



Impact of Oil Pollution on Livelihood: Evidence from the Niger Delta Region of Nigeria

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Authors' contributions

This work was carried out in collaboration between all authors. Author IVE designed the study, wrote the protocol and wrote the first draft of the manuscript. Authors IVE, SCO and OKA managed the literature searches and contributed to the final manuscript. All authors read and approved the final manuscript.

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ABSTRACT

This paper highlights the negative impact of oil pollution in Nigeria with particular reference to the Niger Delta region. For a region that provides a majority of Nigeria's revenue and foreign exchange earnings to bear an exclusive brunt of oil exploration and exploitation is quite an irony. Oil spillage and gas flaring over the years has been at the heart of environmental degradation in the Niger Delta with an average of about 700 spills recorded annually; while gas flaring has continued unabated in spite of been an illegal activity as prescribed by law. In spite of the report(s) by oil companies that majority of oil spills in the region is due to sabotage; neglect on the part of IOC's and ageing infrastructure have equally contributed to the high incidence of oil spill and gas flaring as experienced in the region. Oil spillage and gas flaring have continued to impact negatively on the people of the region causing destruction of the environment, while causing significant damage on livelihood of mostly farming and fishing communities. This situation has increased the vulnerability of households thereby affecting their wellbeing adversely, with a threat on the region's future means of sustenance; while governments response and remediation efforts aimed at

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restoring the regions ecosystem have not being very effective. This paper therefore calls for strengthening of the appropriate federal laws relating to oil exploration to ensure that oil companies operating in the region do so in compliance with proper environmental standards and international best practice.

Keywords: Oil pollution; environment; livelihood; response; Niger Delta.

1. INTRODUCTION

The UNDP [1] describes the situation in the Niger Delta as a region suffering from administrative neglect, crumbling social infrastructure and services, high unemployment, social deprivation, abject poverty, filth and squalor, and endemic conflict. No other sentence describes squarely the condition in which more than 30 million people have found themselves as a result of oil exploration and exploitation activities, yet the situation has progressively continued to deteriorate; chiefly as a result of the nonchalance of the stakeholders and oil companies in the region - with little or no hope in sight. Oil spillage and gas flaring which is the most referenced form of pollution resulting from oil exploration and exploitation in the Niger Delta have had consequences on the Niger Delta region. The situation has affected the living conditions of the people who depend solely on the environment for their subsistence, ranging from fishing, agricultural activities, provision of portable water, recreational activities such as swimming, pure and refined air and green/clean land and water ways. This incidence has continued for decades and still threatens any hope for a sustainable living.

The petroleum industry in Nigeria is practically the most significant source of revenue. Petroleum production and export plays a dominant role in Nigerian's economy and account for about 90% of her gross earnings [2]. Oil and gas alone have generated 40 per cent of Nigeria's national GDP over recent decades [3]. The country also has a proven crude oil reserve of 37,070 billion barrels and a proven natural gas reserve of 5,111 billion cu/meters [4]. In spite of this seemingly hopeful statistics, the Niger Delta which lays the golden egg is a subject of frustration and hopelessness as the negative effects of oil exploitation and exploration has continued to degrade the environment and the lives of the people of the region. While oil spill has played a significant role in the devastation of the flora and fauna, and the general landscape of the region; it has most importantly contributed in affecting the livelihood of the people by affecting

farming and fishing communities. Gas flaring on the other hand has also continued unabated while further exacerbating household living conditions by causing air pollution in host communities and contaminating farm produce with significant effect on livelihood in the region.

In addition, and in respect to its impact on livelihood, [5] reported that about 70% of the people of the Niger Delta region live below poverty line; less than \$1 a day with a clear absence of the basic amenities. Damages from oil operations are chronic and cumulative and have acted in a severely impaired coastal ecosystem and compromised the livelihoods of the region's impoverished residents [1]. In spite of this, the sickening impact on livelihoods is yet to be fully appreciated [6]. It is in the light of this that this study weighs in to discuss the impact and consequences of oil pollution notably oil spillage and gas flaring on the livelihood of the people of the Niger Delta.

2. THE NIGER DELTA REGION AND OIL EXPLORATION

The Niger Delta extends over about 70,000 km² (27,000 sq mi) and makes up 7.5% of Nigeria's land mass [7]. It is the largest wetland and maintains the third-largest drainage basin in Africa. The Delta's environment can be broken down into four ecological zones: coastal barriers islands, mangrove swamp forests, freshwater swamps and lowland rainforests.

The region has an estimated regional population of nearly 30 million people [1]; and comprise of 9 States including Rivers, Bayelsa, Akwa Ibom, Delta, Imo, Abia, Ondo, Cross River and Edo as observed in [8]. However, majority of the oil pollution and gas flaring occur in the core Niger Delta states of Bayelsa, Rivers, Delta, and Akwa Ibom states respectively. It is also the region of Nigeria where majority of the oil exploration activities are carried out. The area host a number of International Oil Companies (IOC'S) including Shell whose activities is more prominent in the region. Oil exploration began in 1956 when Shell discovered an oil well in Oloibiri in Bayelsa State.

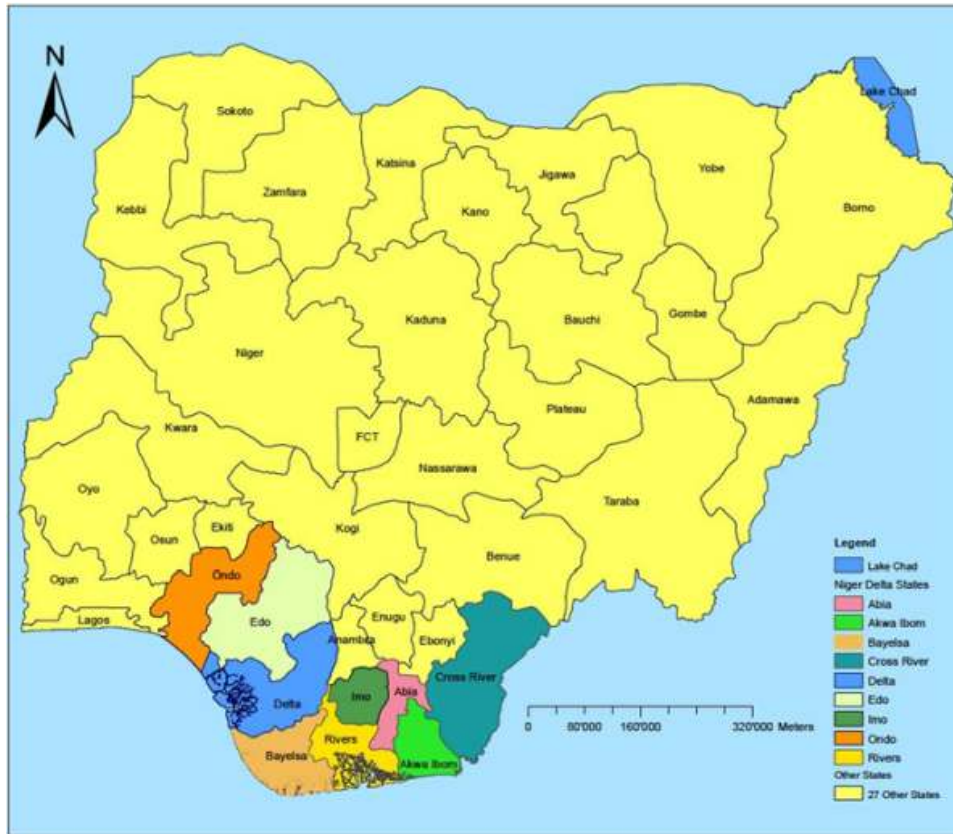


Fig. 1. Map of Nigeria highlighting the Niger Delta
 Source: Aniefiok et al. (2013)

The Niger Delta Basin has since matured with production rising progressively from an initial output of 5,100 bopd at first export in 1958 to the current 2.4 million bopd situating Nigeria as biggest crude oil producer in Africa and the sixth biggest producer in the Organization of Petroleum Exporting Countries (OPEC) which it joined in 1971 [9].

3. CAUSES AND INCIDENCES OF OIL POLLUTION IN NIGER DELTA

3.1 Oil Spillage

Oil spillage often results from sabotage or theft, human error, accidents and operational discharges of petroleum hydrocarbon into the environment. Oil bunkering is also a source of oil spill [10]. The DPR Annual Statistical Bulletin (2014) gives a summary of oil spill incidence report and incidence summary.

From Table 1, it can be deduced that about 65.13% of oil spilled in 2014 was due to

sabotage; 17.38% was by yet to be determined causes; 14.35% was as a result of natural accidents, corrosion, equipment failure and human error; while 3% was due to “mysterious” circumstances. These estimates as conservatives as they seem are constantly been disputed by oil companies who argue that the bulk of the oil spill (as much as 90%) occurring in the region are caused by sabotage or vandalism. Also from Table 2, 2014 recorded a total of 1087 oil spills with an average of 91 spill incidences per month. Consequently, within the last five years, an average of 733 spill incidences have been recorded annually; with a total average of 23,000 barrels spilled per annum. Nigeria has witnessed incessant oil spill incidences in the past five decades with devastating consequences on land and coastal environment in the Niger Delta region. The Niger Delta region have experienced on the average 273 oil spills resulting to about 115,000 barrels of crude oil spilled annually between 1976-2001 [11]. Also, between January 2010 and August 2015, about 6,333 oil spill incidents were recorded [12]; while

according to [13], 1,879 spill incidents were recorded between January 2014 and October 2015. In addition, 1.08 million barrels of crude oil worth about N14,846.71 million was lost in 2014 [14]. Environmental groups conversely say more than 300 spill cases occur yearly [6]. In sum, it is generally held that between 9 million and 13 million barrels have been spilled in the Niger Delta since 1958, and by 2008 that was an equivalent of one Exxon Valdez every year for that period [6]. This is in contrast and a far cry to the only 10 spills reported across all of Europe between 1971 and 2011 according to [15].

3.2 Gas Flaring

Besides oil spills as source of environmental degradation in the Niger Delta, gas flaring stands out as another major source [9]. According to the Department of Petroleum Resources 2014 Industry Statistical Bulletin, Nigeria produced 3,048,546,486scf/d of gas in 2014; used 87% of the amount produced amounting to 2,654,706,605scf/d, and flared 393,839,936scf/d equivalents to 13% of the total gas produced within the year. This figure for the gas flared is a marked improvement considering the 2001 statistics which show that of the 1,943,595,973scf/d produced, 49% amounting to 942,847,891scf/d was flared, while only 51% amounting to 1,000,748,082scf/d was used.

Fig. 2 show the trend analysis of gas produced, utilized, and flared in Nigeria (2001-2014). The figure showed an upward trend in gas produced, and utilized, and downward trend for gas flared within the period. Nigeria flares 17.2 billion m³ of natural gas per year in conjunction with the exploration of crude oil in the Niger Delta [16]. According to NNPC in the 2014 Annual statistical bulletin reported that, of the 2,524.27 Billion scf produced, 2,233.49 BSCF (88.53%) was utilized, while 289.60 BSCF (11.47%) was flared in 2014. In addition, International Oil Companies (IOCs) in Nigeria produce about 2.524 trillion scf of gas annually, the estimated gas they utilize is put at 2.235 trn, with a hefty 289.6bn scf flared [17]. In Nigeria, burning off the associated gas (AG) has been illegal since 1984 and the Nigerian government has set up several deadlines to end the practice, but gas flaring still continues [18]. Fig 2 however shows a progressive reduction in the total amount of gas flared in the country from 2007 to 2014. In spite of this improvement, and with a proven natural gas reserve of 5,111 billion cu/meters [4]; the country still ranks amongst the highest gas

flaring nations in the world; with about 80 percent of gas flared by oil companies operating in the country [19]. This is because oil companies gain maximum economic profit from flaring gas rather than creating the right infrastructure for re-use of associated gas [20].

4. IMPACT OF OIL POLLUTION

4.1 Impact on Environment

The Niger Delta once boasts of an impressive landscape. It is home to a unique and highly diverse flora and fauna; no other area in Nigeria can compare [21]. However, the advent of oil production in the Niger Delta has led to deforestation and ecological degradation, threatening the renewable natural resources and the ecosystem services in a number of ways [22]. Available records for the period of 1976 to 1996 indicate that approximately 6%, 25%, and 69% respectively, of total oil spilled in the Niger Delta area were in land, swamp, and offshore environments [23]. According to Nwilo & Badejo, an estimated 1,820,410.5 barrels amounting to (77%) of oil spilled between 1976 and 1996 were lost to the environment; with only 549,060 barrels representing 23.17% of the total oil spilt into the environment was recovered. Also, available records show that between 2004 and 2014, Nigeria flared a total of 313,553,980.00mscf of gas [14]. This has led to the destruction of the environment in no small measure. The environmental problems of the Niger Delta according to [24] result in generally land resource degradation, renewable resource degradation and environmental pollution, agricultural land degradation, fisheries depletion, deforestation, biodiversity loss, oil pollution, gas flaring and mangrove degradation. Since the people depended hugely on their environment for farming and fishing, any incidence which affect these resources would surely affect their subsistence. On the consequences of oil pollution on the environment and wildlife; [23] opines that; oil kills plants and animals in the estuarine zone; oil settles on beaches and kills organisms that live there; it also settles on ocean floor and kills benthic (bottom-dwelling) organisms such as crabs; oil poisons algae, disrupts major food chains and decreases the yield of edible crustaceans; it also coats birds, impairing their flight or reducing the insulative property of their feathers, thus making the birds more vulnerable to cold; oil endangers fish hatcheries in coastal waters and as well contaminates the flesh of commercially valuable

Table 1. Spill incidence report

Month	Number of spills by causes							Total number of spills	Volume spilled (BBLs)
	Natural accident	corrosion	Equipment failure	sabotage	Human error	YTBD	Mystery		
January	0	6	5	86	1	17	2	117	384.95
February	0	5	4	67	0	20	4	100	168.26
March	0	3	7	63	1	21	3	98	269.91
April	1	4	9	98	2	15	5	134	465.15
May	2	1	8	90	0	13	3	117	690.42
June	1	7	7	49	2	22	2	90	194.47
July	1	5	21	53	1	19	3	103	711.79
August	1	4	8	50	0	9	2	74	1578.86
September	1	0	8	55	0	11	2	77	159.14
October	0	1	8	22	1	12	1	45	427.60
November	5	4	6	39	0	17	5	76	5224.36
December	0	2	3	36	0	13	2	56	27.25
Total	12	42	94	708	8	189	34	1087	10,302.16

Source: DPR, 2014

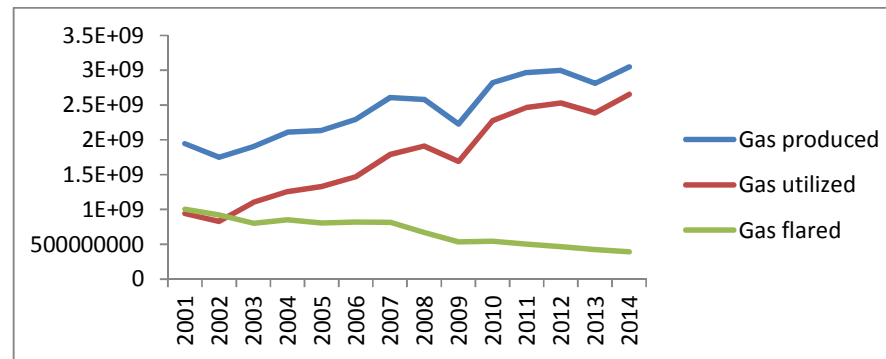


Fig. 2. Nigeria gas production and utilization statistics (2001 – 2014)

Data Source: DPR, 2014

fish. Fishing resources can be damaged through physical contamination, bio-accumulation, and damaging of spawning grounds, as well as habitat destruction, depending on the circumstances of the spill and time of response [25]. Oil pollution on mangrove vegetation is disastrous as witnessed in Ogoniland; with impacts varying from extreme stress to total destruction [3]. For one of the world's important wetlands which harbor a great diversity of flora and fauna, oil spillage in the Niger Delta has continued to impact negatively on the once pristine environment leading to the death virtually everything in sight. Crude oil contains toxic components, which cause outright mortality of plants and animals as well as other sub-lethal damage [21].

Table 2. Spill incidence summary

Years	Number of spills	Quantity spilled (Barrels)
2010	537	17,658.10
2011	673	66,906.84
2012	844	17,526.37
2013	522	4,066.20
2014	1087	10,302.16

Source: DPR, 2014

In addition to oil spillage, wanton gas flaring has also contributed significantly to the ongoing ecological destruction been experienced in the region. Gas flaring in some communities has continued without any end in sight for many years in spite of federal laws against the incidence in Nigeria. The flaring of Associated Gas during oil production result in emissions comprising particulate matter (smoke), sulfur and nitrogen oxides, benz[a]pyrene and dioxin and unburned fuel components such as toluene, benzene and xylene [18]; which may result to acid rain. Acid rain is another problem within the Niger Delta region caused by gas flaring which has led to loss in biodiversity, with forest and economic crops being destroyed [26]. According to [27], the concentration of acid in rain water appears to be higher in the Niger Delta region and decreases further away from the region; leading to loss of biodiversity; and the destruction of forests and economic crops.

4.2 Impact on Livelihood

The Niger Delta is home to a valuable natural resource, providing livelihood in farming and fishing. However, the area is also plagued by large oil spills that threaten the lives of the

inhabitants of the region, those rich natural resources, and the very livelihood of those who depend on them [28]. It is common that indigenous communities and households would depend on the available resources in their place of origin since available resources is a sine qua non for sustainable living. Likewise the people in the Niger Delta depend squarely on their natural environment, (soil, water resources, and forest) for subsistence and survival by engaging in farming and fishing. Oil spills which occur both on land and water is threatening this means of subsistence. On land, oil spills destroy crops and damage the quality and productivity of soil that communities use for farming, while on water, it damages fisheries and contaminate water used for drinking and other domestic purposes thereby reducing any improvement in livelihood activities of people in oil producing areas [29]. Most of the people affected are particularly the poorest and those who rely on traditional livelihoods such as fishing and agriculture [1]. Damages from oil operations are therefore chronic and cumulative and have acted in a severely impaired coastal ecosystem compromising the livelihoods of the regions impoverished residents.

Oil pollution including oil spillage and gas flaring affects livelihood in the form of productivity losses to both crop and fish harvest. The major livelihood sources (including land and water) for the majority of households in the region have been greatly affected. Depending on the severity, oil spilled on land affects soil stability leading to reduced growth and productivity for farmers in communities in the region. According to [30] in the worst affected area of such spillage, oil could penetrate the soil up to a depth of 0.65m, thus destroying crops and interfering with plant growth. Akpan also reported that some plants and fruit trees could be covered by crude oil which might affect normal photosynthesis and transpiration processes leading to chlorophyll deficiency and quick death.

Oil pollution also causes great damage to plant community due to high retention time of oil occasioned by limited flow. Oiled shoots of crops like pepper and tomatoes may wilt and die off due to blockage of stomata thereby inhibiting photosynthesis, transpiration, and respiration. In fact the germination, growth performance, and yield of crops are stifled by oil spillage [31]. Corroborating the evidence, [32] indicated that cassava farm size, yield, and land productivity in oil spillage affected communities were significantly lower than those of the non-oil

spillage communities. With increasing loss of soil fertility due to the destruction of soil microorganisms, and dwindling agricultural productivity, farmers have been forced to abandon their land, to seek non-existent alternative means of livelihood [33]

Evidence of a decline in technical efficiency in polluted soils relative to unpolluted soils has also been found in the region. Unproductive soils as a result of oil spillage constitute constraints in the achievement of technical efficiency for farmers. Farmers generally in the study area are not technically efficient, although the farmers in unpolluted areas are relatively more efficient than farmers in polluted areas; with mean technical efficiency of 78% observed in polluted areas and 88% in unpolluted areas [34]. Fishermen in polluted fishing zones in the Niger Delta also experience reduction in fish harvest and income. The result of a study conducted by [35] revealed that artisanal fishermen in oil producing areas incurred higher costs of production and poor fish harvest presumably as a result of oil exploitation activities leading to lower profit for fishing activities in Niger Delta. This situation has increased the hopelessness of the people as according to [36], unproductive soils due to oil spillage is killing the people's interest in agricultural activities, particularly crop production and fishing.

All forms of oil spillage have negative consequences on livelihood sources and livelihood. As explained by [37] a small leak can wipe out a year's food supply for a family, with it wiping out income from products sold for cash - the consequences of such loss of livelihood ranging from children missing school because their parents are unable to afford the fees, to virtual destitution.

Large oil spills generally devastate ecosystem in the Niger Delta, poison sea food, fish, water birds and animals; fishermen in the Niger Delta are usually negatively affected as their sources of livelihood are destroyed; stream sources which provide drinkable water for rural people in the region remain heavily contaminated beyond use by oil spills and this affects right to life adversely [38]. Farmers and fishermen have been faced with poor harvest thereby increasing the vulnerability of the people and robbing households of a means to survive. Several major rivers are heavily polluted and also farmlands are under acid rain and oil spills. The fisheries sector itself is suffering due to the destruction of fish

habitat in the mangrove zone and highly persistent contamination of many creeks, making them unsuitable for fishing [3].

Oil canals and network of pipelines is making it impossible and dangerous for people to undertake economic activities on it [39]. This ugly trend have increased the vulnerability of households and hence leading household heads to seek non-existent means of livelihood.

Table 3 shows the livelihood losses resulting from oil pollution. From the table [40], a severe environmental degradation index was observed for pollution of rivers/streams, and hotter outdoor environment. The loss of farmland and polluted air showed moderate to high environmental degradation index, while loss of domesticated livestock and loss of family members showed low index.

The people of the region in addition to the loss of yield and farmland from oil spillage also experience losses in crop yield due to gas flaring. Acid rain mainly caused by gas flaring increases the acidity of the soil leading to poor crop yields [41]. According to [42], farmers experience complete loss in yield of crops cultivated within a distance of 100 meters from flare site, 45% loss in yield within 600 meters away from flare site, and a 10% loss 1km from a flare site. This is quite remarkable as it shows the direct impact on livelihood for households and communities in close proximity to gas flaring sites.

Gas flaring also contributes to climate change by releasing CO² and other greenhouse gases into the atmosphere. According to the [18]; one of the significant effects of gas flaring is its contribution to climate change. Gas flares are said to release some 45.8 billion kilowatts of heat into the atmosphere of the Niger Delta daily [41]. This has raised temperatures and rendered large areas uninhabitable [32]. Climate change is a serious problem confronting millions in Africa and the situation in the Niger Delta has robbed households of livelihood sources, and increased the vulnerability of farming households in the region. [43] opined that the continued degradation in the form of spills and gas flares render the Niger Delta extremely vulnerable to the impacts of climate change with a projected loss of 50% ability to produce cereals by the year 2020 that would rise to 80% loss by 2050. Also, air pollution from gas flaring sites lead to the production of acid rain which affects soil PH, contaminates fruits and vegetables, and also

Table 3. Livelihood losses resulting from oil pollution

Environmental degradation index	3-High	2-Moderate	1-Low
Loss of farmland	60	259	54
Polluted rivers/Streams	207	100	66
Hotter outdoor environment	287	96	80
Polluted air	111	215	47
Loss of domesticated livestock	99	67	207
Loss of family members	8	50	315

*Source: Ogbija et al. 2015.

affects the growth of crops thus reducing yield and productivity. Gas flaring also creates noise pollution in which communities may have to live with permanent light [44].

Table 4. Loss in crop yield due to gas flaring

Distance of farmland from flare site	Percentage loss in yield of crops (%)
100 meters	100
600 meters	45
1km	10

*Source: Adeyemo, 2002

Oil pollution has both short to medium term and long term consequences. In the short term, oil pollution would continue to deprive the people of their immediate means of sustenance in farming and fishing which has been the traditional means of survival; hence individuals and households resort to other means of livelihood. Also, individuals exposed to pollution may suffer from debilitating diseases. Oil pollution in the long run may deprive future generations of a means to survive thereby increasing the likelihood of conflict in an already restive region.

5. RESPONSE AND REMEDIATION

Response and remediation to oil pollution has been weak in the Niger Delta; and therefore it could take several years for oil companies in the region to begin to take full responsibility even in the face of a major disaster as is evidenced in Ogoniland. [3] report found evidence of widespread and severe impact on the environment due to oil pollution; contending that oil spills continue to occur with alarming regularity in spite of the fact that the oil industry is no longer active in Ogoniland. Response to oil spills has been marked by corruption, lack of effective communication, power struggles, and an almost total failure to adequately remedy oil spills by cleaning and restoring the environment and compensating those harmed [45]. The

Federal Environmental Protection Agency Act of 1988 orders that following an oil spill, oil companies should “begin immediate clean-up operations following the best available clean-up practice and removal methods”. Hence, government agencies’ including DPR and NOSDRA supervise the petroleum industry operations, and ensure compliance with environmental legislation in the petroleum sector respectively. Shell Petroleum Development Company of Nigeria Limited (SPDC), one of the biggest operators in the region also in its web portal avowed that “it is committed to minimizing oil spills to the environment and to clean up all spills in the Niger Delta when they occur, as fast as possible, no matter what their cause”. This position as taken by shell and accordingly by other oil companies seems to be at variance with reality and evidence on the ground. The slow pace of response, poor history of remediation efforts and measures taken over the years, and the level of destruction to swamps, and farmlands attest to this. According to [3], sites which SPDC records show as having completed remediation, still have pollution exceeding the SPDC (and government) remediation closure values; hence industry as well as international best practices are not been followed as oil industries operating in the region have been complacent when it comes to their operations in Nigeria. Following from this horror, Audrey Gaughran, Global Issues Director, Amnesty International expressed dismay as thus:

“In any other country, this would be a national emergency. In Nigeria it appears to be standard operating procedure for the oil industry. The human cost is horrific – people living with pollution every day of their lives”.

Nigeria has a history of weak institutional arrangements, poor regulation, and official corruption therefore making it easier for international oil players to take advantage of the system. The oil industry is accused of a sharp double standard in its operations - of taking

advantage of Nigeria's lack of environment law and weak regulation, while observing higher standards of safety and maintenance overseas [46]. In addition, there has been history and evidence of collaboration between the state and IOC's in protecting these companies from their responsibility. The "romantic" partnership between the Federal Ministry of Petroleum Resources (and its agencies such as NNPC and DPR), and the oil companies, is known to drive official corruption in the petroleum industry [47]. Response to oil spills by government institutions and oil companies, and mitigation and initial cleanup of first-instance harms caused by oil spills, can take weeks or even months after a spill has been reported [45].

The Environmental Guidelines and Standards for the Petroleum Industry in Nigeria (EGASPIN) produced by the Department of Petroleum Resources (DPR) issued in 2002 forms the framework for environmental regulation of the oil industry. The guideline requires oil companies to inspect pipelines monthly to prevent equipment failure; take practical precautions to prevent pollution and prepare an oil spill contingency plan which should include the operator's policy on pollution, prevention, and management. The contingency plan would ensure that the environment is protected while also ensuring that all measures are in place for containing and cleaning up spills; and that accurate information is given to the public and the authorities. Also, after a spill occurs, oil companies must commence clean-up within 24 hours and ensure no additional damage is caused and keep a daily log of events until the clean-up is completed. They are required to apply to carry out remediation of contaminated sites. These regulations have not been followed strictly by the oil companies in the region. According to [3] in Ogoniland, in 41 sites, the hydrocarbon pollution has reached the groundwater at levels in excess of the Nigerian standards as per the EGASPIN legislation, while ten out of the 15 investigated sites which SPDC records show as having completed remediation, still have pollution exceeding the SPDC (and government) remediation closure values [3]. [48] posits that despite the large number of sites that have not been given a clean bill of health either for cleanup or remediation no oil company to date has been penalized. This could spell doom for the people in the region as the oil companies would continue to pollute the environment bearing in mind that they would not be penalized, or rather be made to pay a token. This situation

has left much of the Delta environment contaminated.

In the case of Ogoniland although the spill is over 40 years old and repeated clean up attempts have been made contamination is still present at the site as any cleaning which will ensure a sustainable recovery could take about 25 -30 years [3]. Kadafa explained that the quantity of oil spilled is also relevant to recovery period but is not the major determinant of the recovery period and the type of clean-up method also determines recovery period. Even with remediation it takes up to 15 years for recovery, and factors like the geology of the area and the type of oil will also determine the recovery period [24]. Therefore, the people of the Niger Delta would continue to suffer the effect of an already devastated environment for years to come which will result to a continuous decline in the livelihood of the people of the area, and endangerment of generations to come.

6. CONCLUSION

In conclusion, the oil pollution which has continued for over a decade in the Niger Delta unchecked has since resulted to loss of livelihood in many communities in the region. This situation if not managed properly could spiral into hopelessness especially amongst the youth and present itself as a recipe for conflict. In addition, there is no doubt about the scale of damage to the environment. Oil spillage has resulted in substantial destruction of the once green delta environment turning large section of the region into wastelands. This study hereby recommends that the relevant laws relating to oil production in Nigeria should be strengthened so as ensure that oil companies operating in the region adhere to international best practice and corporate governance as it would help alleviate the suffering of millions of households and even generations yet unborn.

7. RECOMMENDATIONS

In the light of the above it is therefore recommended that the relevant federal laws relating to exploration of oil and gas in the Niger Delta should be strengthened to ensure that oil companies operating in the region do so in compliance with proper environmental standards, and international best practice.

In addition, this paper also calls for strengthening of relevant agencies involved in monitoring and

detection of oil spills so as to report incidences in the region in order to attract the necessary response.

Finally, we recommend that government take seriously the business of remediation in the area; including the current cleaning-up effort in Ogoniland. This will help instill hope in the minds of the people of the region.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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