delta region during a bidding process organised by Directorate of Petroleum Resources (DPR). This will reinforce their commitment as stakeholders as well as act as a palliative measure towards achieving peace in the region.

The government should mandate all the oil companies operating in the region to embark on the continuous provision of infrastructure (such as water, good roads, electricity, health facilities, schools, markets, etc) for the host communities. Compulsory life insurance schemes must be put in place for the inhabitants of the oil producing areas in addition to the provision of adequate and immediate compensation and clean-up of spills.

There is the need for the government to also develop a National Oil Spill Contingency Plan to complete the formation of the "Clean Nigeria" Association by the Oil companies. Agencies such as the National Relief Agency, Federal Environmental Control and Protection Agency, the Nigerian Navy, Ministry of Transport and Ministry of Environment, and other relevant agencies should constitute a "National Clean-Up Joint Task Force" which will act as 'Rapid Response Squad' in this respect.

There is also the need for long term monitoring and surveillance. It is of importance to note that the Petroleum Inspectorate of the NNPC has collected baseline data while Oil Companies on individual basis are gathering relevant scientific data in this respect to facilitate the monitoring and surveillance oil spills and oil related environmental problems. These efforts need to be properly coordinated. It is therefore suggested that OSOPADEC should coordinate the efforts in Ondo state. Grants should be given to tertiary institutions in the country to carry out necessary studies in the area of socio-economic and health related impacts of oil exploration activities in Oil producing regions in Nigeria. However, at least 3 and 5% of the annual profit of the Oil Companies should be compulsorily contributed to support the grant.

It is hopeful that if these measures are taken, there will be considerable improvements in the management of problems associated with oil exploration and exploitation in the coastal area of Ondo State in particular and in the Niger-Delta region of Nigeria at large.

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