

Environmental Degradation in the Niger Delta Area Due to Petroleum Exploration: Are we Combating the Problems?

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Abstract: Native settlements where oil and gas are produced in Africa are frequently challenged by environmental pollution. This challenge usually causes conflicts within the exploitation arena. Little effort is deceptively portrayed by the government and private organizations to ameliorate the impact of pollution on environmental media and human health risks due to exposure. A critical attribute of these worries has been due to ineffective risk communication and implementation of policies geared toward resolving social and economic intervention by the native residents. The relationship between youth's restiveness, poverty, violent and environmental degradation has been a dominant headline in the lyrics of sustainable development and conflict resolution. Some writers have argued that conflict is not limited to the people who have been cursed with privations in the society; others concluded in their different narratives that the pollution of the environment, poverty and conflict are firmly bound together to provoke agitations and restiveness.

Keywords: Combating, Environmental Pollution, Degradation, Niger-Delta, Nigeria

Introduction

Over the years, the Niger Delta area where oil exploration and exploitation is taking place has mostly been polluted (Penz *et al.*, 2011). The rate of pollution is accompanied by extreme environmental degradation. This scenario has come with detrimental consequence such as endocrine disruptors on the native settlers of that region (Victor *et al.*, 2017). Some of the affected resources include potable water, river and agricultural lands. This has caused poverty and has also spawned violence among the youths. Considering that risk analysis has been a factor used to explain the health consequences of environmental degradation (Adekola *et al.*, 2017). At the moment, every part of the World is challenged by environmental degradation, which explains why environmental degradation has assumed a widespread status (Adebowale, 2014). The global society has suggested practical solutions to solving environmental issues especially, environmental degradation that originates from human activities or anthropogenic. In part of the

world where industrial activities ranged from oil exploration, exploitation, manufacturing, refining and inter alia. These activities have caused a lot of environmental issues by affecting humans, plants, animals and aquatic lives as a result of environmental pollution (Adekola *et al.*, 2012). Environmental degradation is the "deformation of the environment through depletion of the ecosystem and the extinction or annihilation of wildlife (Robert *et al.*, 2014). McBean and Rodgers (2010) explained that United Nations International Strategy for Disaster Reduction, with regards to the environmental deterioration as the lessening of the limit of the earth to meet social and environmental needs. Industries and socio-economic activities, as well as natural factors, contributes to environmental pollution which has affected human welfare through the contamination of potable water, farmland and the atmosphere.

The health problems that are related to chronic exposures to Polycyclic Aromatic Hydrocarbons (PAHs) include decreased immunity, Cataracts, kidney and liver damage, breathing problems, asthma or (lung function

abnormalities) skin redness and inflammation. Induced by a repeated contact with PAHs were found to cause various forms of cancer in aquatic animal models, especially a form that can easily integrate with the cell and corrupt the DNA (Victor *et al.*, 2018). Environmental degradation can occur naturally through avalanches, quakes, tidal waves, storms, wildfires; or as a result of human activities such as accidental oil spill, thermal power stations, burning of fossil fuels, exhaust fumes, bush burning and deforestation, desertification and nuclear leakage, gas flaring and vehicular emissions (Anifowose *et al.*, 2012). In Nigeria, after about four decades of oil production, by early 1980s, Nigeria became almost completely dependent on petroleum extractions. Economically, oil generated 25% of Nigeria's Gross Domestic Product (GDP), which rose to 60% in 2008. According to Griffin and Teece (2016), Nigeria is Africa's top oil producer, derives 95% of export earnings and 70% of government revenue from the oil and gas sector. The money is made from the oil and gas sector to sustain the economy, the extraction of petroleum products and other industrial activities in Nigeria have accompanying environmental issues. Niger Delta region is the point of highest concentration of such industrial activities, which bears the highest effect of environmental degradation in Nigeria.

According to (Johnson, 2011), the incredibly well-endowed ecosystem contains one of the highest concentrations of biodiversity of the planet, flora and fauna trees, arable terrain that can sustain a wide variety of crops, lumber, or agricultural trees and more species of freshwater fish than any ecosystem in West Africa. As mentioned earlier, the potentials of this area notwithstanding, the mining activities in addition to other human-related and natural factors have contributed to depleting the environment of the area, thereby making it unsafe for plants, animals, aquatic and human lives Amnesty International (2013). The extinction of aquatic lives also makes the occupation of fishing un-profitable (Anifowose *et al.*, 2012). Awajiusuk and Lomo-David (2012) reported the effects of gas flaring and oil spillage on both aquatic lives and agricultural yields. These resulted in providing people with limited options in search of favorable habitats. Some live in asbestos and zinc houses and under very unhygienic conditions. This culminates in the loss of farmlands, the stunted growth of cash crops, economic trees, polluted rivers and homes. The prolong refusal by the government and provider organizations to remediate the polluted site is best described as corruption and environment (Leitao, 2016). This paper points out the long neglect of the polluted sites, denial of corporate social responsibility by the exploiting companies and the non compliance to environmental

policies due to corruption. It also considers critical areas of environmental degradation at the Niger Delta Region and provides an overview of causes and effects on the ecosystem and the populace. It gives a discussion on the industrial activities in the region, the level of damage, the consequential effect on the recipients, efforts made to salvage the situation and the successes recorded. The review paper also proffers ideological solution as way forward for sustainable development.

The Niger Delta Area

The Niger Delta region of Nigeria is made up of Rivers, Akwa Ibom, Bayelsa, Abia, Cross River, Delta, Edo, Imo and the Ondo States see Fig. 1 stained in red. It covers 20,000 km² within wetlands of 70,000 km², formed primarily by sediments disposition (Johnson, 2011). It has the presence of 40 different ethnic groups speaking 250 languages and dialects. The Ijaws, Ogonis, Ikweres, Erches, Ekpeyes, Ogbas, Engehes, Obolos, Isiko, Nembes, Orikaris, Kalabaris, Urhobos, Itsekiris, Igbos, Ika- Igbos, Ndoni, Oron, Ibeno, Yorubas, Ibibios, Annangs, Efik, Bekwara, Ejaham among others see Fig. 2.

The Niger Delta region sits on a floodplain that makes up to 7.5% of Nigeria's total land mass. It is among the largest of the wetlands and maintains the third largest drainage basin in Africa (Robert *et al.*, 2014). It has steadily growing population projected to be 27,416,456 as of 2016, accounting for more than 23% of the total population of Nigeria (National Population Census, 2006). The population density is also among the highest in the world with 265 people per square kilometer (Niger Delta Commission (NDC)). The Niger Delta environment can as well be broken into coastal brier island, mangrove swamps forest, freshwater swamps and low land rain forests.

The region is situated in the southern part of Nigeria and bordered to the south by the Atlantic Ocean and to the east by Cameroon. It occupies a surface area of about 1,121,110 square kilometers. Due to the presence of petroleum, wetlands, coastal lands and rivers in the area, its economic activities include mining, agriculture and fishing, while some dwellers are engaged in "white collar" jobs. More than 80% of the dwellers in Niger Delta are rural dwellers and thus engage in rural economic activities.

Dominant Economic Activities in Niger Delta - Nigeria and Associated Effect on the Environment

Outstandingly, the dominant economic activities in the Niger Delta region of Nigeria could be classified under the "white collar" jobs (office administrative duties), agriculture, quarrying, oil exploration, mining and processing.

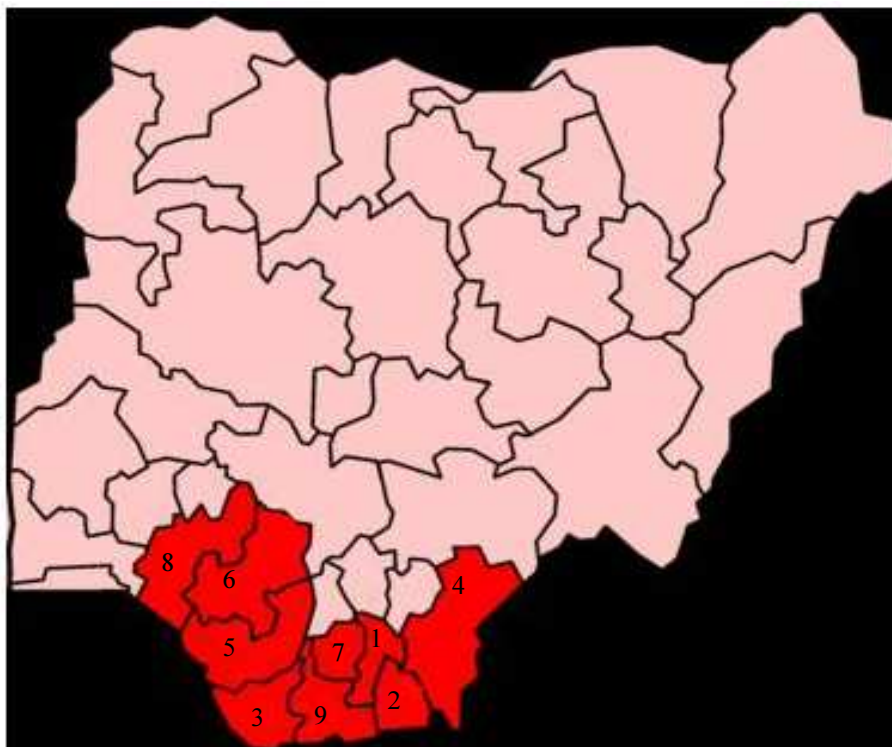


Fig. 1: Map of Nigeria numerically showing States typically considered part of the Niger Delta Region comprised of 1- Abia, 2- Akwa Ibom, 3- Bayelsa, 4- Cross River, 5- Delta, 6-Edo, 7- IMO, 8- Ondo and 9 – Rivers; Source: Global Security (2016)



Fig. 2: Map of Niger Delta Region-Nigeria; Source: Global Security (2016)

Agriculture

For centuries before the discovery of oil in the region, the people of Niger Delta were known to prominently

engage in farming, fishing and hunting at both subsistence and commercial levels. Deforestation, bush burning, application of inorganic fertilizer, use of herbicides and pesticides are among the common

agricultural practices carried out to enhance crop yields and agricultural expansion in the area. Fishing makes use of a hook, fishing net and, in some cases, chemicals for the easy catch; while hunting makes use of local traps and guns. Presently, in order to meet the agricultural needs of the people, farmers in the area engage in deforestation for extension of farmland; bush burning for ease of clearing and, preparing a farmland for crop cultivation; application of inorganic manure to enhance the soil nutrient for better crops yield; use of herbicides to control herbs that compete with the main crops and; utilization of pesticides to eliminate pests that attack crops. These are in addition to introducing dangerous chemicals into rivers as a fishing practice (Bailey, 2008).

All these practices have adverse effects on the entire ecosystem and enhance environmental degradation. While deforestation eliminates trees thereby causing desertification and affect the habitat of some animal species; bush burning negatively effects the soil condition, alters biodiversity, destroys people's homes and species' habitats, extend fire to unintended farmlands and crops, cause respiratory and other health issues and accidents on the road by covering the roads with deep smoke (Johnson, 2011). Also, the use of farm chemicals like fertilizer, herbicides and pesticides; while solving one problem, creates other unintended problems. Some chemicals, when introduced on farmland, end up being washed by run-off water to unintended locations where they harm both aquatic and land species that they come in contact with. Most times, even on the farmland where such chemicals are introduced, they end up killing and endangering more than intended - more so because most farmers are illiterate and exercise no caution with such applications, they incur the dangers of using such chemicals.

Quarrying

In some parts of the Niger Delta region, there exist sites where rocks are broken down to produce gravels and other building resources. Some good deals of excavation also take place in some sites in addition to the breaking down of the rocks to meet economic and building resources need. The activities that take place at quarrying sectors are such that calls for concern. A large volume of dust from broken rocks, current factories and mining operations in the Niger Delta limestone quarries are daily discharged into the air. Similarly, a lot of air-borne particulate matters are generated by the numerous stone crushing industries in the area (Aigbedion and Iyaji, 2007). When the air is laden with such dust, it causes health hazards for some people. For example, pollution studies around Sagamu and Ewakoro cement work in Ogun State and Akamkpa in Cross River State have shown that several people are suffering from eye

pain and asthmatic attack due to the dust-laden air that prevails a few kilometers radians of the factories (Aigbedion, 2005). This is in addition to alteration of the natural landscape.

Oil Exploration/Mining and Processing

Oil exploration in the Niger Delta Region of Nigeria began with British Petroleum (now Royal Dutch Shell) discovery of crude oil at Oloibiri village in Bayelsa State and commercial exploration began in 1958 (Kadafa, 2012). Subsequently, Mobil, Agip, Safran (now ELF), Texaco and Chevron, joined in the oil business in the region (Ekpo, 2004). As mentioned earlier on, oil exploration, mining and processing have substantially improved the economy of Nigeria over the past five decades. Closely associated with oil are the issue of gas flaring, oil spillage and dredging which contribute significantly to environmental degradation thereby making oil exploration, mining and processing assume the prime cause of environmental degradation in the area.

Gas Flaring and Venting

Gas flaring and venting are widely used in the oil and natural gas industry to dispose of associated natural gases for safety reasons during petroleum development operations and, especially, where no infrastructures exist to bring it to the market. The process of flaring (burning) and venting (releasing into the atmosphere without burning) of petroleum associated gas has been a common practice around the area (Ite *et al.*, 2013). So far, over 80% of the gas associated with the Nigerian oil flared off. Thus, many large red flames burning endlessly are a very common sight in the Niger Delta area (Aigbedion and Iyaji, 2007).

According to (Nriaku, 2011) "flaring of associated gas mainly emits Carbon Dioxide (CO₂), Carbon monoxide (CO) and a variety of air pollutants, such as VOCs (which include carcinogens and air toxins), Nitrogen Oxides (NO₂), Sulphur dioxide (SO₂), toxic heavy metals and black carbon sort". Aigbedion and Iyaji (2007) adds that "Nigeria has over 123 flaring sets in the Niger Delta region and has been regarded as one of the highest emitters of greenhouse gasses in Africa, with 45.8 billion kilowatts of heat discharged into the atmosphere of the Niger Delta from combustion of 1.8 billion cubic feet of gas every day; contributing to global warming issues by raising temperatures to inhabitable level. Accordingly, Ite *et al.* (2013) gas flaring and venting associated with petroleum exploration and production in Nigeria's Niger Delta has continued to generating complex consequences in terms of exposure to polycyclic aromatic hydrocarbons, particulate matter, polychlorinated biphenyl and xenoestrogens.

Oil Spillage

According to estimates, well over 2,567,966 barrels of crude oil has been spilled in 5733 incidents in Niger Delta area from 1076 -2000 and about 549,060 barrels were recovered while 1,820,411 barrels were lost to the environment (Edoho, 2008). Aigbedion and Iyaji (2007) explains that “in the Niger Delta area, oil spillage of differing intensity resulting from burst pipelines, tanks, tankers, drilling, etc is a common phenomenon. They added that it causes water and land pollution with grave consequences on both aquatic and terrestrial life”. Oil spillage, on the other hand, has been proven to lead to retardation of vegetation growth over a period of time and if unchecked, could lead to the destruction of vegetation. This has made it impossible for most farmlands in the area to be cultivated, besides killing and destroying the habitat of some animal species on land. Also, in water, oil film on the water surface could prevent natural aeration and lead to the death of trapped marine organisms. In some cases, fish may ingest the spilled oil or other food materials impregnated with oil and as such become inedible and unpalatable (Bayode *et al.*, 2011). To support the argument that petroleum derivatives have consequential effect on the environmental media, (Victor *et al.*, 2017) observed the levels of PAHs in fish species indicating that Qua Iboe river in Eket community of Akwa Ibom state is contaminated with PAHs. Therefore, residents in Eket community may be at risk of contracting diseases associated with polycyclic aromatic hydrocarbons due to persistence exposure to/and consumption of the fish. It is believed that other fish species do bio-concentrate PAHs and possibly, beyond permissible limit.

Dredging

This implies deepening/widening of an existing channel or cutting a new access channel in order to increase access to wetlands. Since most of the drilling sites are in the wetlands, it becomes both a challenge and a necessity to create channels for ease of transportation. Where this happens, the resultant spills are openly deposited over the bank mostly upon fringing Rhizophora mangrove and abandoned. The subsequent poor spill management practices have led to a number of environmental impacts through direct burial and destruction of fringing mangroves and associated fauna, change in topography and hydrology, siltation of navigation canals, flooding and suffocation of mangroves, degradation of water quality, habitat fragmentation and land use (Ohimain, 2003). Johnson (2011) adds that dredging is responsible for decreasing the population and diversity of zooplankton and benthic invertebrate, degradation of water quality through increased turbidity and siltation and impacting negatively

on virtually all components of the environment. Accordingly, petroleum activities in the Niger Delta area affect the oil and gas infrastructure, land use, water quality, aquatic lives, vegetation, soil conditions, site topography, air, animal and their habitats and human.

Host Community's Response to Environmental Degradation in the Area

Over the years, the activities of multinational co-operation in the area, which have resulted in the above-mentioned issues, have cost the inhabitants of the area their occupation in farming, hunting and fishing. It has also spoiled their air and drinking water, resulting in starvation and widespread health issues. In response, the youths of the area have resorted to killings, pipeline vandalism, kidnapping of oil experts for a fee, oil bunkering, armed robbery and general restiveness in the area, thereby creating more problems than solve any.

Negative Impacts of Oil Exploration on Biodiversity

The pollution of the environment arose from the exploration of crude oil in the Niger Delta area with its negative impact on the biodiversity at the polluted sites. The stressor is occasionally caused by leakages of crude oil pipelines, vandalization of pipelines by larcenist, gas flaring and delusion of chemicals used in production. The oil pollution effect on the ecosystems is profound. The government has enacted policies that will help protect the environment from further assault, but these can only be effective if the laws so propounded are implemented by concern regulatory agencies. Though the oil companies have contributed to the reduction of pollution at the basal level, they have considerably narrowed the scale wider spillage.

Nigerian Crude Oil Exploration- a Short Tale Account

The breakthrough that led to Nigeria's independence in 1914 and subsequent termination of colonialism in 1960, agricultural practices was the hallmark of the country's economy (Baker and Edwards, 2012). The sustainable agricultural products were cocoa, groundnut, rubber, cotton and palm oil Bamberger and Oswald (2012). The exploration of crude oil started in 1956 but with little impact on the Nigerian economy as at then Baro and Endouware (2013). The bulk of Nigeria's revenue was agriculture (Anifowose *et al.*, 2012). More than seventy percent of the population was self-employed in agriculture. Immediately the oil began to dominate the agricultural sector, the country's economic status began to portray retrogression as a single commodity nation.

Oil and Gas Reserves in Nigeria

The Nigeria oil reserve at a time was estimated at 35.2 billion barrels, were upon the Nigerian government organized to increase reserve to forty billion barrels (Nkeki *et al.*, 2013). In 2005, Nigeria holds five oil blocks in the Joint Development Zone (JDZ) shared by Nigeria and São Tomé and Príncipe (STP). The JDZ was holding 11 billion barrels reserves, which could produce about three million barrels per day (Bailey, 2008).

Mitigation Efforts by the Government

Over the years, successive governments in the country have made the following efforts to mitigate environmental issues in Niger Delta of Nigeria:

- i. **Regulatory Framework:** Some of the related environmental laws and regulations in the oil and gas sector includes Oil Pipeline Act of 1956 (amended in 1965); Mineral oils (safety) Regulations (1963); Oil in Navigable Waters Act (1963); the Federal Environmental Protection Agency (FEPA) Act (1988); The National Policy in the Environment, 1989 (revised in 1999); National Environmental Protection (Pollution Abatement and Industries Generating Wastes) Regulation (1991); Environmental Impact Assessment (EIA) Act (1992), Department of Petroleum Resources (DPR), Environmental Guidelines and Standard for the Petroleum Industry in Nigeria (EGASPIN) (2002) (Ite *et al.*, 2013). The minerals and Mining Decrees of 1999 is also in the league of the legislative framework by the government to protect the environment
- ii. **Establishment of the Niger Delta Development Commission (NDDC):** The NDDC was set up in 1999 by President Olusegun Obasanjo shortly on his assumption of office, to replace OMPADEC as the agency with the sole mandate to develop the Niger Delta. Since the establishment of this Commission, he has, in line with her fifteen print mandate worked very hard to address the causes and effects of environmental degradation in the area
- iii. **Creation of Presidential Amnesty for Militants:** As in response to the criminal activities in the area, which were mostly caused by the unjust exploitation of the area and the resultant effects on the residents, the government, under late President Umaru Musa Yaradua granted amnesty to the youths in the area. The amnesty program was to enable the agitators to submit their weapons to the government and in turn, get trained in any vocation of their choices. This program yielded positive result as many Militants submitted their weapons and got trained and empowered by the government
- iv. **Environmental Impact Assessment and Cleaning Exercises:** Over the years, the agencies of government concerned with the environment (as well as Non-governmental organizations) have been working hard to do some clean-up of the environment. The clean-up exercises help to reduce the extent of damage caused by the oil-related activities

Understandably, despite the efforts of the government to help reduce the effect of environmental degradation in the area, not so much has changed. This situation calls for more drastic measures to enhance the sustainable environment in the area.

Conclusion

Despite the increase in the exploitation and exploration of petroleum products in the Niger Delta area, the social responsibility of the private organizations is poorly executed. The resistance against government and companies by the jobless youths and militants seems to be strong. The amnesty program granted by the government to militants and subsequent creation of the ministry of Niger Delta is seen as palliative and remedial approach to solving the agitation. Therefore, one straight approach to resolving their privations is to make the jobs available to the youths of that area as well as provide basic amenities to the communities. Therefore, by merely cleaning up the pollutants is not a favor but a statutory duty by the government and corporate social responsibility of the companies. Recommendations

Aigbedion and Iyaji (2007) observe that the legislature has not made sufficient provisions for sanctions against those who fail to comply with the environmental protection regulations. They added that:

- i. Mining Companies should submit an environmental restoration plan together with an application for either prospecting or mining lease of an area
- ii. Processing Companies must install appropriate equipment, where necessary, for preventing or minimizing pollution
- iii. All mining companies and processing companies are to prepare a prognosis of the possible environmental impact of their operations, as well as the technique for monitoring the impact for approval of the mines department before the companies can commence operations
- iv. Nigeria, in general, does not have policy issues, but implementation issues. Every law on the use of environment must be seriously implemented with defaulters brought to face the deserving sanctions.
- v. Environmental law enforcement agencies must be set up with determined sincerity and responsibility of monitoring the activities of those that exploit environmental resources. They should ensure strict compliance with environmental regulations

- vi. Since some damage to the environment is inevitable in the course of exploration – appropriate remedial and compensation plans should be put in place to reduce the effect and help the environment

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Author's Contributions

Agnes Edet Asuquo Offiong: Wrote and edited the manuscript.

Onnogen Usang Nkanu: Supplied the relevant literature.

Etim Nkanu Efut: Edited the manuscript.

Uba James Uba: Gather Literature and corrected the manuscript.

Conflict of Interest

The authors declare no competing interest.

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