



Review of some Impacts of Oil Exploration and Production in Niger Delta, Nigeria

S. O. Oladipupo¹, R. B. Mudashiru², M. O. Oyeleke², S. B. Bakare²

¹Department of Water Resources & Environmental Engineering
University of Ilorin, Ilorin.

²Department of Civil Engineering
Federal Polytechnic Offa,
P.M.B 420, Offa, Kwara State.

Corresponding Author's email address: bunmbello@gmail.com

Abstract-*Oil exploration and exploitation has been on-going for several decades in the Niger Delta. It has had disastrous impacts on the environment in the region and has adversely affected people inhabiting that region. This present study is aimed at unveiling various environmental problems associated with oil exploration and production in the Niger Delta of Nigeria, using Ogoniland in Rivers State as a case study by identifying all possible causes of oil spillage, accessing the extent of environmental and public health impacts of oil exploration and production. This study made use of past literature to gather information on causes of oil spillage, extent of oil spillage and the various impact of oil spillage in Ogoniland region. The results from gathered literature showed that the annual oil spillage quantity has significantly decreased but the annual oil spill incidences are increasing yearly. Also, there is no significant improvement because the incidences are increasing with less quantity being spilled. The study recommends that further oil spills should be prevented and environmental improvement measures should be taken.*

Keywords: *Oil exploration, oil exploitation, oil spill, impact.*

1 INTRODUCTION

Oil exploration in Nigeria commenced in the 1950s and extensive production facilities were established during the following three decades. These operations were handled by Shell Petroleum Development Company (Nigeria) Ltd (SPDC), a joint venture between the Nigerian National Petroleum Company (NNPC), Shell International, Elf and Agip.

Oil exploration and production projects may have impacts on the natural environment long before any oil is actually produced. These are complex, multi-faceted projects, with many different phases, including: land survey, land clearance for seismic lines, establishment of seismic and drilling camps, site preparation, infrastructure construction, drilling for oil (even when the effort is unsuccessful) and development of transportation infrastructure. Once a facility begins operating other issues have to be dealt with, such as spills caused during oil production and the disposal of water (often salty and known as 'produced water') and flaring of gas ('produced gases) generated alongside the oil. All of these activities and their effects leave an environmental footprint.

The oil industry's environmental awareness and standards in the 1960s were very different and lower compared to those of the present day. This impact was exacerbated by the Nigerian Civil War (known widely as the Biafran War) in the late 1960s, during which oil industry infrastructure was targeted and a number of facilities were damaged, with consequent spillage of oil and widespread pollution.

While oil exploration and the associated social and environmental consequences in Ogoniland began prior to Nigeria's independence, the situation did not improve when the country gained independence in 1960. Environmental incidents, such as spills and uncontrolled flares, continued to occur in the area and responses were slow and inadequate.

Partly in response to the environmental consequences of oil production, the Movement for the Survival of the Ogoni People (MOSOP) was founded under the leadership of the Nigerian author Ken Saro Wiwa. A staunch defender of the rights of the Ogoni people, Saro-Wiwa criticized oil companies and the government's oil policy and brought international attention to the Ogoni cause.

In 1990, MOSOP presented the Ogoni Bill of Rights to the Federal Government of Nigeria. The Bill included a number of references to environmental issues. In 1993, Saro-Wiwa joined 300,000 Ogoni on a march to demand a share in oil revenues and greater political autonomy. The conflict within the region, however, was not resolved in a peaceful manner. As a consequence of the ensuing violence, oil exploration and production activities in Ogoniland ceased in 1993.

In November 1995, following a trial by a military tribunal, Saro-Wiwa and eight other Ogoni leaders were hanged in Port Harcourt. Continued social upheaval in the area further alienated the Ogoni community from SPDC, and MOSOP has since been campaigning for the total expulsion of Shell from Ogoniland.

While no oil production has taken place in Ogoniland since 1993, the facilities themselves have never been decommissioned. Some oil pipelines carrying oil produced in other parts of Nigeria still pass through Ogoniland but these are not being maintained adequately. Consequently, the infrastructure has gradually deteriorated, through exposure to natural processes, but also as a result of criminal damage, causing further pollution and exacerbating the environmental footprint.

As of 2006, there are eleven (11) oil companies operating one hundred and fifty- nine (159) oil fields and one thousand four hundred and eighty-one (1,481) wells in the Niger Delta in Nigeria (The Guardian, 2006). Human activities and those of oil exploration and exploitation raise a number of issues such as depletion of biodiversity, coastal and riverbank erosion, flooding, oil spillage, gas flaring, noise pollution, sewage and wastewater pollution, land degradation and soil fertility loss and deforestation, which are all major environmental issues. Therefore the present study investigates through past history the various environmental problems associated with oil exploration and production in the Niger Delta of Nigeria, using Ogoniland in Rivers State as a case study.

1.1 Significance of Study

The present study reveals the some problems associated with oil exploration and production in the Niger Delta of Nigeria, using Ogoniland in Rivers State as a case study by identifying all possible causes of oil spillage, accessing the impacts of oil exploration and production especially in the study area and to recommend the effective solutions provided for clean-up.

1.2 Study Area

Rivers State – in which Ogoniland, the study area for this project is located – is situated in the coastal plain of the eastern Niger Delta. Its topography is mainly characterized by rivers, lakes, creeks, lagoons and swamps of varying dimensions. The land surface can be grouped into three main divisions from north to south: the freshwater zone, mangrove swamps and the coastal sand ridge zone.

Ogoniland, a kingdom in Rivers State, Nigeria is a region covering some 1,000 km² in the south-east of the Niger Delta basin. It has a population of close to 832,000 (**Table 1**), according to the 2006 National Census, consisting mainly of the Ogoni people. The region is divided administratively into four local government areas: Eleme, Gokana, Khana, and Tai. Traditionally the area is formed by six kingdoms (Babbe, Eleme, Gokana, Ken-Khana, Nyo-Khana and Tai) with His Majesty King Godwin N.K. Gininwa as the area's Paramount Ruler.

1.3 Geology of the study area

The geological profile of Ogoniland, including the depth and quality of groundwater, is a key factor when assessing contaminated sites. The soil type and size of the soil grains and their distribution are crucial to the mobility of crude oil in soils and to the groundwater conditions that determine the spread of a 'contamination plume' which can result when hydrocarbons are released in water.

3 MATERIALS AND METHODS

This research is based on primary data which were obtained from past literatures.

3.1 History of oil spillage

Oil spillage is a global issue that has been occurring since the discovery of crude oil. The total spillage of petroleum into the oceans, seas and rivers through human activities is estimated to range between 0.7-1.7 million tons per year (www.science.irank.org). In the past years, oil spill has impacted negatively on the socio-physical environment of the Niger Delta oil producing areas, massively threatening the subsistent peasant economy, the environment, entire livelihood and basic survival of the people in the areas, which if not effectively checked can lead to total destruction of the ecosystems. The oil industry located within this region has contributed immensely to the growth and development of the country which is a fact that cannot be disputed, but oil exploration activities has rendered the Niger Delta region as one of the five most severely petroleum damaged ecosystems in the world. Studies have shown that the quantity of oil spilled over 50 years was at least 9-13 million barrels, which is equivalent to 50 Exxon Valdez spills (FME, et. al. 2006).

Oil spill incidents have occurred in various parts and at different times along our coast. Some major spills in the coastal zone are the GOCON's Escravos spill in 1978 of about 300,000 barrels, SPDC's Forcados Terminal tank failure in 1978 of about 580,000 barrels and Texaco Funiwa-5 blow-out in 1980 of about 400,000 barrels. Other oil spill incidents are those of the Abudu pipe line in 1982 of about 18,818 barrels, The Jesse Fire Incident which claimed about a thousand lives and the Idoho Oil Spill of January 1998, of about 40,000 barrels. The most publicised of all oil spills in Nigeria occurred on January 17, 1980 when a total of 37.0 million litres of crude oil got spilled into the environment. This spill occurred as a result of a blow out at Funiwa 5 offshore station. Nigeria's largest spill was an offshore well-blow out in January 1980 when an estimated 200,000 barrels of oil (8.4million US gallons) spilled into the Atlantic Ocean from an oil industry facility and that damaged 340 hectares of mangrove (Nwilo and Badejo 2005). The Punch Newspaper on February 20, 1991:2 reported a total of 2,796 oil spill incidences recorded between the periods of 1976-1990 leading to 2,105,393 barrels of oil spilled. The UNDP 2006:181 also reported that between the period of 1976-2001, 3 million barrels of oil were lost in 6,817 oil spill incidences of which over 70% of the spilled oil was not recovered. In 2001 the western operations of the Shell Petroleum Development Company (SPDC) recorded a total of 115 incidences of oil spills in which 5,187.14 barrels of oil were spilled and 734,053 barrels of the spilled oil representing 14.2% were recovered (SPDC Nigeria Brief, May 1995).

Table 1 shows some polluted sites in the Nigeria Delta and the cause of pollution, Table 2 gives the number of oil spills into the marine environment reported between the periods of 1997-2001 and Figure 1 shows the quantity of oil spill in Nigeria between 1976 and 2013.

Table 1: Some Severely Oil Polluted Sites in the Niger Delta

| LOCATION | ENVIRONMENT | IMPACTED AREA (hectare) | NATURE OF INCIDENT |
|----------------------|-------------------------|-------------------------|--------------------------------|
| Bayelsa State | | | |
| Biseni | Freshwater Swamp Forest | 20 | Oil Spillage |
| Etiama/Nembe | Freshwater Swamp Forest | 20 | Oil Spillage and fire outbreak |

| | | | |
|---------------------|-------------------------|----|-----------------------------|
| Etelebu | Freshwater Swamp Forest | 30 | Oil Spillage |
| Peremabiri | Freshwater Swamp Forest | 30 | Oil Spillage |
| Adebawa | Freshwater Swamp Forest | 10 | Oil Spillage |
| Diebu | Freshwater Swamp Forest | 20 | Oil Spillage |
| Tebidaba | Freshwater Swamp Forest | 30 | Oil Spillage |
| Nembe creek | Mangrove Forest | 10 | Oil Spillage |
| Azuzuama | Mangrove Forest | 50 | Oil Spillage |
| Delta State | | | |
| Opuekebe | Barrier Forest Island | 50 | Salt Water Intrusion |
| Jones Creek | Mangrove Forest | 35 | Spillage & Burning |
| Ugbeji | Mangrove Forest | 2 | Refinery Waste |
| Ughelli | Freshwater Swamp Forest | 10 | Oil Spillage-Well head leak |
| Jesse | Freshwater Swamp Forest | 8 | Product leak/Burning |
| Ajato | Mangrove Forest | | Oil Spillage |
| Ajala | Freshwater Swamp Forest | | Oil Spillage |
| Uzere | Freshwater Swamp Forest | | Oil Spillage |
| Afiesere | Freshwater Swamp Forest | | Oil Spillage |
| Kwale | Freshwater Swamp Forest | | Oil Spillage |
| Olomoro | Freshwater Swamp Forest | | Oil Spillage |
| Ughelli | Freshwater Swamp Forest | | Oil Spillage |
| Ekakpare | Freshwater Swamp Forest | | Oil Spillage |
| Ughuvwughe | Freshwater Swamp Forest | | Oil Spillage |
| Ekerejegbe | Freshwater Swamp Forest | | Oil Spillage |
| Ozoro | Freshwater Swamp Forest | | Oil Spillage |
| Odimodi | Mangrove Forest | | Oil Spillage |
| Ogulagha | Mangrove Forest | | Oil Spillage |
| Otorogu | Mangrove Forest | | Oil Spillage |
| Macraba | Mangrove Forest | | Oil Spillage |
| Rivers State | | | |
| Rumuokwurusi | Freshwater Swamp Forest | | Oil Spillage |
| Rukpoku | Freshwater Swamp Forest | | Oil Spillage |

Source: FME, NCF, WWF UK, CEEP-IUCN 2006 Niger Delta Resource Damage Assessment and Restoration Project.

Table 2: Oil Spill Data in Nigeria between 1976 and 2013.

| S/N | YEAR | TOTAL NO OF SPILLS REPORTED | TOTAL QUANTITY SPILLS/BARRELS (X10 ³) |
|-----|------|-----------------------------|---|
| 1 | 1976 | 128 | 26.16 |
| 2 | 1977 | 104 | 32.88 |
| 3 | 1978 | 154 | 489.29 |
| 4 | 1979 | 157 | 694.12 |
| 5 | 1980 | 241 | 600.51 |
| 6 | 1981 | 238 | 42.72 |
| 7 | 1982 | 257 | 42.84 |
| 8 | 1983 | 173 | 48.35 |
| 9 | 1984 | 151 | 40.21 |
| 10 | 1985 | 187 | 11.88 |
| 11 | 1986 | 155 | 12.91 |
| 12 | 1987 | 129 | 31.87 |
| 13 | 1988 | 208 | 9.17 |
| 14 | 1989 | 195 | 7.63 |
| 15 | 1990 | 160 | 14.94 |
| 16 | 1991 | 201 | 106.83 |
| 17 | 1992 | 367 | 51.13 |
| 18 | 1993 | 428 | 9.75 |
| 19 | 1994 | 515 | 30.28 |
| 20 | 1995 | 417 | 63.68 |
| 21 | 1996 | 430 | 46.35 |
| 22 | 1997 | 339 | 59.27 |
| 23 | 1998 | 390 | 98.35 |
| 24 | 1999 | 387 | 33.02 |

| | | | |
|--------------|------|--------------|----------------|
| 25 | 2000 | 390 | 103.17 |
| 26 | 2001 | 397 | 123.83 |
| 27 | 2002 | 338 | 13.28 |
| 28 | 2003 | 315 | 10.38 |
| 29 | 2004 | 266 | 48.77 |
| 30 | 2005 | 246 | 20.68 |
| 31 | 2006 | 267 | 5.73 |
| 32 | 2007 | 306 | 6.92 |
| 33 | 2008 | 321 | 4.91 |
| 34 | 2009 | 229 | 27.28 |
| 35 | 2010 | 209 | 15.14 |
| 36 | 2011 | 184 | 20.00 |
| 37 | 2012 | 226 | 11.78 |
| 38 | 2013 | 197 | 7.26 |
| TOTAL | | 10002 | 3023.26 |

Source: Department of Petroleum Resources Data Base (DPR).

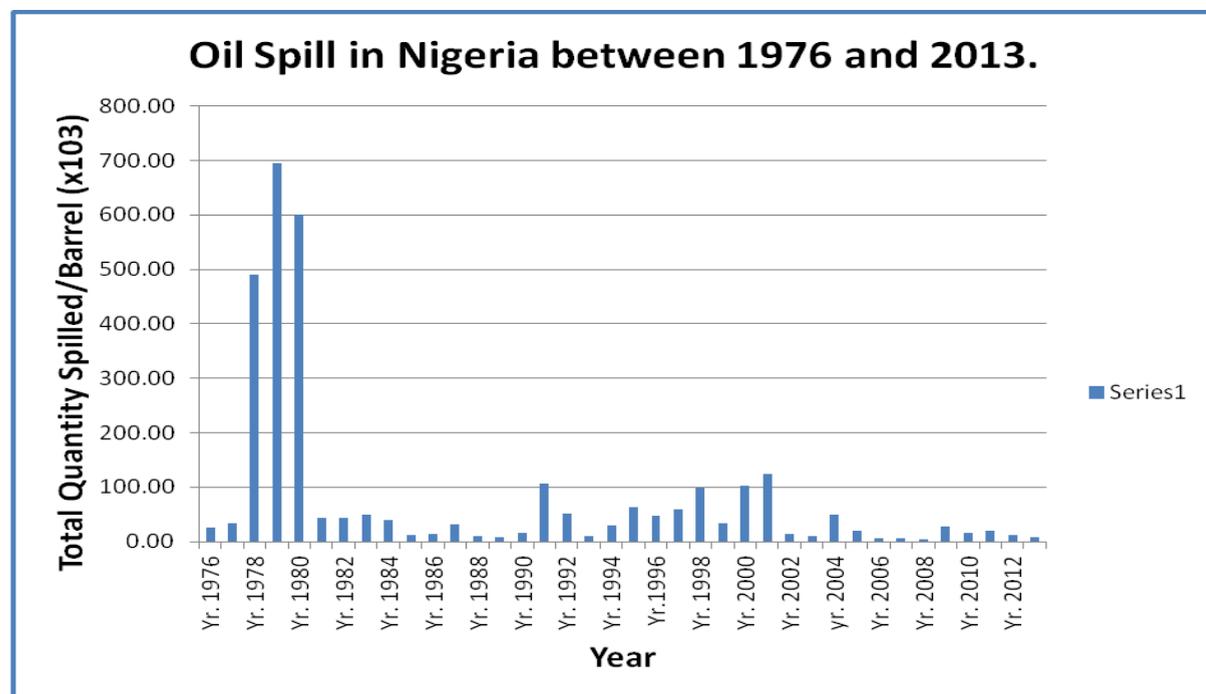


Figure 1: Oil Spill in Nigeria between 1976 and 2013.

3.2 Gas Flaring

The Energetic Solution Conference (2004) estimates that the Niger Delta region has about 123 gas flaring sites. Agbola and Olurin (2003) stated that about 45.8 billion kilo watts of heat is discharged into the atmosphere from 1.8 billion cubic feet of gas every day in the Niger Delta region, leading to temperatures that render large areas inhabitable. Complete utilization of produced associated gas, reduction of flaring and production greenhouse gas is one of the policies that oil companies are expected to comply, with the stoppage of gas flaring completely by 2004 or 2008. However, 84.60% of total gas produced is still flared with 14.86% only being used locally (Ukoli, 2005). From 1970-1986 a total of approximately 125.5 cubic meters of gas was produced in the Niger Delta region, 102.3 (81.7%) million cubic meters was flared, 2.6 million cubic meter was used as fuel by the oil producing companies and about 14.6 million cubic meters was domestically consumed (Awosika, 1995).

3.3 Causes of Oil Spillage

In Nigeria, fifty percent (50%) of oil spills is due to corrosion, twenty eight percent (28%) to sabotage and twenty one percent (21%) to oil production operations, One percent (1%) of oil spills is due to engineering drills, inability to effectively control oil wells, failure of machines, and inadequate care in loading and unloading oil vessels.

3.4 Some Environmental Impacts of Oil Exploration and Production

Oil spills pose a major threat to the environment in Nigeria. If not checked or effectively managed, they could lead to total annihilation of the ecosystem, especially in the Niger Delta where oil spills have become prevalent. Life in this region is increasingly becoming unbearable due to the ugly effects of oil spills, and many communities continue to groan under the degrading impact of spills (Oyem, 2001). Some of the environmental impacts of oil exploration and spillage are;

- a) **Destruction of the ecosystem:** In the Nigerian Coastal environment a large areas of the mangrove ecosystem have been destroyed. The mangrove was once a source of both fuels for the indigenous people and a habitat for the area's rich ecosystem, but is now unable to survive the oil toxicity of its habitat. The oil spills have also had adverse effects on marine life, which has become heavily contaminated; in turn having negative consequences for human health from consuming contaminated seafood (**Figure 2**). Oil spill has also destroyed farmlands, polluted ground and drinkable water and caused drawbacks in fishing off the coastal waters. A study by Twumasi and Merem (2006) about the Niger Delta forest area made assessments using Geo spatial Data processing and Analysis; Two Landsat Thematic Mapper I and Enhanced Thematic Mapper plus (ETM+) images, the analysis was for the period 1985-2005. The results showed a slight decline in water bodies from 343,654 to 343,513 hectares, mangrove and closed forest showed a decline from an initial estimate of 55,410 hectares in 1985 to 37,117 hectares and closed forest from 250,161 hectares in 1985 to 175,609 hectares, the results of the study is shown below in **Table 3** and Figure 3.



Figure 2: Visible hydrocarbon pollution on surface water in Ogoniland, (UNEP, 2010).

Table 3: Decline of Mangrove and Closed Forest in the Niger Delta

| CLASSES | AREA (HECTARE) IN 1985 | AREA (HECTARE) IN 2000 | % CHANGE (1985-2000) |
|-----------------------|------------------------|------------------------|----------------------|
| Water | 343, 654 | 343, 513 | -0.04 |
| Crop land | 16, 495 | 23, 974 | 45.34 |
| Settlement/bare areas | 52, 738 | 108, 725 | 106.16 |
| Mangrove | 55, 410 | 37, 117 | -33.01 |
| Closed forest | 250, 161 | 175, 609 | -29.8 |
| Mixed forest | 162, 916 | 192, 436 | 18.12 |

Source: Twumasi and Merem, 2006

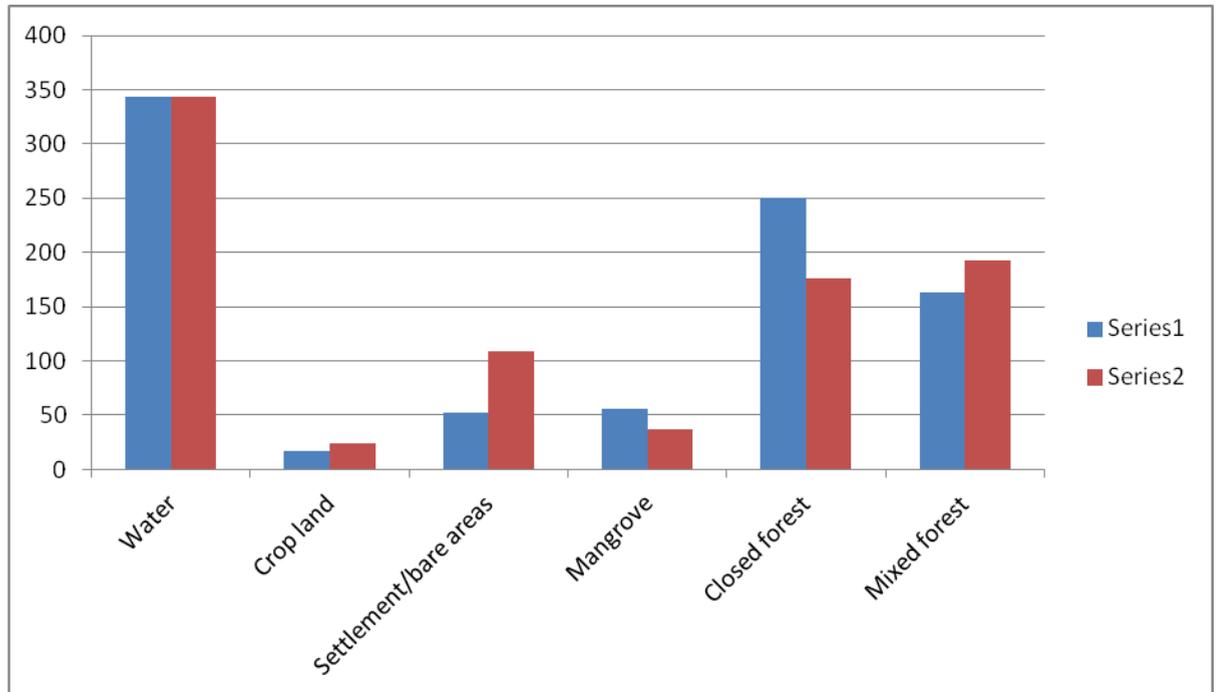


Figure 3: Decline of Mangrove and Closed Forest in the Niger Delta



Figure 4: Birds killed as a result of oil spill, (Worldwide Web)



Figure 5: Local fisherman with his catch (note the sheen in the water, Bonny River) (UNEP, 2010)

- b) **Gas Explosion:** In 2004 Nigerian Liquefied Natural Gas pipeline transversing through Kala-Akama, Okrika mangrove forest leaked and set ablaze and burn for three days. The local plant and animals within the areas were engulfed (Nenibarini, 2004). Apart from this fire incidence over several decades there have been many well documented cases of fire incidences that have resulted in a large number of human fatalities.



Figure 6: An oil well on fire (Yorla 13, Khana LGA) (UNEP, 2010)

Acid Rain and Heat Effects: A study by Salau (1993) and Adeyemo (2002) about the impact of gas flaring on agriculture showed a direct relationship between gas flaring and productivity decline in agriculture as shown below in **Table 4**.

Table 4: The Impact of Gas Flaring On Agricultural Output

| DISTANCE OF FARMLAND FROM FLARE SITE | PERCENTAGE LOSS IN YIELD OF CROPS |
|--------------------------------------|-----------------------------------|
| 200 Meters | 100 Percent |
| 600 Meters | 45 Percent |
| 1 Kilometer | 10 Percent |

Source: Salau, 1993: 19-22, Adeyemo, 2002:69.

- c) **Health Risks:** Major oil spills affect human health and well-being, an important tenet of environmental sustainability. Residents of oil-producing areas at times have to cope with drinking water that contains residual oil even many years after clean-up. There is also the lasting health effects of chemical dispersants used during clean-up. For example, many residents of the Niger Delta have complained of asthma, breathing difficulties and pain, headaches, nausea, and throat irritation as well as chronic bronchitis. Such health concerns can bring about substantive causes of action in toxic tort for exposure to dangerous substances and chemicals. It has also been held to be a violation of the fundamental right to health in the Nigerian case of *Jonah Gbemre v. Shell*, in which the Nigerian federal court held that gas flaring and oil spillage by Shell in the course of their oil exploration and production activities in the applicant's community were violations of the fundamental right to a healthy environment and dignity of human persons.



Figure 7: An aerial view of a community encircled by oil pollution (Andoni LGA) (UNEP, 2001)

- d) **Clean-up Obligations and costs:** Major oil spills can take several years to clean up. For example, the United Nations estimates that the restoration process in Nigeria's Niger Delta could take up to 30 years with a projected cost of \$1 billion (USD) in the first five years. This illustrates the fact that the costs of clean-up, restoration, and reclamation are often enormous and

far-reaching. International environmental law therefore places a duty on the multinationals to pay for such clean-up costs.



Figure 8: The immediate removal of existing floating hydrocarbon from creeks, and on an ongoing basis thereafter, will help to minimize further contamination downstream (UNEP, 2010).

- e) **International Liability Issues:** Major oil spills could affect the waters and environmental quality in nearby countries. For example, Mexico claims that the BP oil spills provided cross-border effects in Mexico. This is a violation of Article 194(2) of the Law of the Sea Convention, which requires states to “take all measures necessary to ensure that activities under their jurisdiction or control are so conducted as not to cause damage by pollution to other states and their environment, and that pollution arising from incidents or activities under their jurisdiction or control does not spread beyond the areas where they exercise sovereign rights in accordance with this Convention.”
- f) **Loss of Business Profits and Subsistence Rights:** Oil spillage leads to loss of income and means of subsistence for individuals and companies in the commercial fishing, shrimp, and oyster industries. This affects fishermen and -women, charter boat operators, owners of hotels, tourist management agencies, rental property owners, and other businesses in coastal resort areas. Thus, oil spillage is a violation of some of the international and national law principles, which seek to protect the rights of individuals to their means of subsistence. For example, over 30,000 individual claims have been filed by businesses and workers in the Gulf region against BP, seeking repayment for profits and income that were lost because of the oil spill

4 RESULTS

From findings based on literature, the annual oil spillage quantity has significantly decreased but the annual oil spill incidences are increasing yearly. There is no significant improvement because the incidences are increasing with less quantity being spill. It should be noted that the quantity and occurrence of oil spills are based on the records submitted by the oil companies to the NNPC, so one would hardly expect that all incidences are reported and the quantities reported represent the actual figure. A major limitation of this study was obtaining recent oil spillage data from NNPC these data are public records and should be easily accessible.

In terms of analysis and evaluation of oil exploration in the Niger Delta it can be seen from the literature review from the beginning of the oil exploration and exploitation activities in Nigeria, oil development activities have contributed to the growth and development of the country in general. Although, the activities that come with the oil exploration and exploitation causes alterations to the environment. Which significantly have negative effects; some of the effects that come with petroleum development can be reduced or prevented basically by taking some steps in terms of prevention.

In terms of monitoring, the location of the oil companies; the terrain, the accessibility, revenue, man power availability for the monitoring agency, qualified personnel isn't available. This restricts the ability and efficiency of monitoring by the government. Updating the legislations, revising the legislation, license and putting new conditions to the oil companies and reviewing the fines will go a long way in ensuring compliance, even though the government cannot systematically or frequently monitor these sites.

The government should be commended in that now they are tackling the problem with the UNEP with collaborations with UN (United Nation), which is taking steps towards finding a permanent solution or remediation for Ogoniland. The SPDC has to be commended also for the sponsorship of this activity and their readiness finally in taking steps into the remediation of Ogoniland

5 RECOMMENDATIONS

The Ogoni people live with this pollution every minute of every day, 365 days a year. Since average life expectancy in Nigeria which was put at 52years (World Bank, 2011). It is a fair assumption that most members of the current Ogoniland community have lived with chronic oil pollution throughout their lives. There are a number of measures which should be taken to achieve both environmental improvement and prevention of further oil spills. The following is a list of emergency measures needed to be initiated in Ogoniland;

1. Ensuring that all drinking water wells where hydrocarbons were detected are marked and also informing the people in the area about the dangers associated with it.
2. Providing adequate sources of drinking water to the households whose drinking water supply is contaminated.
3. Making sure the people of the community who have been consuming water with benzene over 900 times the WHO standard are recorded on a medical registry and their health status assessed and followed up.
4. Posting signs around all the sites identified as having contamination exceeding intervention values warning the community not to walk through or engage in any other activities at these sites.
5. Posting signs in areas where Hydrocarbon were observed on surface water warning people not to fish, swim or bathe in these areas.
6. Mounting a public awareness campaign to warn the individuals who are undertaking artisanal refining that such activity are damaging their health.

6 CONCLUSION

Oil exploration in Nigeria has had severe environmental and human consequences for the indigenous people who inhabit the area surrounding oil extractions. The social and environmental cost of oil production has been extensive. They include destruction of wildlife and biodiversity, loss of fertile soil. Pollution of air and drinking water, degradation of farmland and damage to aquatic ecosystem, all of which have caused serious health problems for the inhabitants of the area surrounding oil production.

It can be concluded that improvement have begun in terms of achieving sustainable development in the Niger Delta, the government should continue to allocate more revenue into the Niger Delta for steps toward finding a permanent and lasting solution.

REFERENCES

1. The World Fact Book.
2. World Bank (1982). *World Development Report 1982*, Volume 1. ISBN 0-19-503224-1. Available at <http://go.worldbank.org/16BEWURYE0>.
3. E&P Forum/UNEP (1997). Environmental management in oil and gas exploration and production: An overview of issues and management approaches. UNEP IE/PAC Technical Report 37 / E&P Forum Report 2.72/254. ISBN 92-807-1639-5.

4. National Bureau of Statistics, Federal Republic of Nigeria. 2006 Population Census. Available at www.nigerianstat.gov.ng/nbsapps/Connections/Pop2006.pdf.
5. WHO (2006). Country Health System Fact Sheet 2006 – Nigeria.
6. Environmental Guidelines and Standards for the Petroleum Industries in Nigeria (EGASPIN) (1992). Issued by the Department of Petroleum Resources, Nigeria. (Revised edition, 2002).
7. WHO (2008). Guidelines for Drinking-water Quality, Third Edition Incorporating the First and Second Addenda, Volume 1: Recommendations. Geneva.
8. Association of Nigerian Scholars for Dialogue. Ogoni Bill of Rights, November 1990. Available at www.waado.org/nigerian_scholars/archive/docum/ogoni.html.
9. Adati, A. k. (2012). Oil Exploration and Spillage in the Niger Delta of Nigeria. *Civil and Environmental Research* (Vol 2, No.3).
10. Adeyemo, A.M. (2002). The Oil Industry Extra-Ministerial Institutions and Sustainable Agricultural Development: A Case Study of Okrika L.G.A. of Rivers State, in Nigeria. *Journal of Oil and Politics*, 2(1).
11. Adati, A. k. (2012). Environmental Impacts of Oil Exploration and Exploitation in the Niger Delta of Nigeria. *Global Journal of Science Frontier Research Environment & Earth Sciences* Volume 12 Issue 3 Version 1.0.
12. Egberongbe, O. A., Nwilo, C. P. And Badejo, T. O. Oil Spill Disaster Monitoring Along Nigerian Coastline.
13. Olawuyi, S. O (2012). Legal and Sustainable Development Impacts of Major Oil Spills. *Consilience: The Journal of Sustainable Development*. Vol. 9, Iss. 1 (2012), Pp. 1 – 15.
14. Badejo, O. T. and Nwilo, C. P. MANAGEMENT OF OIL SPILL DISPERSAL ALONG THE NIGERIAN COASTAL AREAS.
15. Amu, L.A.O (1997). A Review of Nigeria's Petroleum Industry. NNPC, Lagos.
16. Aigbedion, I., Iyayi, S. E. and Agbeboh, G.U (2007). Prospect Assessment and Risk Analysis: Example from Niger Delta, Nigeria Basin, *World Applied Science Journal*, 2(6):569-574.
17. Anifowose, B (2008) Assessing the Impact of Oil & Gas Transport on Nigeria's Environment. U21 Postgraduate Research Conference Proceedings 1, University of Birmingham UK.
18. Awosika, L.F (1995) Impacts of global climate change and sea level rise on Coastal resources and energy development in Nigeria. In: Umolu, J.C., (Ed). *Global Climate Change: Impact on Energy Development*. DAMTECH Nigeria Limited, Nigeria.
19. Chukuezi, C (2006). Oil Exploration and Human Security in Nigeria: A Challenge to Sustainable Development. 2006. Federal Ministry of Environment Abuja, Nigerian Conservation Foundation Lagos, WWF UK and CEESP/IUCN Commission on Environmental.
20. Federal Ministry of Environment Abuja, Nigerian Conservation Foundation Lagos, WWF UK and CEESP-IUCN Commission on Environmental, Economic, and Social Policy, May 31,(2006). Niger Delta Resource Damage Assessment and Restoration Project. Ndubuisi, A.L. and Asia, I.O (2007). Environmental Pollution in Oil Producing Areas of the Niger Delta Basin, Nigeria: Empirical Assessment of Trends and People's Perception. *Environmental Research Journal*1, (1-4):18-26. ISSN 1994-5396.
21. Nwilo, C.P. and Badejo, T.O (2005a) Impacts and Management of Oil Spill Pollution along the Nigerian Coastal Areas. Department of Survey & Geoinformatics, University of Lagos, Lagos, Nigeria. www.fig.net/pub.figpub36/chapters/chapter_8.pdf.
22. Odeyemi, O. and Ogunseitan, O.A (1985). Petroleum Industry and its Pollution Potential in Nigeria. *Oil & Petroleum Pollution*, Elsevier Applied Science Publishers Ltd, England, 2: 223-229.
23. Powell, C.B., White, S.A., Ibiebele, D.O., Bara, M., Dut Kwicz, B., Isoun, M. and Oteogbu, F.U. Oshika Oil Spill Environmental Impact; effect on Aquatic biology. Paper presented at NNPC/FMHE International Seminar on petroleum industry and the Nigerian Environment 11 – 13 Nov. 1985, Kaduna, Nigeria, 1985:168 – 178.
24. Tolulope, A.O (2004). Oil Exploration and Environmental Degradation: the Nigerian Experience. *International Information Archives*, International Society for Environmental Information Science. EIA04-039, 2: 387-393.
25. Ukoli, M.K (2005). Environmental Factors in the Management of the Oil and Gas Industry in Nigeria. (www.cenbank.org).