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# The spate of environmental degradation and its impacts on Niger delta communities' sustenance

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## Abstract

The dependency and politicisation of natural resources, low budgetary provisions and weak institutions have degenerated natural resource exploration activities to exploitation. This situation currently being described as social injustice has fuelled ethnicity in the highly culturally polarised landscape of the country. The inability to sustainably develop the Niger Delta region in spite of the huge extraction of hydrocarbon and other natural resources in the face huge ecological devastation affecting sociocultural life in the community has emanated tenuous environment for economic activities which is the main source of foreign exchange. This study attempt to analyse methodically the underexplored subtleties of ecological resources devastation in the region and the overall sustainability in the emerging post fossil fuel era majorly for the local habitants. New perspective of the less talked about dumping of toxic waste in Koko and the Calabar Superhighway are also reviewed.

**Keywords:** Natural Resource; Environmental Pollution; Deforestation; Toxic Waste; Sustainable Development

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**Notes:** For the purposes paper, the Niger Delta region will be designated as comprising the area covered by the natural delta of the Niger River, excluding the areas added because of the taxonomy of the oil producing states in Nigeria for administrative, political and developmental expediency. The natural limits of the region will be defined by its geological and hydrological homogeneity consisting of six states (i.e. Akwa Ibom, Bayelsa, Cross River, Delta, Edo, and Rivers), hitherto known as South-South region. Most of the data were generated from different sources, collated into a table before evaluation. Data that could not be generated independently were source from other related research study and duly cited. Key limitation of writing this thesis was on accessing comprehensive and updated statistical data on oil spillage and gas flaring.

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## **1. Introduction**

### **1.1. Statement of Problem**

The people of the Niger Delta region have been known to be very vocal and agitated over their purported natural resource devastation in the face of chronic poverty, weak infrastructure and the poor state of social services. Reports abound that oil and gas exploration have destroyed their livelihood sources amidst other health and social implications. Series of violent agitations and clashes have been recorded in the regions over claims of environmental and social injustice. The objective of the study therefore is to find answers to;

- 1- What are the primordial causes of environmental degradation in the Niger Delta and how has it contributed to reoccurring social crisis and violent agitations that currently threatens peaceful co-existence in Nigeria?
- 2- If this crisis is induced by oil and gas exploration in the region, what are the known causes of devastation in the regions?
- 3- Are there instances of political, institutional and administrative culpability in the spate of devastation?
- 4- To what extent has it affected host communities' sources of livelihood and sociocultural lifestyle?

The entire objective of this thematic literature is to appraise the disturbing scale of environmental degradation and its social implications on rural people. Obviously, it is beyond the scope of this paper to find solutions to the myriad questions besetting the region, however where occasion demand, recommendations will be provided. Merely assessing the devastation does and will not provide palliative, neither does it assuage the recurring agitations against the ecosystem endangerment in the region. The more crucial concern is to illustrate the ecological exposure of the local people where it abounds, the scale of devastation and the cultural and economic consequences.

### **1.2. Background**

The disruptive impact of oil and gas exploration has created a dynamic that overshadows most other positive efforts. The size of oil and gas reserve in a region that holds 36 billion barrel and 183 trillion cubic feet (DPR 2012) (See Table 1) and produces averagely 2 million barrel daily has placed the craft of governance at a precipice. Detailed network of oil fields and pipelines in the region can be seen in Figure 3. Some of the tough choices that must be confronted are grappling with dwindling revenue from hydrocarbon sales, national development plans, honouring fiscal obligations to multinational corporations' joint ventures and improving the quality of life in the Niger Delta region.

**Table 1.** Oil and Gas Reserve

	Oil Reserve (MMBLS)	Natural Gas Reserve (TCF)		
		Associated Gas AG	Non Associated Gas (NAG)	Total Gas
2010	36,532.97	92,945	89,872	183
2011	36,247.41	92,498	90,660	183
2012	36,248.00	89,729	92,528	183

Source DPR, 2012

According to Elkington (1998), the concept sustainable development transiting environmental management into issues of social justice that will not deprive the existing inhabitants and its future generation from having a balanced opportunity of sustenance. The uneven distribution of natural resources in Nigeria and the future of fossil fuels will require linking the engines of growth to sustainability and transiting rural livelihood dependency from crude oil resources in a mechanism that is very open to the fluctuations of economic tinkering in resource efficiency management. The 1989 Manila interregional consultation on people's participation in environmentally sustainable development, reported that "the concept of sustainability is best understood in terms of the sustainability or non-sustainability of a community. Authentic development enhances the sustainability of the community. This must be understood as a process of economic, political and social change that need not necessarily involve growth."

The fate of the Nigerian economy and the capacity for growth is therefore inextricably anchored on petrodollar from the region. However economic development can hardly occur in communities experiencing socio-political turbulence and executing predatory policies. Therefore, a multi-dimensional development initiative centred around human wellbeing is the only guarantee form of sustainability in any social space. Notably, the UN Human Development Report (1990) highlighted how development can enlarge peoples' choices and the most critical is to live a long healthy life, to be educated and to have access to resources needed for decent lives. Coupled with political freedom, guaranteed human rights and personal self-respect because no single individual or group can guarantee human happiness. The process of development should at least create a conducive environment for people, individually and collectively, to develop their full potential and to have a reasonable chance of leading productive, creative and happy lives in accord with their needs and interests. The Ogoniland predicament still resonates one of the inexcusable level of devastation and insensitivity in human history.

### 1.3. Territorial perspective

The Niger Delta region located from the middle of southern coastal belt of Nigeria to the border of Cameroun, overlooking the Bight of Benin. It occupies the largest portion of the tropical rain forest that covers a combined area of 84,616km<sup>2</sup> (NPC, 2011). Spreading from the coastal inland zone, mangrove forest, freshwater zone to the lowland rainforest with luxuriant biological diversity that supports different species of terrestrial and aquatic life; it ranks among the largest everglades and the richest natural resource zone globally. The small island settlements in region are interconnected by freshwater creeks, mostly unpaved roads and a network of dilapidated highways and bridges. This highly heterogeneous people have about 25.1million population (NPC,

2011), comprising over 40 ethnic groups like Ijaws, Edos, ikwerres Urhobos, Isokos, Okrikas, Ibibios, Efiks, Itsekiris, Orons, Ukuwanis, Ibenos, Kalabaris, Ogonnis etc distinguished by about 120 languages and dialects. Francis et al (2011) reported that 76% to 80% of the people in the rural communities lack access to hygienic water (See Table 8), while only about 34% have access to hardly available electricity energy source. Kerosene (Paraffin) is used for lighting and cooking, but most people resort to firewood as primary energy source because its dependable supply and affordability. About 48% of households' source livelihood from land cultivation and fishing, another 10% on services and the other 17% and 7% on trading, and education/health service respectively.

## 2. Natural resource crisis and the rise of environmentalism

It is a truism that the location of the region in the coastal belt on the shores of the Atlantic makes it highly susceptible to natural fluctuations during volatile climatic condition. However, the harshest threat to local sustainability largely emanate from man-made sources like exploration and processing of hydrocarbons, illegal logging and industrial development activities. There is no doubt that economic growth is desirable to scale investment in social infrastructures, but it is only an articulated process that prudently consume local natural capital that can activate enduring development. Promoting economic growth without in-depth impact assessment has had precarious consequences on rural ecological sustainability. However, the prevalence of pressure group and civil societies in urbanised societies tends to advocate for a fiat economic growth without environmental improvement from the reduction of environmental devastation. Social awareness and the environmentalism of pressure groups tends to serve a barometer for better public policies and social justice that engenders healthier ecosystem. This can be adduced to why most of the major environmental crisis in the region are prevalent in rural communities. Some of the major pollution crisis in the country as highlighted as follows;

### 2.1. Toxic waste dumping

Waste toxicity became a topical in Africa, when some Nigerian students in Italy translated and reported the dumping of hazardous radioactive waste on an isolated Nigeria port town in Koko. Ignorance, poverty and corruption could have fast-tracked the shipment of the unwanted cargoes as well as many other shipments that followed in quick successions to the shores of other African communities (Adebowale, 2012). From Koko to Kssa to Annobon all remote communities in Africa witnessed dumping of tens of thousands of tonnes of toxic waste in quick successions as a result of the penalty on industrial waste. Brooke (1998) reported that the tightening of safety laws in Europe and the United States pushed waste merchants' attention to poor and most unprotected shores of West Africa based on proximity.

The dumping of 3,800 metric tonnes of radioactive waste on the backwater port of Koko, (a town of 5,000 predominantly fishermen and farmers) triggered ripple effects on other undiscerning African leaders that have obviously signed-off on the 'lucrative' gains of toxic waste importing business. Hazardous waste dumping that became a source of emergency funding for various government necessitated the signing of contracts. Brooke

(1998) also reported that other West African governments were promised huge financial compensation in return for the permission to dump toxic waste, but for the quick intervention of a European lobbying group that exposed the transaction. Politicians and a group of odious businessmen in Sub Sahara Africa countries and their other foreign accomplice were in some way enmeshed in the controversies of inflicting destruction, pains and sufferings on the ecology in the region.

The Nigeria military government's retaliated by cutting off diplomatic relations and the seizure of an Italian freighter and a protest to the International Court of Justice at The Hague, expressed the country's preparedness to forestall further breach on its territorial integrity. In addition to diplomatic cautionary to affected neighbouring countries, domestic policy measures to wade off hazardous waste merchants served as a moral leadership to join the regional force of policing the disaster peddlers. The parties to the Lome conventions agreed to criminalise the dumping of dangerous waste and activate legislative framework to discourage the catastrophe.

## 2.2. Oil spillage in the delta

Discovery of oil by multinational corporations set Nigeria on an interesting path of wealth and controversies. The environmental consequences from oil and gas exploration activities in the region are yet unquantifiable and not so well documented. Is successive government concerned of the devastation of the rich mangrove and tropical rain forest and its implication for its terrestrial and aquatic species? According to Francis et al (2011), 546 million gallons of crude oil were spilled from 1958-2010, averaging about 300 spills or nearly 10.8 million barrels per annum and about 50,000 acres of mangrove forest disappeared between 1986-2003. A UN HDI report (2011) also estimated spillage of 3 million barrels from 6,817 incidents, comprising 6% on land, 25% on the swamp and 69% on the offshore environment between 1976 and 200.

From Forcados to Funiwa, to Oyakama to Ogada Brass to Ogoni, Abudu, Idoho, Ughelli, Sohika, Etiama, Jones Creek, Bodo etc., the environment is being battered with relentless pollution destroying arable lands, water resources and diverse plants species supporting an immediate population of 25.1million. Nwilo and Badejo (2005) also stated that 50% of these oil spills in this area is due to pipeline and equipment corrosion, 28% to vandalism from sabotage and 21% to oil production operations but 1% of oil spills is due to engineering drills, ineffective well control, machine failures, and supply chain logistics challenge from the network of 7,000km pipelines and 606 oil fields and installations (Francis et al 2011). Whilst the paper covers the period from 1990 to 2014, it is however, critical to highlight the Funiwa blowout of 1980 and Forcados terminal oil spillage that resulted in an incident of 400,000barrels and 580,000barrels respectively. This was adjudged the largest individual spill in its time. Table 3 explain the classification of spill while tables 4 and 6 shows a 25 years break down of spillage data. In a recent call by the head of the Nigeria Upper Chambers was quoted as "...oil spill has become an irresponsible environmental behaviour and reckless waste of the peoples' wealth and benefits" and called on multinational companies to stop the spill (Umoru, 2012). Neglecting pollution clean-up and sicknesses associated with pollution impacts life expectancy indicators. From Ifeadi and Nwankwo (1987) classification oil spillage (see Table 1) based on the quantity and the ecological space polluted, it is obvious

that the level spillage record in the regions have being mainly major. According to Amnesty International, a total of 543 spills resulting to about 30,000 barrels of spillage were reported in 2014.

**Table 2.** Comparative Data on National Average and Regional Actuals

S/N	Description	Nigeria	Niger Delta Region
1	Surface (sq km)	923,768	84,616
2	Population (Million)	186,988	25.1
3	Pop density	205.3	296
4	Life Expectancy	53.4	52.7
5	Fertility Rate	5.7	4.3
6	Infant Mortality Rate (per 1000 live birth)	109	120
7	Threatened Species	333	69
8	Forest Area (% of Land Area)	12.2	N/A
9	Unemployment/Underemployment Rate %	10.4/18.7	24
10	GINI	0.49	0.51
11	Poverty (2010)	62.6	53.4

Source UN, World Bank, NBS, UNDP. Mongabay

**Table 3.** Oil Spill Category

CATEGORY	QUANTITY	ENVIRONMENT
Minor	Less than 25 barrels	Inland waters
	Less than 250 barrels	Onshore, Offshore or coastal region
Medium	Between 25-250 barrels	Inland waters
	Between 250-2500 barrels	Onshore, offshore or coastal region
Major	Over 250 barrels	Inland waters
		Onshore, offshore or coastal regions

Source: Ifeadi and Nwankwo (1987)

### 2.3. Crude oil exploration induced gas flaring

Arising from hydrocarbon exploration, the oil and gas exploration from the daily flaring of 1.8 billion cubic feet of gas has culminated to the discharge of an estimated 45.8 billion kilowatts of heat into the atmosphere (Agbola and Olurin, 2003) of the 187 trillion cubic feet of gas reserve in the country (Francis et al., 2011). The World Bank estimated that 75% of the gas produced in Nigeria is flared, compared to 99% associated gas utilised or re-injected into the ground in Western Europe. Citing from Kadafa (2012), the Liquefied Natural Gas pipeline traversing Kala-Akama, Okrika mangrove forest leaked and burnt for three days with grave

implications the ecosystem. Otene et al. (2016) submitted that the Nigeria “flares about 36.79 bcm of natural gas annually and 0.0392 bcm per day. About 75% of the associated gas is flared with just 12% of produced gas re-injected back into sub-surface reservoirs. Nigeria flared over 14% out of 160 bcm gas that was flared globally in 2004 ranking the country as the second to Russia accounting for 16% of global gas flared. Nigeria loses more than 4.9 million USD/day to gas flaring.” Figure 1 depicts one of the incidents of gas flaring in Abama, one of the several host communities, whilst tables 5 and 6 contains a 25year data on gas flaring. Gas flaring is known to be causing rising temperature, destroying vegetation, suppressing growth and plants flowering and reduces agricultural production leaving a trail of devastated vegetation and its inhabitants. Whilst the growing clamour for the reduction of gas flaring globally, the cut-off date to extinguish flared gases from oil exploration in Nigeria seems endless. This is in spite of proportional regulatory sanctions and fines on perpetrators.

These activities of oil and gas exploration resulting to environmental pollution and the grave health implications for human life, has necessitated in some cases, the involuntary complete resettlement of certain communities with the loss of ecological resources often translating to loss of livelihood for farmers. This coupled with the occupational uncertainties and sociocultural effects associated with the displacement of ancestral homes, religious and cultural artefacts.

### **3. Environmental crisis caused by improper development planning**

#### **3.1. Illegal logging induced deforestation**

The total forest area of the country’s landmass is 11,089,000 hectares, out of which the combined industrial round-wood and wood-fuel capacity is about 86.63million square cubic meters valued at about US\$2,003 billion. There are 560 native tree species, 16 are critically endangered, 18 are endangered and 138 are vulnerable. FAO Report (2010) shows that between 2000 and 2010, the country recorded a net loss rate of 410,000 hectares of its forest resources annually placing it as the worst in Africa. From 1990, a total of 6,145,000hectre of forest area has been lost to agriculture, logging, timber export, industrial development, wood-fuel collection, urbanisation etc., which places Nigeria as the fourth most threatened forest globally. Another FAO reports (2016) shows that the country recorded a wood removal rate of 7,663.3 Hectares, out of which 87% is utilised for wood-fuel between 2010 and 2015. Recent studies show that the forest occupy 92,377km<sup>2</sup> or 10 percent of Nigeria land, a finding that is well below the FAO recommended national minimum of 25% (NACGRAB 2008) (Please see Table 7 and Figure 4). Lots of forest resources is aggravated by weaknesses in legislation, enforcement capacity and policy thrust. Although wood collection is not the primary trigger of deforestation, it certainly contributes substantially. Besides the local impacts, forest stock harvested unsustainably accelerate deforestation and degradation with attendant impacts on natural wildlife, as greenhouse gases emission sink and ultimately on global warming. Socioeconomic needs from population upsurge is a primary factor contributing to tree felling and bush burning. Lumbering is depleting forest

structure and specie composition in the tropical rain forest with detrimental effects on environmental and economic and social sustainability.

Citing from Ikuomola et al. (2016), illegal logging activities mostly driven by foreign syndicate of Asian extract are procured for industrial demand in the international markets. Saboteurs fronting for their international collaborators in urban centres, in connivance with local fraudulent public officials have increased the distortion of the natural ecosystem. Edo, Delta, Akwa Ibom and Cross River States in the regions holds the largest combined forest reverse nationally but the commercial value of hardwood depletion in the region is difficult to quantify because of poor data availability; thus the inadequacies of accounting for ecological wealth in growth plans for economic forecast.

The establishment of the Federal Environmental Protection Agency (FEPA) in 1988 after the Koko toxic waste debacle meant that environmental impact assessment policy was almost non-existent, meaning multinational corporations, domestic organisations and the general public carried out developmental activities without concerns for environmental liabilities and future sustainability. This is coupled with the ineffective regulatory oversight and non-transparent governance mechanisms that has hampered the enforcement of applicable environmental legislation in the country.

### 3.2. The Ogoni oil pollution debacle

Reports of environmental degradation in the Nigeria will be incomplete without highlighting the infamous Ogoni Oil spillage. Crude oil exploitation is based on hi-tech sophisticated processes that are deployed independently of host communities and their socioeconomics perspective. Irrespective of location, exploration activities are conducted in standardised structure that downplay the relevance of oilfields localities compared to urbanized centres where the natural resources are transformed, energy generated and consumed (Bagliani et al., 2010). Multinational corporations' exteriorization of its hydrocarbon exploration, production and distribution transfers the hazards from its activities to host communities. This narrative is entrenched in the tousel history of the people of Ogoniland who have lived most of their lives with divers pollution destroying their natural habitant since the discovery of crude oil in the late 1950s. Attempts through non-violent protests to get the multinational corporations and the Nigeria government to clean up oil, remediate the land and compensate the people stimulated Ken Saro-Wiwa, a writer and non-violent environmentalist to lead a movement of his indigenous people to clamour for social justice. The pace and recognitions of the MOSOP environmentalism at international cycles created embarrassments to the then Nigerian military dictatorship and its multinational accomplices. A hurriedly constituted politically motivated trial found him guilty and was later executed by the military dictatorship (Martinez 2002). A UNEP report (2011) later vindicated Ken Saro-Wiwa and reported that the people of Ogoniland have lived with "chronic oil pollution throughout their lives"

### 3.3. The Calabar Super Highway Project

The Calabar superhighway project was conceived as a 12 lane, 260km long road linking neighbouring north central Benue State in Nigeria through the rainforest to the deep seaport in Bakassi on the shores of the Atlantic

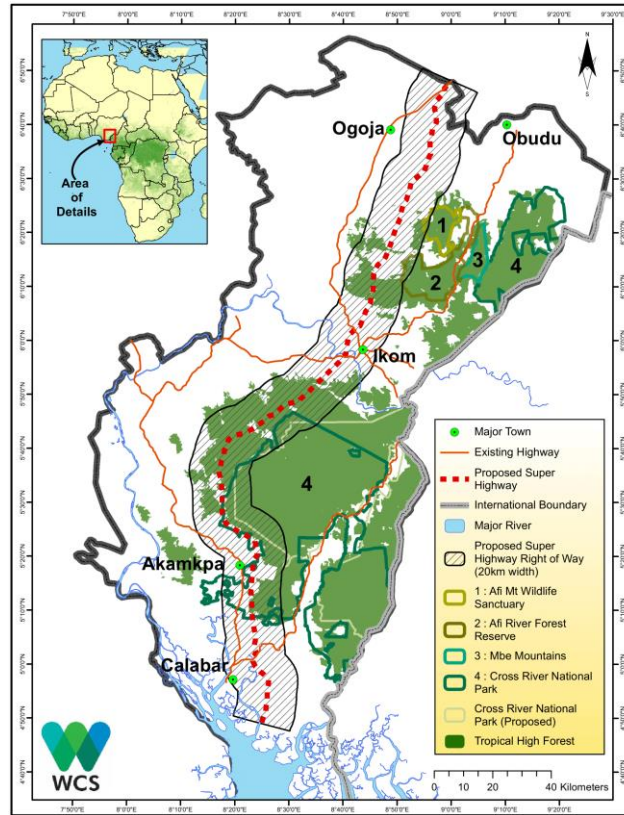


Ocean (Please see Figure 1). At the project conceptualization and design stage, the project was perceived as one that will actuate development in the rural communities. However, the ecological impact at implementation stage exhibit disastrous tendencies on almost all the Sustainable Development Goals, especially the destruction of rainforest that preserve unique species of plants and animals as well as being the few remaining carbon-sinks in Sub-Sahara Africa. The project was proposed to acquire 20.4km all along the highway as the right of way in an environment designated as protected areas for Cross River National Park, Afi River Forest Reserve, Afi Mountain Wildlife Sanctuary etc.

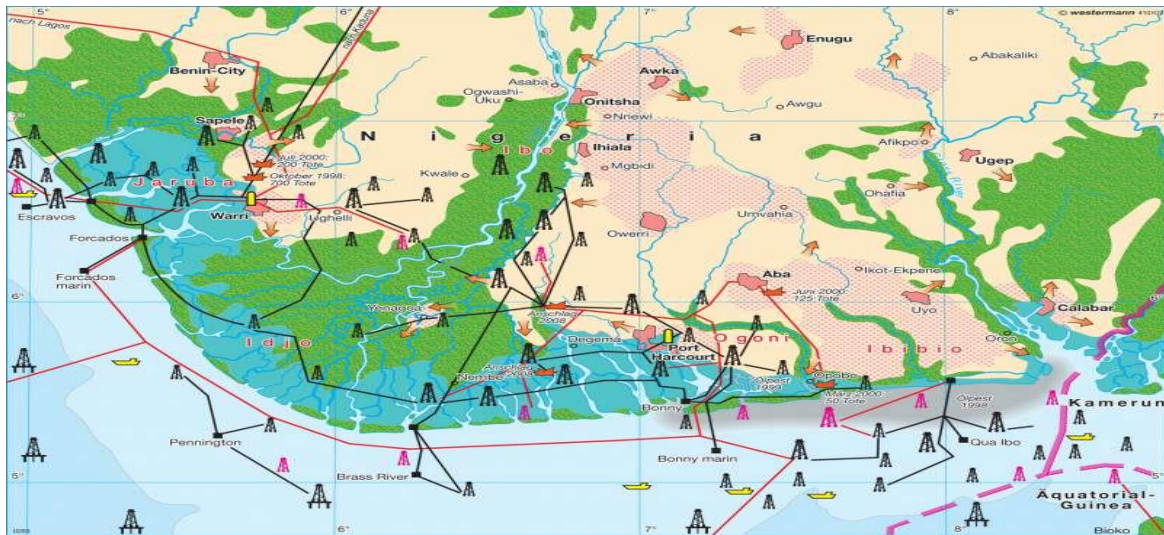
The clearing of an invaluable rainforest superhighway will connect about 180 communities that accommodate over 1 million people in a biodiversity that is home to endangered animal and plant species. 16 primate species, including Common Chimpanzees, Drills, Cross River Gorillas, and Grey-cheeked Mangabey are allege to be at home in the rainforest. It also contains 950 species of butterflies, 610 species of birds including Grey Parrot, Oil Long Tailed Cuckoo and Grey Throated Tit-Flycatcher) and 42 species of Snakes (Amaza, 2016). Many environmentalists, advocacy groups and international NGOs (World Conservation Society, Amnesty International etc.), in what was referred to as land grabbing, called for the immediate de-revocation of the traditional rights of occupancy and the re-routing of the project completely in an area selected by the United Nations Reducing Emissions from Deforestation and Forest Degradation (UN REDD+) program.



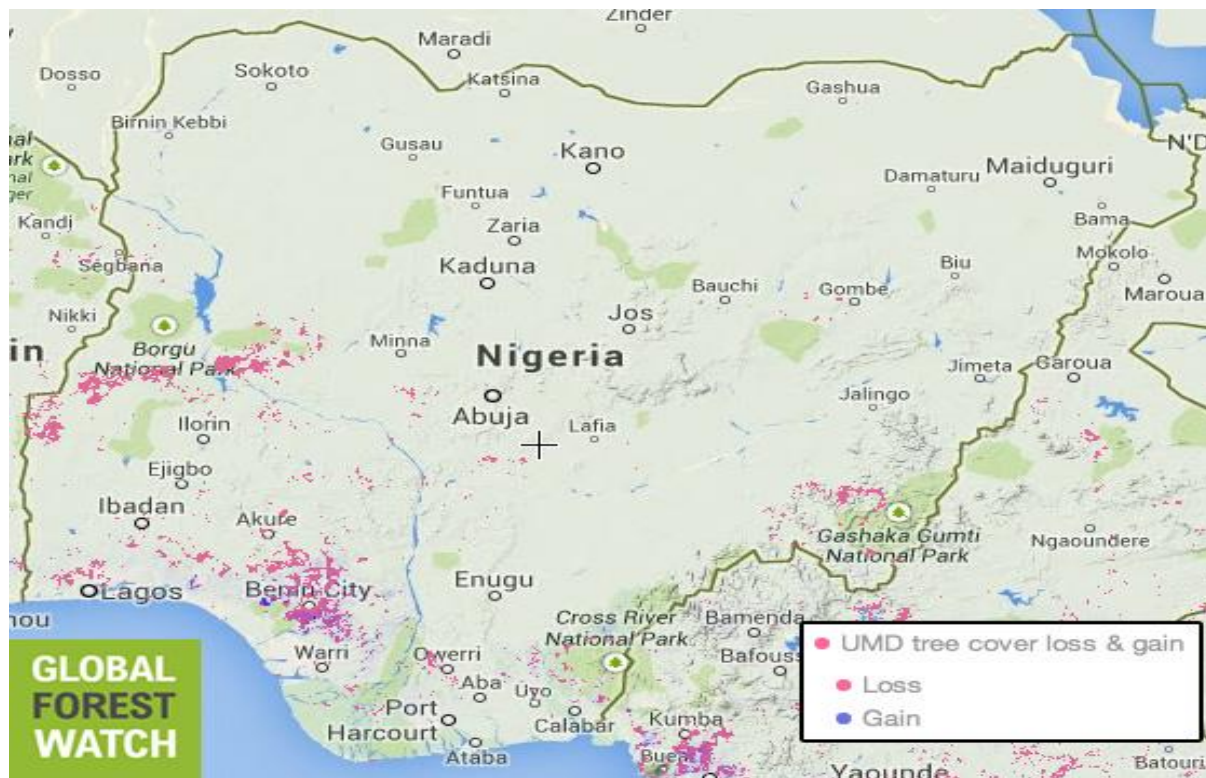
**Figure 1.** Gas Flaring in Oil Field (Visual Image of Gas Flare Burn in Abama, Bayelsa State, Nigeria. Source: Tom Ashby / Reuters)



**Figure 2.** The Calabar Super Highway Project (Photo Source: Wildlife Conservation Society)



**Figure 3.** Interconnection of Oil Fields and Pipelines in Niger Delta (Source: Diercke International Atlas)



**Figure 4.** Tree Cover Loss and Gain (Source: Mongabay-Global Forest Watch)

#### 4. The new pathway to sustainability

##### 4.1. The price of sedentariness in curbing the spate of degradation

Underscoring the level of degradation is dangerous to the people in the region, however, the real tragedy is overlooking the externalities arising from the depletion of ecological formations and the instructional lethargy responding sustainably to safeguard human life and natural resource wealth. Local agitators are responding by resorting to armed conflicts, pipeline vandalism and deploying unorthodox methods to process raw crude oil. This has further aggravated the incidents of oil pollution and wanton destruction of local vegetation.

Data from UN HDI (2006) highlights the region's comprehensive human development index, a measure of quality of life reflecting indicators like, life expectancy, knowledge and a decent wellbeing is only slightly above 0.564 (with 1 being the highest score). In comparison to the index in other similar oil rich regions, the rating is far below index of countries like Saudi Arabia 0.8000 (2000), United Arab Emirates 0.849(2003), Kuwait 0.844 and Indonesia 0.697 etc., all these countries are bequeathed with comparable natural oil and gas resources.

Taylor et al (2012) underlined that “genuine human progress involves the use of human hands, hearts minds to do what we can with what we have here today”. According to Sneddon (2000), “the explosion of policy-orientated work within the natural and social sciences, concentrated on connotations of sustainability as applied to specific developmental projects, stands in contrast to the sustainable development conceptual bedrocks. This neglect is reflected in the remarkable range of *ad hoc* interpretations and practices applied to the concept of sustainability. In Basiago (1999) re-echoing of Redcliff’s (1991) question of whether sustainable development ‘is about meeting human needs, or maintaining economic growth or conserving natural capital, or about all three’ it is obvious that the Nigerian Authorities, other multilateral agencies and key stakeholders would provide appropriate answers by their subsequent actions or inactions.

This becomes disconcerting when the developmental politics, conflict of interests and divergence from values undermine the engendering of the sustainable development goals without recourse to socio-political and ecological consequences. The International Finance Corporation financed in 1993, the USD \$3.5 billion Chad-Cameroun 1,050Km crude oil pipeline for multinational corporations that left tales of woes and devastation across some many affected communities in these countries. An environmentalist, Oronto Douglas cautioned that financing the pipeline with taxpayers’ funds was akin to financing ‘human right violations, environmental degradation and social injustice’ (SCAN, 1999). This was in line with Abbott’s (2013) emphasis of Srinivasan peoples-centred development, as espoused in the Inter-Regional Consultation on Environmental Sustainable Development of 1989 in Manila. It reflects on a loss of confidence in the prevailing concept of development controlled by State dominated policies in collaboration with foreign assisted institutions. A model faulted mainly “for imposing external agendas on the poor; for weakening government accountability to its own citizens; for escalating the national debts burden; for depriving the poor access to productive assets essentials to their livelihood and for divesting people of their sense of community and control over their own lives”.

#### 4.2. Instinctive constraints of international protocols and conventions

International treaties like the Basel Convention (1989) that control the trans-boundary movement of hazardous waste and disposal; the 1992 Rio Declaration on Environment and Development Practice Agenda 21, encapsulating the rights and responsibilities of nations in pursuit of economics growth to environmental protection. UNFCCC (2013) Warsaw Framework on UN REDD+ and Paris Climate Change Treaty (2015) that seek to control greenhouse emission into the atmosphere and other United Nations conventions and agreements supporting SDGs, are some of the known and available mechanisms that empowers sustainable management of natural capital globally.

But it is possible for authorities in multinational companies’ home countries in partnership with institutional partners and governments to holistically scrutinize exploration and exporting of natural resources in overseas countries; and establish a robust legal mechanism that captures the actual social cost of natural resource extraction. This can contribute in reversing the incidents of environmental degradation in the Niger Delta as well as compensate for the ignorance and vulnerability of local host communities experiencing growing demand of natural resources; forestall the acceleration of the rapid depletion of the carbon sinks and

attain full sustainability to redress the excesses of existing practice that is fuelling social injustice and build natural wealth stock for future generations' sustenance.

However, Lipman (2002) cited that the inability of the Basel Convention, like many conventions and protocols, to make hazardous waste traders completely responsible for damages, amongst other weaknesses, creates a loophole in the enforcement mechanism. In addition, most of these regulatory instruments are merely hypothetical diplomatic tools, anchored on the voluntary commitment of each Member States. The enforcement assessments are cautionary non-intrusive and has no punitive mechanisms. However, the point is not to solely deprecate the efficacy of any institutional programme, policy or theory, neither is it an attempt to subjectively underestimate the relevance of these instruments. But absorbing universally applicable social, economic and environmental guidelines into sustainable development plans should constantly be subjected to reviews and tweaking in view of the enormity of the man-made ecological crisis in the planet. The open access and borderless nature of the atmosphere, should compel galvanising all planetary ecological resources as carbon sinks and reservoirs for greenhouse gases. To move the humanity off its present predicaments of increasing state of global warming, ecological related actions or inactions should come with consequences.

## **5. Materials and methods**

### **5.1. Methodology**

Saunders et al. (2012) underscored that the research objectives, research questions and the extent of existing knowledge should essentially guide the choice of a methodology. Hence, no singular research method is inherently superior or inferior to the other. In this study, crude oil spill and gas flaring data from 1990 to 2014 were presented and analysed for the development of this paper based on careful consideration of a number of publicly available records from numerous sources like NBS, UN HDI, NNPC, EIA, DPR, World Bank, UNCTAD and FAO. Case studies and databases were identified and assessed in determining the social, environmental and economic backdrop for the study. The spate of degradation in the Niger Delta region, highlighting toxic waste dump, oil spillage, gas flaring and deforestation issues vis-à-vis the emission of greenhouse gases and depletion of the carbon sink. Comparative study using descriptive case studies and secondary data was made to elucidate the statement of problems using information from previous studies, books, reports, journals, conference, and seminar papers. Work data from different international organisations were critical to generate concepts that this literature seek to convey. Inductive technique geared towards identifying patterns in the data collected formed the basis for the findings.

### **5.2. Data collection and analysis**

The first step involves mapping out the scope and the territorial overview of the area that make up the six states in the Niger Delta to be covered. The variables consist of crude oil production frequency of spills, percentage of quantity spilled, natural gas production, and flared. One off case incident of toxic waste dumping and activities of deforestation induced mostly by illegal loggers and Calabar Superway Highway project and Ogoni Oil Spill debacle were used case studies, whilst the Koko toxic waste dump was used to emphasis the

power of political will in addressing degradation in the region. In addition, data from the National Bureau of Statistics, NNPC Statistical Bulletin and other government agencies were analysed to buttress the theoretical narrative of the spate of degradation in the Niger Delta region.

## 6. Results

### 6.1. Oil spillage

**Table 4.** Crude Oil Spillage Incident and Quantity (NNPC Statistic Bulletin, 2015)

#	Year	# Incident	Spills in Barrels
1	1990	160	14,940.816
2	1991	201	106,827.98
3	1992	367	51,131.91
4	1993	428	9,752.22
5	1994	515	30,282.67
6	1995	417	63,677.17
7	1996	430	46,353.12
8	1997	339	59,272.30
9	1998	390	98,345.00
10	1999	320	20,000.00
11	2000	330	30,100.00
12	2001	302	76,960.00
13	2002	262	19,980.00
14	2003	221	9,916.00
15	2004	236	8,317.00
16	2005	224	11,921.00
17	2006	253	
18	2007	588	32,000.00
19	2008	419	100,000.00
20	2009		104,000.00
21	2010	537	17,658.10
22	2011	673	67,906.84
23	2012	844	17,526.37
24	2013	522	4,066.20
25	2014	1087	10,302.16
<b>NA</b>	<b>TOTAL</b>	<b>10,065</b>	<b>2,51,133.90</b>

From the total crude oil production of 19,731,884,225 barrels produced, a total of 775,236.95 barrels were spilt from 10,065 incidents during the period under review (Please see table 4 and 6). The occurrence of oil spillage did not show any particular trend unlike gas flaring that showed reducing trend. Aside from the increasing incidence of exploration companies' equipment failure formed the major component of spill records. This is in addition to the increased rates of saboteur from local agitators for natural resource devastation and economic benefits of crude oil sales.

**Table 5.** Comparative Data on Gas Production, Utilisation and Flared (1990-2014)

<b>Year</b>	<b>Gas Produced (MSCF)</b>	<b>Total Gas Used (MSCF)</b>	<b>Gas Flared (MSCF)</b>	<b>% Flared</b>
<b>1990</b>	1,004,385,817	212,676,842	781,708,975	78.83
<b>1991</b>	1,111,430,806	240,232,978	871,197,828	78.38
<b>1992</b>	1,133,475,714	265,245,470	868,194,916	76.59
<b>1993</b>	1,189,859,807	279,447,478	910,412,329	76.51
<b>1994</b>	1,189,859,807	239,173,126	950,686,680	79.89
<b>1995</b>	1,240,026,105	286,654,468	953,371,638	76.88
<b>1996</b>	1,252,391,038	313,009,439	939,381,599	75.00
<b>1997</b>	1,312,449,282	366,814,560	801,846,530	70.21
<b>1998</b>	1,308,017,175	473,647,578	834,542,305	63.8
<b>1999</b>	1,541,589,148	751,575,936	798,418,851	60.11
<b>2000</b>	1,509,652,294	652,762,460	882,760,070	55.20
<b>2001</b>	1,853,079,467	908,009,999	920,905,671	50.52
<b>2002</b>	1,651,591,488	897,789,582	753,801,906	45.64
<b>2003</b>	1,828,541,855	983,562,969	844,978,886	46.21
<b>2004</b>	2,082,283,189	1,195,742,993	886,540,196	42.58
<b>2005</b>	2,093,628,859	1,282,313,082	811,315,777	38.75
<b>2006</b>	2,182,432,084	1,378,770,261	803,661,823	36.82
<b>2007</b>	2,415,649,041	1,655,960,315	759,688,726	31.45
<b>2008</b>	2,287,547,344	1,668,148,489	619,398,854	27.08
<b>2009</b>	1,837,278,307	1,327,926,402	509,351,905	27.72
<b>2010</b>	2,392,838,898	1,811,270,545	581,568,354	24.30
<b>2011</b>	2,400,402,880	1,781,370,002	619,032,858	25.79
<b>2012</b>	2,580,165,626	1,991,498,902	588,666,724	22.82
<b>2013</b>	2,325,137,449	1,916,531,001	409,311,430	17.60
<b>2014</b>	2,524,268,444	2,234,668,430	289,600,014	11.47
<b>Total</b>	<b>44,218,335,225</b>	<b>25,114,803,307</b>	<b>19,000,244,445</b>	<b>42.97</b>

Source: NNPC Statistic Bulletin 2015

**Table 6.** Comparative Data on Crude Oil Production Versus Oil Spillage Natural Gas Production versus Gas Flared

YEAR	TOTAL CRUDE OIL PRODUCED (Barrels)	OIL SPILLAGE (Barrels)	TOTAL GAS PRODUCED (MSCF)	GAS FLARED (MSCF)	Percentage of Gas Flared
1990	630,245,500	14,940.816	1,004,385,817	791,708,975	78.8
1991	690,981,500	106,827.98	1,111,430,806	871,197,828	78.4
1992	716,262,000	51,131.91	1,133,475,714	868,194,916	76.6
1993	695,398,000	9,752.22	1,189,859,807	910,412,329	76.5
1994	664,628,500	30,282.67	1,189,859,807	950,686,680	79.9
1995	672,549,000	63,677.17	1,240,026,105	953,371,638	76.9
1996	681,894,600	46,353.12	1,252,391,038	939,381,599	75.0
1997	855,736,287	59,272.30	1,312,449,282	856,147,988	65.2
1998	806,443,999	98,345.00	1,308,527,832	834,880,254	63.8
1999	774,703,222	20,000.00	1,541,589,148	790,013,212	51.3
2000	828,547,638	30,100.00	1,509,652,294	856,889,834	56.8
2001	865,173,584	76,960.00	1,853,079,467	945,352,096	51.0
2002	729,190,940	19,980.00	1,651,591,488	753,801,906	45.6
2003	831,775,504	9,916.00	1,828,541,855	844,978,886	42.2
2004	910,156,489	8,317.00	2,082,283,189	886,540,196	42.6
2005	918,966,736	11,921.00	2,093,628,859	811,315,777	38.8
2006	869,196,506		2,182,432,084	803,661,823	36.8
2007	803,000,708	32,000.00*	2,415,649,041	759,688,726	31.5
2008	768,745,932	100,000.00*	2,287,547,344	619,398,854	27.1
2009	780,347,940	104,000.00*	1,837,278,307	509,351,905	27.7
2010	896,043,406	17,658.19	2,392,838,898	581,568,354	24.3
2011	866,245,232	67,906.84	2,400,402,880	619,032,858	25.8
2012	852,776,653	17,526.37	2,580,165,626	588,666,724	22.8
2013	800,488,096	4,066.20	2,325,137,449	409,311,430	17.6
2014	798,514,589	10,302.16	2,524,268,444	289,600,014	11.5
<b>TOTAL</b>	<b>19,731,884,225</b>	<b>775,236.95</b>	<b>44,218,335,225.00</b>	<b>19,045,154,752.00</b>	<b>43.0</b>

Source: NNPC Statistical Bulletin (2015), DPR (2014), Adewuyi (2014), World Bank (2015)

(Spillage data only from Shell Nigeria)



**Table 7.** Area of Forest Reserve & Plantation by State

State	Area of Forest Reserve (HA)	Area of Forest Plantation (HA)	% of Forest Plantation to Forest Reserve
<b>Akwa Ibom</b>	31,857	25,800	80
<b>Bayelsa</b>	N/A	N/A	N/A
<b>Cross River</b>	610,129	19,000	63
<b>Delta</b>	78,506	2,000	3
<b>Edo</b>	482,047	150,000	31
<b>Rivers</b>	25,000	231	1
<b>Total</b>	1,227,539	197,031	35.6

Source: NBS (2012)

**Table 8.** Percentage Distribution of Household by Major Source of Water for Drinking and Cooking (2007 – 2011)

	Akwa Ibom	Bayelsa	Cross River	Delta	Edo	Rivers	Average
Pipe Borne Water Treated	3.8	7.7	7.9	5.4	4.4	3.1	<b>5.4</b>
Pipe Borne Water not Treated	0.9	7.4	1.8	1.9	0.4	-	<b>2.4</b>
Borehole/Hand Pump	39.7	9.7	21.9	41.5	25.7	39.7	<b>29.7</b>
Protected Well Spring	0.9	0.9	2.6	13.9	21.5	22.3	<b>10.3</b>
Unprotected Well Spring	1.1	13.8	4.0	14.7	7.8	15.7	<b>9.5</b>
Rainwater	-	17	-	2.7	0.7	1.7	<b>5.5</b>
Stream/Pond River	53.5	57.8	61.0	19.7	36.4	12.1	<b>40.1</b>
Tanker/Truck Vendor	-	-	-	0.2	3.2	5.0	<b>2.8</b>
Other Sources	0.2	1.0	0.9	-	0.2	0.4	<b>0.54</b>

Source: NBS (2012)

## 6.2. Gas flaring

The data on (Table 6) exhibit a decreasing trend from 78.9 percent of gas produced in 1990 was flared compared to drastic reduction to 11.5 percent of natural gas produced that was flared in 2014. However, the flaring of 19,045,154,752 scf, amounting to about 43 percent of natural gas was flared into the open atmosphere over a period of 14 years (1990-2013). Aside the economic loss of gas flaring, there are other health and safety implications of inducing atmospheric contaminants, particulate matter, petrochemical oxidants etc., which can result to acid rain. This effect in addition to other chemical reactions could also be attributed to corrosion on corrugated roofing sheets evident in the host and nearby communities. In addition, the toxic gases could also contribute in acidifying and depleting soil nutrients in the ecosystem. More significantly, is the contribution to the emission of greenhouse gases increasing incidence of global warming and heat waves.

The ecological implications of sequestering the flaring of 19 bscf of natural gas, will require a wide-scale and deliberate forestation programme (at an average of one acre of new forest to sequester 2.5 tons of carbon annually) running into millions of hectares of forest, with other attendant socioeconomic implications.

**Table 9.** Livelihood Losses Resulting from Oil Pollution

<b>Environmental Degradation Index</b>	<b>3-High</b>	<b>2-Moderate</b>	<b>1-Low</b>
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 Domestication of Livestock	99	67	207
Loss of Family Members	8	50	315

Source Ogbija et al. (2015)

**Table 10.** Hospital Admission and Illness Report (2013)

<b>Hospital Name</b>	<b>Diarrhoea</b>	<b>Asthma</b>	<b>Eye Infection</b>	<b>Bronchitis</b>	<b>Skin Infection</b>
General Hospital Ughelli (Ekakprame Afiesere & Erhoike)	80	80	370	35	23
Bomadi Central Hospital	40	35	5	10	10
Warri Central Hospital (Ubeji)	70	55	110	45	98
Oleh Hospital (Uzere)	10	7	6	0	21
Kwale General Hospital	35	10	20	0	5
Total	235	187	511	90	157
Mean	47	37.4	102.2	18	31.4

Kadafa (2012)

**Table 11.** The Impact of Gas Flaring on Agricultural Output

<b>Distance of Farmlands from Flare Site</b>	<b>Percentage Loss in Yield of Crops</b>
200 meters	100 percent
600 meters	45 percent
1 kilometre	10 percent

Kadafa (2012)

## 7. Discussion

The socio cultural impact of result from 4.1 is first evident from data on table 10. About 25.1 million people lives in the region, statistics shows the breakdown of the percentage of household dependence on various water source. 1,380,500; 602,400; 7,454,700; 2,585,300; 2,384,500; 1,380,500; 10,065,100; 702,800 and

135,540 people depend on treated pipe borne water, untreated pipe borne water, borehole/hand pump, protected well spring, unprotected wellspring, rainwater, stream/pond river, truck vendor, and other sources for water supply respectively.

This corroborate the local National Bureau of Statistics data of about 14.9 million people depending on water from protected well spring, unprotected wellspring, rainwater, stream/pond river are all possibly exposed to contaminated water from oil spillage. This can be attributed to the effect of above national average infant mortality of 120 per 1000 and below national average life expectancy of 52.7 recorded in the region. (See Table 2). The degradation of the natural ecosystem could have also exacerbated the sensitive unemployment challenge, in an environment where about 65 percent of the population depend on smallholder farming and fishing as source of livelihoods.

Toxic waste dump and deforestation as a source of environmental degradation in the region relied on secondary data for analysis, but impact on Niger Delta ecosystem is active with grave consequences. In spite of the social-environmental effect of dumping 3,800metric tonne of toxic waste in a sleepy town of Koko, post impact scholarly ecological survey is not common. However, the toxic waste concealed in damaged and leaking drums caused the local hired labourers loading the drums into the waiting cargo to experience severe chemical burns, while some were hospitalised. Lipman (2002) reported that on complete evacuation, 500metres radius of the dump site was declared unsafe over concerns of ecological contamination. The radioactive wastes known to contain mercury, cadmium, arsenic lead etc., if exposed to the atmosphere and inhaled, ingested or absorbed through the skin, can cause severe health complications to human and animal life. The aside the contaminated waste permeation of the ground in a tropical region of high rainfall could have polluted underground water.

Report that the Niger Delta mangrove which is the largest in Africa has declined by 26.1%, from 9990km<sup>2</sup> to 7386km<sup>2</sup> between 1980 and 2006 which could largely be attributed to formation of oil fields, industrial development, spread of human development and wood extraction. Also, permitting the Calabar Super Highway project covering an estimated land area of 5304square kilometre will result to a permanent loss of 530,400 hectares of arable land and a projected 250,000 trees within a 24month period poses grave danger for the already volatile region in the future. More so the rainforest serves as carbon sinks that is capable of sequestering 5443.2 metric tonnes of carbon emission annually. In addition, this is aside the calculated loss of 187 hectares  $(12.2\% \times 7,666.5)/5 = 187$  of forest removal rate annually by FAO predicted.

Lastly, from the findings in 6.0 above, the combination of the radioactive toxic waste trade, oil and gas exploitation, illegal logging and poor projects framework, has almost reduced the local environment in the region to ecological wasteland. The externalities of oil and gas exploratory companies only harness the loopholes of the weak or perhaps non-existence regulatory framework. The challenge is more complicated if the transferred externalities is allowed to extend beyond the present generation to the next. Then, the problem will require commuting the externalities of the present into monetary value and equally translate it for future.

## 8. Conclusions

The following conclusions have been drawn:

- 1-From the foregoing, the primordial causes of environmental degradation in the Niger Delta and how it has contributed to reoccurring social crisis and violent agitations that currently threatens peaceful co-existence in Nigeria could be attributed to a blend of leadership deficiency, lack of sincerity of purpose and political will and flawed strategic framework that continually plagues an economy mostly dependent on foreign exchange from the unprocessed oil and gas sale. The symptom of the foregoing is reflected in form of a combination of lingering oil pollution, gas flaring, deforestation and toxic waste dump that currently devastating the rich ecological resources and threatening the households' livelihood source. There also concerns of health implications to human, animal and plant life from the series pollution enablers and cases prevalent in the region.
- 2-The social crisis could be submitted to have arisen from environmental and social injustice due the oil and gas exploratory companies wanton exploitation of hydrocarbons without recourse to socioeconomic and environmental sustainability. This is in addition to cases of political neglect or indifference from the various level of political leadership structure to the detriment of an inclusive development in the face of chronic poverty and weak social infrastructure. Also, the escalation of the agitation previously centred on resource allocation and development to environmentalism, injustice, constitutional quagmire and clamour for self-determination has created some sensitivities which could obstruct the socioeconomic development of the Nigerian State, Africa's largest economy and the most populous black nation globally, if diplomatic measures are not applied.
- 3-The politicisation of natural resources management and governance in the country is having economic and developmental ramifications on host communities where natural resource are located. The constitutional provisions and regulatory framework to enforce environmental polluters accountability, encourage public institutions and administrative hierarchies to carry on with 'business as usual' attitude, has heightened clamour for the devolution of powers by diverse political actors. Series of special purpose interventionist programmes by the central government have consistently failed to assuage the burdens of oil exploration in rural communities. Cycle of political leadership change at all levels, insincerity, corruption and complexities of other social cultural factors have been adduced for most of these failures.
- 4-It therefore means that challenge is not that of root-cause knowledge deficiency or applicable measures to engender sustainable socio-political development. Rather understanding political and institutional sensitivities towards natural resources management. Amazingly, records of incidents of oil spillage are conspicuously missing from the joint venture operations of the Nigeria national oil company annual statistical bulletin. However, the real disaster is overlooking the externalities arising from the depletion of ecological formations and the lethargy of the political institutions to respond like in the case of the Koko waste disaster. What changed between Koko to Ogoni and the other Niger Delta Communities?
- 5-Findings from the study (See 6.0) has unveiled a disturbing occurrence of weak resource management framework that is ravaging local ecology on which households depend for sources of livelihood. Farmers, fishermen and other traders from local communities like Forcados, Funiwa, Oyakama Ogada,

Brass, Ogoni, Abudu, Idoho, Ughelli, Sohika, Etiama, Jones Creek, Bodo and many more live a cluttered lifestyle only because of the presence of hydrocarbon in their local communities. The people who rely on fresh water and farmlands for livelihoods and also preparing other daily chaos are faced with difficulties from polluted farmland and water. Yet, social infrastructures are almost non-existent in many rural communities in the region and where available, they are very weak. Statistics in Tables 2 and 8 clearly highlights the impacts of hydrocarbon exploration in the region. In addition, Ogbija et al (2015) from selected communities in Delta State (Table 9 and 10) and Kadafa (2012) (Table 10) also provides empirical verification livelihood, health implications and impact agricultural produce.

Therefore, deploying economic policies for resolving socio-political bottlenecks can be appealing, nonetheless the multi-dimensional issues of livelihoods disruptions associated with environmental degradation should blend scientific knowledge with a people-centric democratic bottom-up model. This is to avoid the menace of narrow-mindedness planning and implementation that allows policy framework to continually tackle symptoms rather than addressing root causes. Hence, responding to the immediate needs of local ecological dependants should be systematic; because their preoccupation in the face of devastation, economics deprivation and volatile weather patterns, will be the concern for survival, sustainability and before the thinking of entrenching their sociocultural heritage. Therefore, the pursuit of development should cognise factors that adequately promotes the attainment of Sustainable Development Goals to forestall the weaknesses of the earlier Millennium Development Goals MDGs. Structures of governance could therefore be calibrated, in anticipation of symptoms of socioeconomic failures, to essentially bridge the inequalities gaps in crucial sectors like environment, education, income redistribution etc., and the capture inclusivity priorities in addressing ecological challenges.

## **Abbreviations**

USD \$ - United States of America Dollars

The Delta: The entire area of the Niger Delta Region in Nigeria

BCM – Billion Cubic Meters

DPR – Department of Petroleum Resources

EIA- US Energy Information Administration

FAO – Food and Agriculture Organisation

FEPA – Federal Environmental Protection Agency

Km – Kilometre

Km<sup>2</sup> – Square Kilometre

IFC – International Finance Corporation

MDGs – Millennium Development Goals

MSCF – Thousand Standard Cubic Feet

NACGRAB - National Centre for Genetic Resources and Biotechnology, Nigeria

NBS - National Bureau of Statistics, Nigeria

NGOs – Non-Governmental Organisations

NNPC – Nigeria National Petroleum Company

NPC – National Population Commission, Nigeria

SCF- Standard Cubic Feet

SDGs – Sustainable Development Goals

TCF – Trillion Cubic Feet

Ton – Tonne

UNFCCC – United National Framework Convention on Climate Change

UN HDI – United Nations Human Development Index

UNEP – United Nations Environmental Programme

UN REDD+ - United Nations Reducing Emissions from Deforestation in Developing Countries: Approaches to Stimulate Actions

US – United States of America

UNCTAD – United Nations Conference on Trade and Development

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