OIL POLLUTION IN THE RIVERINE AREAS- A CASE STUDY OF AKWA-IBOM STATE

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ABSTRACT

A study of the oil production activities in the riverine area of Akwa-Ibom State was carried out by the author. In this regard, visits to different oil locations were made to obtain information on the consequences of oil production activities. Through these visits, the ecological situation of the environment was assessed, useful information was also obtained by interacting with the community members in those areas of operation before this article was put together.

It was therefore discovered that oil production has in no small measure improved the economic growth of the state in question. Roads and community town halls were built by some oil company operators. Also, pipe borne water, electricity and employment were also provided, in addition to some sporadic scholarship awards to the indigenes of the areas. Nonetheless, its effects on the environment has been disastrous, because, many villages have lost their agricultural lands due to underground high pressure pipe lines that traverse the whole operation areas. Fishermen are also not left out as fishes have been driven out of reach due to production activities and occasional oil spillage. Eventhough, the oil production activities have negative impact on the state in question, it has undoubtedly improved the general standard of living of the people

Keywords: Oil, Pollution, Akwa-Ibom, Environment, Spillage

INTRODUCTION

Nigeria's oil industry consists of three major phases: Crude oil exploration and production, oil refining, and petroleum product transportation and marketing (Amu, 1984). Unfortunately, all these phases have in one way or the other contributed to the pollution of the environment. Crude oil exploration, production and refining are mainly concentrated in the riverine areas of the country, in which Akwa-Ibom State forms a part Fig.1. Fig.1 shows the map of Akwa-Ibom state where the various activities related to exploration and exploitation of oil in Nigeria have had considerable impact on the natural environment. This environmental problem seems to be well articulated by people in the Riverine areas, which also form the major oil producing zones in Nigeria. Unfortunately, industrialisation, which is often indexed by economic growth, has created the problem of waste disposal and pollution.

In the last thirty years, Nigeria has experienced increased activities in the areas of oil exploration, exploitation and refining. While these activities have generated immense socio-economic benefits for the country, they have also created serious health and environmental problems (Ekekwe, 1981). Oil industry operations have introduced pollutants as liquid discharges and oil spills into the general environment- air, water and land. The environmental impact of these activities has been the concern of the Government,

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Communities and the Oil Company operators. The oil companies operating in Akwa-Ibom State and environs are; Exxon/Mobil producing Nigeria unlimited, Shell petroleum development Company, Nigeria limited, Ashland Oil Company and TotalFinaElf (Amu, 1984). Generally, oil spills are a natural consequence of crude oil production and are therefore unavoidable. Therefore, a spill may result because of faults at any stage of the production and movement, which involve many mechanical processes, the continued efficiency of which may not be guaranteed. There is no doubt that some attempts have been made at managing oil pollution problems, especially since the beginning of the century when the Government acknowledged that oil spillage have begun to constitute very serious danger to the inhabitants of oil producing areas (Fed. Rep.of Nig.1981). In the cause of this study, a working tour of Akwa-Ibom state was carried out by the author to enable him have on -the -spot assessment of the impact of oil pollution on the communities vis-avis their environment. The riverine areas of Akwa-Ibom State visited include Oron, Eket, Ikom, Ikot-Abasi, Unam, Mfem, Akam, Adanga, Ukana and Ibibio. In Eket, Oron and Ikot-Abasi exploration and exploitation are major threats to the environment as observed by the author. Environmental contamination of Air, Soil and
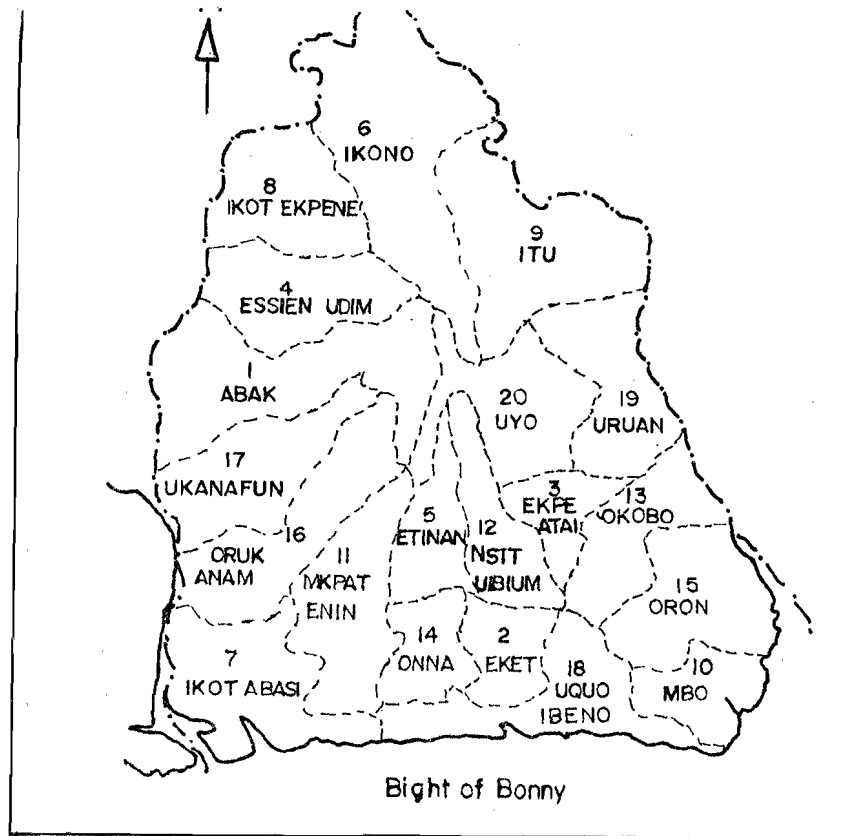

Fig. I Outline map of Akwa Ibom State of Nigeria

Water, food and recreational facilities are noticeable in these areas and have adversely affected both the flora and the fauna of this complex riverine ecosystem. The various submissions made by the oil producing communities e.g. Oshika Oil spill, the environmental study by Akwa-Ibom state Task Force on soil and land use, and the personal observations / interaction with the communities by the author, now form the basis of this paper. This paper, therefore, presents a case history on the environmental impact of oil exploration and production in the riverine areas of Akwa-Ibom State of Nigeria.

DISCUSSION

Pollution is an undesirable change in the physical, chemical or biological characteristics of air, land and water that may or will harmfully affect human life, produce undesirable change in plant and animal species, our industrial processes, living conditions, deteriorate our raw material resources and cultural assets. Such changes involve the release of substances or energy into the environment by man in quantities that may damage either his health or resources. Pollution can thus be simply referred to as the unfavourable perturbation of the environment brought about by human activities.

Pollutants are things that bring about pollution. They consist of substances released into the environment in sufficient concentrations as to produce measurable effects on the soil, plants, animals, humans and or resources (Ifeadi ET al.1985). The dispersion and movement of some pollutants in the biosphere are complex and their pathways are not fully known. Thus, they produce unfavourable effects either on the environment or man directly, when released into the air, water and land.

Pollution can be sub-divided into three main categories, reflecting the kinds of environment affected. These are air (atmospheric), water (aquatic), land (terrestrial),

pollution. In an environmental context, the term oil represents crude petroleum or any refined petroleum products. Waste oil and grease from industrial and automotive sources make a significant contribution to the pollution of terrestrial and aquatic environments. Oil pollution is a major problem because aquatic and terrestrial environments are usually affected. It becomes a terrestrial pollution problem when oil spills on land and farmlands. Oil could be discharged into water during normal ship and tanker operations, as well as, through broken pipes as accidental oil spills. It indirectly damages water birds and plant life by sticking onto them. Oil also harms aquatic life indirectly by reducing the amount of light and oxygen that enters the water. Long term effects of oil spills may result from absorption of the organic components of oil by organisms thereby endangering their lives.

Between 1970 and 1982, Nigeria recorded 1581 incidents of oil spillage which caused considerable ecological and physical damage to environmental resources: - land/soil, water, and vegetation.(NAOC,1982). In August 1980, a buried crude oil pipe line from the Obagi oil field which connects Erema 1 to Rumuekpe oil fields busted spreading crude oil over an area of 25.14 hectares. As a result, water resources in the area were badly polluted. Also, on 17th January 1980, a blow out occurred at North Apoi involving 20 crude oil wells of a famous multinational oil prospecting company. This was followed later by an outbreak of fire. By February 19, 1980, about 1862 square kilometres of land and water had been polluted including 362sq km. of Riverine or coastal beaches, 70sq.km. of estuary, and 163 towns and villages (Ekekwe, 1981).

Crude petroleum is toxic to most species of flora and fauna, and when it spills and contaminates the environment, it affects the health and general living condition of the affected communities. Such spillage could result

in the destruction of farms and farmlands. It could also pollute community water resources and destroy fish in nearby ponds (Izeogu, 1986). In the worst affected area of such a spillage, oil could penetrate the soil up to 0.65m, thus destroying farm crops and interfering with plant growth. For instance, some plants and fruit trees could be covered by crude oil which might affect normal photosynthesis and transpiratory processes leading to chlorophyll deficiency and quick death. The spillage could also pollute creeks, swamps and rivers as well as drinking water drawn from wells. The sample of water from a drinking well of such an environment may be found unsatisfactory by international standards due to high values of acidity, chemical oxygen demand, carbon, chloroform extract and odour.

Nigeria's oil fields are scattered about the riverine zones of Nigeria, on-shore and off-shore. In association with the pools of oil are tremendous reservoirs of natural gas. Most of the gas produced is flared at the oil gathering locations called flowstations. These flaring process always result in the pollution of soil, air and water.

Exxon/Mobil producing Nigeria unlimited, operating in Akwa-Ibom state, has 48 off-shore structures: - 37 well platforms, 7producing platforms, 2 quarter platforms, 1 berth stage and 1 gas injection platform. The resultant effect of all these production operations is the disturbance of the ecosystem. Some of the Mobil oil fields in Akwa-Ibom State are Eket, Adua, Etim, Enang, Utue, Ata and Ibom etc (Amu -NNPC, 1984). While SPDC'S oil fields include: -Ekim, Udar, Ibibio, Etebi and Ubium etc .The Ashland offshore oil fields include - Akam, Adanda, and Ebughu (Amu-NNPC, 1984).

The Oil production activities so far mentioned also result in air pollution, which is largely from the products of combustion and materials carried with the hot gases derived from the burning of fuels. Fossil fuels when combusted produce a range of carbon, nitrogen and sulphur compounds, the precise composition of the resulting gases depend mainly on the degree of oxidation and combustion of the fuel. Oil and other organic or fossil fuels contain carbon and sulphur. When oil is burned, carbon atoms combine with oxygen to produce heat. If the burning process were completely efficient, the end product would only comprise carbon dioxide and water. However, combustion is not totally efficient and the burning of fuel therefore results in the production of carbon monoxide and sulphur oxides (both toxic pollutants) which can damage vegetable crops, trees, buildings, clothings and most importantly, human health. It is the presence of these gases in the atmosphere that give rise to the problem of Acid rain which attacks metallic objects with reduced value and life span.

Large quantities of gas (mostly methane) are usually associated with oil (petroleum) and during oil production, this gas is burned off at flow-stations above the oil wells. Burning of this gas all over the oil wells as in the riverine area of Akwa-Ibom state e.g. Ikot town, Ikot-Abasi etc. obviously introduces sulphur dioxide and oxides of carbon and nitrogen into the atmosphere. In addition to these gaseous pollutants, considerable amount of heat is emitted into the atmosphere and this could adversely affect the thermal balance of the area. Horizontal flare at the flowstation generates and releases large quantities of soot and heat. Hydrocarbon-laden soot was found on roof tops, vegetation and valuable property in Akwa-Ibom State. The effects of flare and hydrocarbon on vegetation were the drying of vegetation: - plantains, Rhizophora SP, and cocoyam etc. Corrugated iron sheets on roofs were massively attacked. Owing to the rapid rate of damage, the natives of Akwa-Ibom State resort to the use of thatch to protect their roofs in order to minimise the danger of corrosion to the aluminium roofing sheets. This is an extra cost and lack of

aesthetics that goes with oil production activities within the community of operation.

Studies of total hydrocarbon values of particulate collected from rooftops at Iko-Ikot Abasi, when analysed, gave high hydrocarbon concentrations of up to 54.12mg/kg while that of the oil-polluted water samples indicate a high alkalinity value of 1710.omg/l at the Exxon/Mobil Tank farm discharge channel (Olusola, 1983). This is definitely an indication of high contamination of Land, water, and air environment and the excessive precipitation of soot from gas flares at the oil/gas fields in the communities of the state.

The pipeline community of the Qua-Iboe River, and the shoreline of the Bight of Bonny, east of this river, is dominated mostly by diatoms with blue-green algae constituting a very low proportion of the biomass (Concawe, 1983). However, the blue-green algae densities tend to increase with increasing amount of visible oil in the sediments such that, in the exposed Mobil discharge channel, 100% of the population is blue-green algae represented by oscillatoria. These algae had gained dominance over diatoms, and are the indicator species of hydrocarbon pollution. This means that only these organisms can survive in this stressed and polluted environment while others cannot survive having been choked to death. This biological evidence of pollution was further buttressed in the studies by the observed distressed behaviour of the fishes, which had been washed by waves into the effluent channels, and by the mortality of both the adult and friends of Tilapia. This apparent reduction in fish population will undoubtedly affect fishing productivity in these riverine areas.

Generally, studies of sediment values in the riverine areas of the state reveal significantly high values. At Ikot Abasi, a value of 233.38mg/kg was obtained at an embankment opposite the flow-station. The high level in sediments is due to nearby oil pipes and flow-station activities, which are located along the creeks. The amount of hydrocarbon in sediment samples can be used to identify potential areas, which face the risk of oil pollution.

CONCLUSION AND RECOMMENDATION

Various studies and visits to oil fields in Akwa-Ibom state, have established that oil pollution, which is common in oil producing areas of the country, cause a lot of damage to the environment. Public policy relating to socio-economic and environmental considerations should be the most important factors in the continued exploitation and utilisation of petroleum resources. Environmental quality considerations should constitute the essential criteria in any modern policy formulation for the oil industry. In the oil industry, all new activities and projects should be accompanied with an Environmental Impact Statement (EIS), and existing projects should be subjected to Environmental Impact Assessment (EIA). For example, all exploration and development/production plans submitted to the petroleum inspectorate division for review must be accompanied by a relevant environmental report. Environmental awareness on the effects of oil production operations should be promoted in all aspects of our national life. Special provision should be made for inter-disciplinary studies on the socio-economic and health aspects of the oil industry in the Nigerian environment.

For the areas affected by the high level of hydrocarbon soot and gas released by the gas flare from the Oil Company locations in various areas, the following remedial measures are suggested: -

(1) Resettlements of the affected communities because of health hazards arising from air, water and land pollution. (2) Introduction of crops which can withstand the ambient conditions and; (3) the provision of pipe

borne water. Finally, measures to provide some reasonable degree of protection of its ecological and human environment from the activities of oil industry operation must be adopted (Ojikutu, 1979). The measures so adopted must discourage damaging discharges through appropriate prevention programmes, such as contingency planning, adoption of the best available pollution control technology, and continuous monitoring of the state of the Nigerian environment. This study has demonstrated that sediments along some points on the Ibeno and Ikot beaches are pollutants from oil and oil related activities. It has also shown that all communities, within the area of oil production activities, are in potential dangers, if adequate and sufficient measures are not put in place, for the protection of life and property.

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