

A Review on Oil Spillage: A Case Study of the Niger Delta, Nigeria

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ABSTRACT: Niger Delta the oil hub of Nigeria crude oil production generates higher revenues for Nigeria through its abundant crude oil resources. However, oil spillage is a major catastrophe that has affected the region over the years, thus the environmental challenges of the occupants resulting from oil spillage. In this research work, a thorough review was carried out on oil spillage and its effect in the region. The outcome of the reveal showed that environmental damage has brought about health implications in the region and also affected the main sources of livelihood via farming and fishing, thus, causing an increase in unemployment and poverty rate, and low standard of living among the populaces. Irrespective of the fact that measure are put in place by private and governmental bodies to curb the menace and as well manage oil spillage in Niger Delta region of Nigeria, but the problem still persist. However, these challenges could be managed by adjustment in the execution of cooperate social responsibility of oil companies, enforcement of existing laws and establishment of new regulations which can safeguard the environment and the people of Niger Delta, Nigeria.

Keywords: Oil spillage, Niger Delta, Environmental damage, Control, Environmental Pollution

I. INTRODUCTION

The environmental pollution of Niger Delta region of Nigeria as a result of oil spillage has been frequently and the resulting contamination of the general condition has on the other hand caused earth shattering pressure in the zone [1]. The spill oil influences water bodies and rural land when it happens. Besides, it also has huge negative impact on the aquatic organism thus leading to their destruction especially the fishery habitat. Also, the crops in the affected ground rarely survive and the impact of any oil contamination for the most part perseveres for quite a while. Oil slicks happen through holes or harm to oil pipelines

or from mishaps including big haulers, street trucks or railroad vehicles. On-shore, most environmental pollution resulting from oil spillage occurs during the loading and unloading operations of tankers and vessels. Nevertheless, water produced along with crude oil contains a few synthetic concoctions infused to restrain consumption or improve division of oil structure water. The removal of such created water causes ecological contamination particularly in the area freshwater environment. Similarly, processing plant squanders distinctively contaminate water and air and the air contaminants incorporate oxides of nitrogen, carbon and sulfur [2-3].

According to Osuji [4], an oil spillage type of environmental contamination simply means the arrival of a fluid petroleum hydrocarbon into environment and is usually as a result of human activity. The term could likewise be alludes to marine oil slicks, where oil is delivered into the sea or seaside waters. Generally, oil slicks is therefore incorporate with the arrivals of unrefined petroleum from big haulers, seaward stages, penetrating apparatuses and wells, just as spills of refined oil based goods such as gas, diesel and their results. In occurrence of oil spills, it may take as long as months or even a longer time to tidy it up. Research works in the past has shown that most human-made oil contamination originates from land-based crude oil operation. However, there are other cases of oil spillage resulting from tankers, pipeline across the ocean and even vessels [6-10].

II. DESCRIPTION OF THE RESEARCH AREA

This study was carried out in Niger Delta region, the crude oil hub of Nigeria. The area covers an estimated 70,000 km² and is one of the World's knowbiggest deltas. It is situated in the central piece of Southern Nigeria within the scope of 5°33'49"N and 6°31'38"E in the North. Also, its Western limit is located at Benin 5°44'11"N and

5°30'49"E and its Eastern boundary at Imo River 4°27'16"N and 7°35'27"E. The map of the study area is shown in Fig. 1.

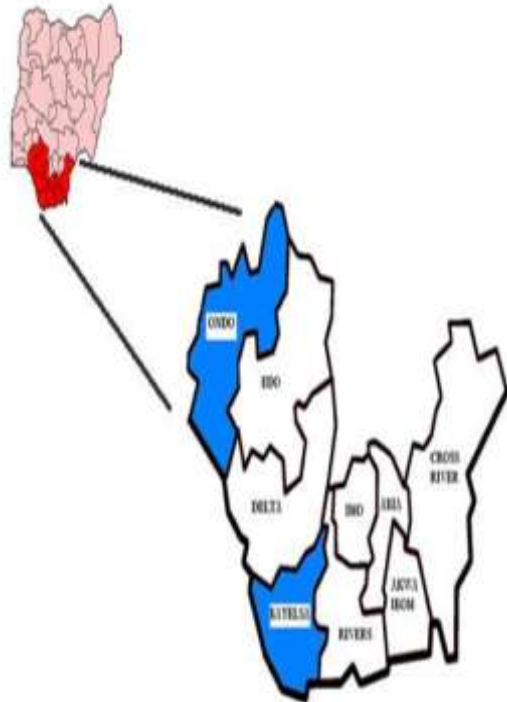


Fig. 1 Map of the Study Area [11]

It is bordered in the Eastern region by the Republic of Cameroun and in the Southern region by the Atlantic Ocean. However, within Nigeria, the region under study is characterized by both geologically and politically and the geography. Geographical consideration shows that the region consists mainly of Rivers, Bayelsa, Delta Cross River and Akwa Ibom and has a territory of around 67,284 km² with a joined populace of 16,331,000 people. However, under political consideration, states such as Abia, Edo, Imo, and Ondo states with an absolute region of 112,110 km² of land as at 2006 are group as Niger Delta region. In this region, 12% of Nigeria's complete surface territories are fully represented [13].

Furthermore, the area under consideration is situated along the Atlantic coast which frames the southern boundary of Nigeria, and run through to the entrance of Rivers Niger and Benue where it enter the sea through a collection of snare of streams, rivulets, and estuaries. With an estimated 2370 km² of waterways, streams and estuaries, it is considered the largest wetland in Africa and the third largest in the world respectively. The vegetation in this region is mainly of rainforest that consists of 8600 km² of swamp forest and an estimated 1900 km² of

mangrove forest [12]. Notwithstanding, the region is bless with a ton of gas reserves but underutilize. As reported by researchers in the past, an estimated 606 oil fields exist in this region of which 360 are on-shore and 246 are seaward [14]. Also, the vast majority of the new oil fields that existed in this region are profound water fields created and being grown seaward.

2.1 Oil Spill in Niger Delta

Since the discovery of crude oil in this region and the kick start of enormous scope activities in the petroleum exploration in 1958, this part of Nigeria had been consistently encountering instances of ecological corruption, environmental pollution and natural contamination. One of the most noticeable instances of ecological effect resulting from crude oil activities in the region under consideration is keyed to incessant oil spillage resulting from the exploration activities of the oil companies operating in the region. According to DeFrancesco et al. [15], the continuous increase in petroleum exploitation exercises such as seismic overviews, land acquisitions, drilling, transportation, storage, waste dumping and related oil spillages are the major cause of the degradation of the physical environment and this has brought about the deprivation and annihilation of economic livelihoods of the people of this region. IAs recorded from research work carried out in the region, the main enormous scope oil blow out happened in October 1959 and this causes more than 2000 individuals destitute. More so, the first oil spill happened in 1970 and it resulted to more than 150 barrels spillage across land and water. Also, Nwilo and Badejo [14] reported that out of total quantity of spilled crude oil, 77% were lost to environment while 23.17% was recuperated. Similarly, in the year 1998, 5,724 cases of crude oil spillage including 2,571,118 barrels were delivered into environment [16]. As further indicated by Akpan [17], in the year 1970 and 1983, an estimated 1,581 instances crude oil spillage involving 1,711,355 barrels happened on both offshore and onshore. Also, in the year 1976 and 1996, 4647 oil spillage was recorded to have spilled causing 2,369,470 barrels of petroleum into the environment. As indicated by the National Oil Spill Detection and Response Agency (NOSDRA) reports, an estimated 2,400 petroleum spillage was accounted for the period of the year 2006 and 2010. A New York Times (2012) as well reported that around 260,000 barrels of petroleum is spilled annually for as far back as 50 years.

2.2 Effect of Oil Spill in Niger Delta Region of Nigeria

As reported by the United Nations Environment Program (UNEP) on Ogoniland, for the past 50 years, there has been continuous wide spread of petroleum across land and water and that it could take up to 25 to 30 years to clean it up [20]. However, Nwankwo and Ifeadi [17] reported that such spillage cause damages to Niger Delta environment in the following ways:

- i. Oil film on water surfaces forestalls common air circulation and prompts passing of caught marine life forms underneath the surface.
- ii. Spillage leads to contamination of food materials, thus making it unsafe for human consumption.
- iii. Apart from the possible fire out break resulting from crude oil spillage on land, a polluted land by spillage is unfit for crop cultivation.

Also, Onojake [18] is of the opinion that the consequences of oil spillage in this region could also result to;

- i. Damage of rich mangrove forest in the region
- ii. Killing of terrestrial and aquatic organisms
- iii. Damage of household and livelihoods of the populace in this region.
- iv. Cause infertility of the polluted soil
- v. Results to increase in the cost of living and possibly increase poverty rate among the people
- vi. Lead to poor health status thereby reducing the life expectancy which is estimated at 41 years at the moment.
- vii. Can lead to militancy and violence among the populace in this region.

Fig. 2 shows discharging crude oil into the surrounding environment resulting from a welded failure in an oil pipeline. Also, Fig. 3 on the other hand shows crude oil soiled inter-tidal mud flat, both at Bodo Community in the Rivers State region of Niger Delta. In Fig. 4, the impact of the spilled unrefined petroleum on the surrounding mangrove vegetation is shown.

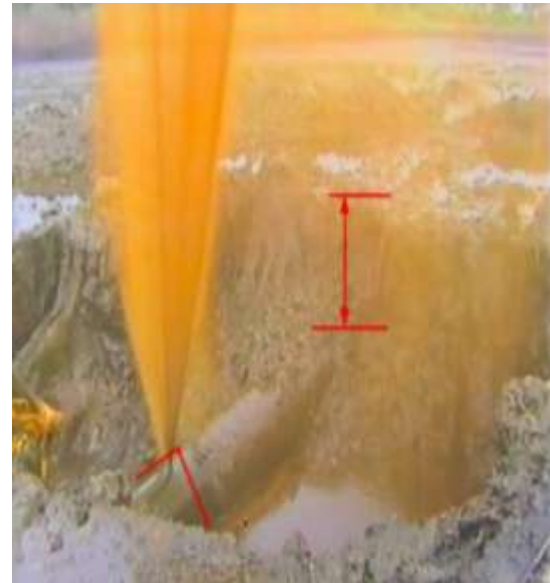


Fig. 2 Weld Failure along an Oil Pipeline at Bodo Community [19]

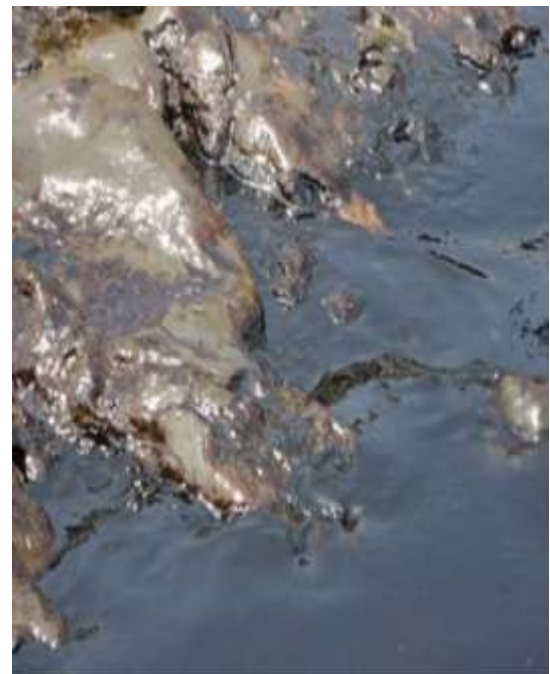


Fig.3 Crude Oil Soiled Inter-Tidal Mud Flat [19]



Fig.4 Contaminated Mangrove Forest [19]

Across the nation, there are around twelve systems of pipelines network that pass on rough to the fare and even across residential houses, treatment facilities and fuel warehouses. The pipelines cover and run within 49.89 km (31miles) to 616.379 km (383 miles), through generally provincial or muggy territories of land starting from Niger Delta region to other part of Nigeria. A large portion of the installed pipelines are possessed and control by International Oil

Companies (IOCs) and the Nigerian National Petroleum Corporation (NNPC). Reports of existing research work showed that most petroleum spillage in the region is due to failure resulting from equipment failure and man. Some of these failures could happen through accidental discharges during loading and unloading of the product. Also, ageing equipment, over stacking, corrosion, abrasion of parts could cause it as well. Be that as it may, a few crude oil spillage occur due to sabotage either to seal crude oil or as a dissent against the Federal Government and the International Oil organizations regulation policies. The records of significant spillage occurrences in this region showed that between of 1976 and 2001, there has been about 6817 recorded scenario of spillage in this region and this has resulted in the loss of an estimated 3,000,000 (three million) barrels of crude oil out of which 25% was spilled directly into swamps and about 69% spilt offshore. As shown in Table 1 is the record of spillage in the region [20]. The resulting effects of the tabulated spillage as documented are as follows:

- i. Spillage in water environment such as ocean could forestall normal air circulation, thus, leading to death of marine organisms.
- ii. Also in a few cases, dead fishes as a result of spillage occurrence may saturate the spilled oil or other food materials impregnated with petroleum.
- iii. Oil spillage could lead to a major impediment of vegetation development.
- iv. In some cases, it could leads to potential fire risks and renders the dirt unsuitable for development.

Table 1. Reported Major Oil Spillage in Niger Delta Region [19-22]

Date it Occur	Location where it Occur	State where it Occur	Amount of Spillage Recorded
July, 1979	Petroleum spillage at Forcados Terminal	Rivers State	1979 570,000
January, 1980	Funiwa No. 5 Well Blowout	Rivers State	400,000
May, 1980	Petroleum spillage at Oyakama	Rivers State	10,000
November, 1982	System 2c Pipeline Rupture	Along Warri-Kaduna Abudu Edo pipeline	18,000
August, 1983	Petroleum spillage at Oshika	Rivers State	10,000
January, 1988	Petroleum spillage at Idoho	AkwaiBom State	40,000
1988	Petroleum spillage at Jones Creek	Delta State	21,548
October, 1998	Petroleum spillage at Jesse	Delta State	10,000
May, 2000	Petroleum spillage at Etiama	Bayelsa State	11,000

December, 2003	Petroleum spillage at Agbada	Rivers State	Unknown
August, 2004	Petroleum spillage at Ewan	Ondo State	Unknown
August, 2005	Petroleum spillage at Ugheli	Delta State	10,000

2.3 Oil Spillage and Land/Water Resources Pollution

Oil spillage is a more awful type of contamination which presents incredible danger to man, the biological system and nature. Oil spillage which is the uncontrolled release of oil or its results including synthetic concoctions and squanders, which essentially happens through gear disappointment, activity mistake or resolved harm have been recognized as the principle wellspring of natural harm in the locale extra time [14]. The various stages and processes of crude oil business which include geographical prospecting, drilling, production, transportation, and refining, cause different degree of hazard to mankind and his environment. Water is essential to all activities of man, from domestic to industrial activities. Niger Delta is made up of different drainage systems, the Gulf of Guinea, creeks, rivers, streams

According to Osuji and Onojake [23], pollution simply means the introduction by man directly or indirectly of unwanted substances/materials into the environment causing an unsafe ecosystem that can jeopardize human wellbeing, hurt living assets and biological systems and even weakens or meddles with comforts or other real employments of nature. Also, one significant natural contamination that has stimulated open and examination intrigue on account of its various impediments is unrefined petroleum [24]. Contamination by raw petroleum typically happens as spillage that is uncontrolled, arrival of unrefined petroleum into land and water condition because of hardware disappointment, operational incidents, or purposeful harm to offices [22]. In spite of the fact that, the ramifications of the present expanding pattern of oil contamination are gigantic for what it's worth broad. Without a doubt, monetary misfortunes exist, yet a more risky danger has to do with the strength of the populace, expanding destitution level of the networks and diminished pace of network improvement.

III. CONTROL AND MANAGEMENT OF OIL SPILLAGE IN NIGER DELTA

A lot of techniques and approaches have been taken by private and governmental bodies to effectively curb and manage spillage of petroleum and its byproduct in this region. Among the many measures put in place by government to curb the

menace include the setting up of the Niger Delta Development Commission which is aimed at tackling ecological and environmental problems associated with it. In same line, laws and regulations are put in place mainly to ensure that exploration and exploitation of the product did not result to spillage and as such, creation of environmental sensitivity index maps produced to help in taking such decisions that will protect the environment of the region is put in place.

3.1 Laws and Regulations

Laws and regulations were put in place by the Nigeria Federal mainly to control and eradicated all form of pollution that causes environmental degradation in the region. For instance, the Ecological Impact Assessment (EIA) order No 86 that was established in 1992 was declared to secure and support our environment. The law makes the improvement of an EIA necessary for any significant venture that may effectively affect the earth [25] and it also looked to evaluate the conceivable or expected ecological effects of proposed exercises which include their immediate, total, present moment and long haul impacts, and to recognize the measures accessible to relieve unfriendly natural effects of proposed exercises, and appraisal of those measures [26]. A portion of these laws, guidelines and peaceful accords as put together include;

- i. The Federal Environmental Protection Agency Act Cap 131 LFN that was established in 1990
- ii. International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage, established in the year 1971
- iii. The Endangered Species Decree Cap of 108 LFN 1990
- iv. The Mineral Oil (Safety) Regulations that was established in 1963 and mainly to oversees safe arrival of inflammable gases and offers disciplines to logical inconsistency and obstruction.
- v. The Harmful Waste Cap 165 LFN that was established 1990
- vi. The Petroleum (Drilling and Production) Regulations, which was established in the year 1969. Be that as it may, this requires permit holders to play it safe, including the

arrangement of forward-thinking gear endorsed by the suitable position to forestall contamination of inland water resources, stream courses, and the regional waters of Nigeria or the high oceans by oil or different liquids or substances.

- vii. The Convention on the Prevention of Marine contamination Damage, that was established in 1972
- viii. The African Convention on the Conservation of Nature and Natural Resources, that was established in 1968 and the law disallows release or escapes of oil into waters inside harbor region and makes arrangements for safeguards in the movement of oil and rules for safe activity of pipelines.
- ix. The Petroleum Regulations of 1967 put in place to management and curb the product, and
- x. The Oil in Navigable Waters Act of 1968 that forbids the release of petroleum or any blend containing of it into the regional or traversable inland waters.

3.2 Establishment of Relevant Government Agencies on Pollution Matters

To ensure that pollution originating from petroleum and its byproducts are properly control, government agencies on pollution related issues were establish. To that effect, the Federal Ministry of the Environment (FME) is legitimately entrusted with the duties and responsibilities of ensuring and the same time supporting the region of oil rich Niger Delta of Nigerian through the detailing and usage of administrative systems for the sole purpose of pollution control. Also, the National Policy on the Environment (NPE) was created by the Ministry to carry out day to day activities in ensuring the aim is achieve [25]. Correspondingly, the Federal Government equally set up another commission called the Oil Detection and Response Commission with the sole aim of overseeing oil slick related issues in the Nigerian Coastal and Inland waters. Furthermore, different organizations put in place to manage contamination related issues are the National Maritime Authority, which their main duty is to bargains contamination in Nigeria's water way and the Department of Petroleum Resources, which centered mainly on crude oil related business. All these agencies and arrangement were put in for the sole purpose of assuming some job in overseeing contamination. More so, due to the expanding mindfulness on the need to forestall and control petroleum spillage in Nigeria, the Clean Nigeria Associates was in November 1981 and the agency is a consortium of eleven oil organizations working in Nigeria. The

sole aim and role of creating the agency was to keep up an ability to battle spills of fluid hydrocarbons or toxins when all is said in done. The Clean Nigeria Associates utilize the entire scope of various strategies and procedures for reacting to oil slicks.

3.3 The Niger-Delta Development Commission (NDDC)

In trying to put in place a measured to control oil spillage and equally develop the region, the Federal Government of Nigeria through a demonstration of the National Assembly in 2000 set up the commission mainly to complete the accompanying assignments as stated;

- i. To identify factors repressing the advancement and development of the region and also to help the states in the arrangement and execution of approaches to guarantee
- ii. To ensure the region territory is properly overviewed so as to discover measures which are significant to advance the physical and financial turn of events
- iii. To tackle biological and natural related issue that arises from the investigation of crude oil in the region territory.
- iv. Liaise with the different oil and gas prospecting and the same time create organizations on all related issues of contamination anticipation and control.
- v. Prepare and project plans intended to advance the physical improvement of the region territory and also to put in place productive administration of the assets of the Niger-Delta region.
- vi. To carry out assessment and equally report on any completed task in the region territory.

3.4 Environmental Sensitive Index (ESI) Mapping

Natural affectability list Environmental Sensitive Index(ESI) planning mainly to aid the administration of oil slick occurrences. The ESI planning was first initiated in Nigeria in the mid-1980s. Gundlach and Murday[27] portray the ESI arrangement of planning and they also proposed the classifications that could be utilized for Nigerian shorelines. Most importantly, on the long term, these shoreline classes have been acknowledged on a genuinely all inclusive level[27].

IV. CONCLUSION

In this study, a review on oil spillage, a case study of Niger Delta, Nigeria was carried out. It was revealed from the study that oil spillage has

generated severe environmental pollution in the study area. Most of the oil spill was because of pipeline disappointment, human mistakes, maturing of gear, vandalization of oil funnels and storerooms by privateers and so forth. In addition, petroleum/crude oil spillage has prompted contamination of water that is drinkable, farmland, demolition of the environment, causes the death of marine fishes and animals in the area. Albeit, some control measures were set up by government and private organizations to guarantee oil spillage occurrences are forestalled and this equally resulted to the creation of the Niger Delta Development Commission mainly to handle biological and ecological issues. Absence of severe consistence to existing ecological insurance rules and guideline and private bodies measures with the powerlessness of administrative and private organizations to implement these laws have added to the contamination of the earth of the locale.

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