OIL AND GAS ACTIVITIES AND THE NIGERIAN ENVIRONMENT

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Prepared for the IAIA12 Conference, Energy Future: The Role of Impact Assessment, 27 May – 1 June, 2012, Porto, Portugal. Please do not cite without permission.

Abstract

The discovery and mining of crude oil and natural gas deposits in Nigeria over the past four decades has immensely increase the wealth of the nation but not without its devastating environmental impacts. The industry operates hundreds of producing wells, gas plants, networks of thousands of kilometers of pipelines criss-crossing the entire oil bearing zone to the flow stations and terminals. This bee-hive of industrial activities runs on a very fragile ecosystem in the Niger delta region. The Niger delta is Africa largest delta and the third world largest. It is one of the largest wetlands in the world, with about 2,370 sq km consisting of rivers, islands, creeks, swampy terrain and estuaries. It contains the most extensive freshwater swamp forest in the entire East and West Africa, the stagnant swamps covers 8,600 sq km and the coastline spanning over 450km.

Although there are sound legal frameworks for oil and gas operations in Nigeria, double standards and shifting commitment on the part of both the operating Oil Corporations and the government has voided its implementation. This paper gives the history of oil industry activities in Nigeria, the perceived double standards of the industry on environmental issues, the impact of oil and gas development on the rich biological diversity of the region and its socio-economic consequences. This paper further reviews the abject poverty of the oil and gas producing communities whose source of livelihoods; fisheries resources, agricultural soils/farmlands, forests, clean water, fresh air and housing are being destroyed due to these activities and poor resource management, and the resultant social stresses of conflicts. It also analyses the future of energy development in Nigeria.

1.0 Introduction

Nigeria is located within the sub-Sahara African region with geographic coordinates 4°N – 14°N and 3°E – 15°E with a total area of 923,800 sq km which is about 14% of the land area of West Africa[1]. Nigeria shares boundaries with the Republics of Benin in the west, Cameroon in the east, Niger and Chad to the north and the Gulf of Guinea to the South.

The country is richly endowed with crude oil and natural gas deposits which are the main source of energy and foreign exchange earnings.

The exploration of oil in Nigeria started in 1908 with the discovery of deposits at the Araromi area of the present Ondo State, then later in 1956 at Olibiri by Shell-BP. Following this discovery Nigeria joined the ranks of oil producers in 1958 when its first oil field,Olibiri field, began producing 5,100 bpd. After 1960, exploration rights in onshore and offshore areas adjoining the Niger Delta were extended to other foreign companies. By the late sixties and early seventies, Nigeria had attained a production level of over 2 million barrels of crude oil a day. The oil and gas industry's profile has grown to the point that presently there are over 400 production and storage facilities in the oil-bearing region with a production capacity of about 3.5 million bpd. These deposits are concentrated at the Niger Delta region of the country, which has attracted the presence of multinational oil and gas companies to the area.

The Niger Delta region is described as one of the most fragile ecosystem in the world. It is Africa's largest delta and the world's third largest mangrove forest. It is one of the largest wetlands in the world, with about 2,370 sq km consisting of rivers, islands, creeks, swampy terrain and estuaries; the stagnant swamps covers 8,600 sq km and the coastline spans over 450km [2, 3]. The mangrove forest covers 54,000 sq km of the region, while the landmass is over 70,006 sq km.

The Niger Delta region is the most important ecological zone of economic and international significance in Nigeria. It has a rich biological diversity and the ecosystem supports numerous species of economic and ecological importance. It has the highest productivity of any known ecosystem and supports important local and commercial fisheries e.g. sardines, bonga, shad, cat fishes, croakers, snappers, etc. The region has four distinct ecological zones; coastal island zone, mangrove swamp zone, freshwater zone and rainforest zone[4]. The swamps (mangrove and freshwater) provide habitats for numerous plant and animal species, wildlife, migratory and resident organisms. The mangrove forests also provides timber.

The ecology of the area is influenced by the tides of the Atlantic Ocean and flood regions of the River Niger. The region which lies at the coastline of Nigeria has very low elevation with the possibility of inundation in the event of sea level rise due to climatic changes.

For politically convenience, the Niger Delta zone is divided into nine states (Abia, Akwa Ibom, Bayelsa, Cross River, Delta, Edo, Imo, Ondo and Rivers); being made up of 185 local governments of over 800 communities from 12 major ethnic groups, with a population of about 30 million people.

2.0 Methods and Data

The methodology for this study involves literature review; the existing reports on the area were used to acquire the background information. The field study involves data acquisition from

incident sites and was complimented with data obtained from incident reports and registers. Interviews and questionnaires were administered on host communities for data collection on the socio-economic status of the study areas of interest. Data was collected form secondary and primary sources. All data collected was subject to analysis, verification and classification. The evaluation methodology adopted in this study was based on IPCC common methodology. The areas highly susceptible to the effects of oil and gas exploitation were identified and the biophysical assessment of the oil and gas activities in the region was conducted.

3. Results

The results of the data obtained are represented in Figs. 1-4. Figs. 1 depict the oil spill data from 1983 – 2009, while Fig. 2 shows data of gas flared in the region from 1983 – 2009.

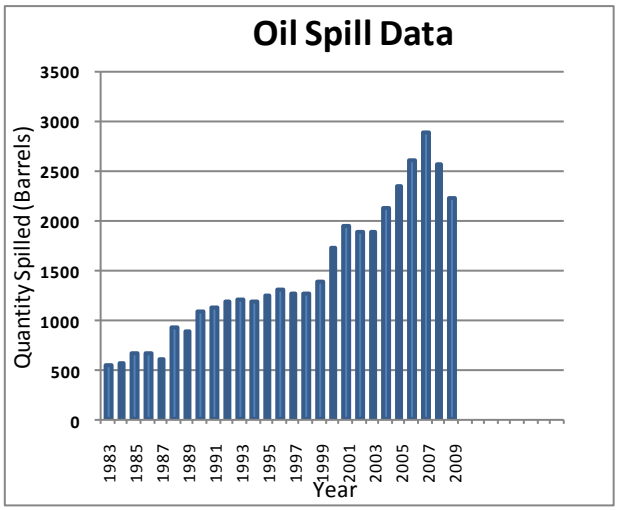

Fig 2: Gas flares data 1983-2009

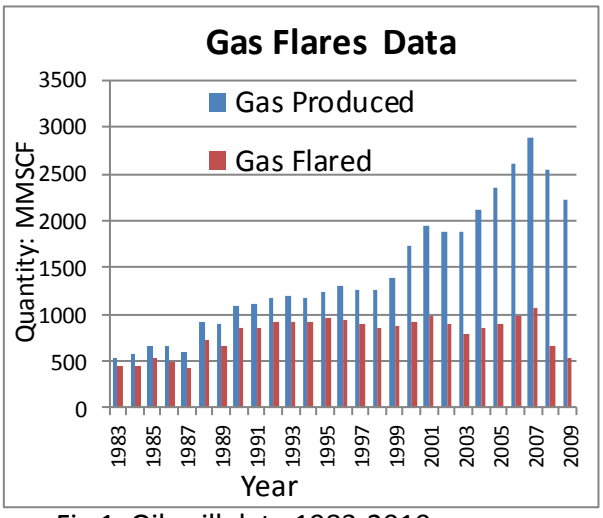

Fig 1: Oil spill data 1983-2010

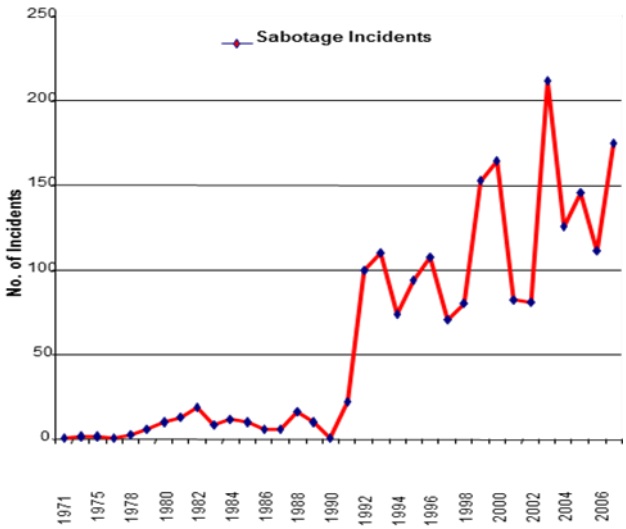

Fig 3: Sabotage incidents

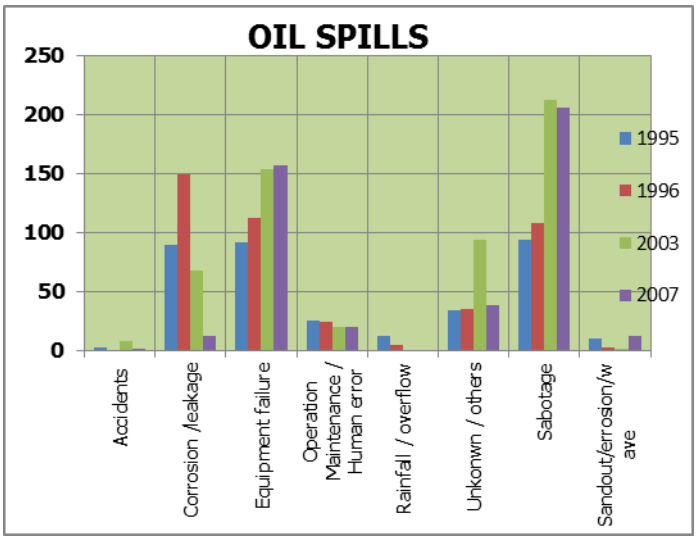

Fig 4: causes of oil spill and frequencies

Figures 3 shows sabotage incidence, while figure 4 indicates causes of oil spill and the frequencies of occurrences. Oil spills are attributed to human error, equipment failure, pipeline corrosion/rupture, or sabotage/third party interference. Because the country's oil fields lack the infrastructure to produce and market associated natural gas, it is flared.

4. Discussion

Analysis of the data obtained indicated that there is colossal damage to the ecosystem and its services of the Nigerian environment, particularly the Niger Delta region where the oil and gas exploration activities takes place. This has severe consequences on the livelihoods of the host communities who have to daily co-exist with the unabating anthropogenic perturbation of their environment.

Between 1976 – 2010 a total of 13,030 oil spill incidents that resulted in the discharge of 3,257,362.44 barrels of oil into the terrestrial, coastal and marine environment were reported in the Niger Delta region. Oil spills on land damage soil fertility, affects farmlands, accounting for low agricultural yield among the host communities. As the region is a food producing zone in Nigeria, the issue of oil spill also challenges food security in the country. Spills into aquatic environments affect the coastal marshes, mangroves and wetlands. The mangrove is the habitat and nursery for numerous fish species, including fin-fish and shellfish amongst others that are of commercial value in the region. The destruction of the mangrove not only destroys the fishery industry and livelihoods of the host community but exposes the sandy-beach to sea waves and coastline erosion, increasing the possibility of inundation of the region due to sea level rise.

Contaminated surface fresh water and underground water supply due to oil spills is common in the region. This makes for unsafe drinking water and increases health problems. UNEP report in the region indicated "that there are in a significant number of locations, serious threats to human health from contaminated drinking water to concerns over the viability and productivity of the ecosystems." The report further stated that the pollution has gone deeper than many have previously supposed[5].

Gas flaring and venting is another source of pollution to the ecosystem from oil and gas exploration and production operations in the country. Figure 2 shows the country's flare rates. Nigeria has the worst flare rate in the world after Russia. The World Bank 2010 global estimated annual flared volume from satellite data is 134 billion cubic meters (bcm) of which Nigeria accounts for 15.2 bcm, making for 11.34% of the global flare rate. There are over 100 flare sites in the Niger Delta region most of which have been burning for over five decades. Flares contain heat, toxins and particulates that adversely affect vegetation, humans, soil, water and livelihoods of the host communities. The impact of gas flares on the health of the host communities increases the risk of respiratory diseases, asthma, cancer and premature death. Reduced crop yield and acid rain has been attributed to the gas flares due to large volumes of

carbon dioxide, methane, oxides of nitrogen and sulphur it emits to the environment together with carcinogenic substances such as benz(a)pyrene and dioxin; and unburnt fuel comprised of benzene, toluene, xylene and hydrogen sulphide. Noise is another source of pollution that can scare wildlife around the area and impair hearing.

5. Conclusions

This paper has clearly indicated that the exploration of oil and gas deposits in Nigeria has enormously impacted the biodiversity and ecosystem services of the oil bearing zone with its socio-economic consequences. These findings are buttressed by many scholars even as reported by Emoyan et al[6] that environmental degradation in the region has been a continuous process for nearly forty years and that existing environmental legislation is amorphous in addition to being inequitable with respect to overlying communities in the delta. A recent major independent scientific assessment conducted by United Nations Environment Programme (UNEP) also indicated that pollution from over 50 years of oil operations in the region has penetrated further and deeper than many may supposed. The report says that some areas which appear unaffected at the surface are in reality severely contaminated underground and actions to protect human health and reduce the risk to affected communities should occur without delay[5].

The lack of proper environmental accountability and integrity on the part of the oil and gas companies operating in this region over the decades has resulted in colossal damage to the environmental. On the other hand, the failure of effective regulatory controls of the oil and gas operations has help worsen the situation. Government overdependence on the oil sector (oil accounts for 95% of foreign exchange earnings and 80% of budgetary revenues) is a fundamental problem that heightens regulatory failures. Therefore there is need for government to adopt measures that would provide ecological and human protection as the oil business in the country at the present is inevitable.

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