



REVIEW OF REMEDIATION MANAGEMENT IN THE NIGER DELTA IN NIGERIA:
PROSPECTS AND CHALLENGES

FLORENCE O. UMOH, ETUKUDOH, NDARAKE EMMANUEL AND GBARABE ROLAND

¹Department of Soil Science, Faculty of Agriculture, Akwa Ibom State University, Nigeria ²Elechi Amadi Polytechnic, Romula, Rivers state. Nigeria.

Abstract

This review the crude oil spill remediation Management in the Niger Delta, Nigeria: Prospects and challenges. In the Niger Delta, there is pervasive poverty and despicable environmental damage as a result of crude oil mining activities going on in this region. This review identifies the constraints to effective implementation of Nigeria's environmental laws and policies especially the Environmental Impact Assessment (EIA) as it concerns oil prospecting, which has hitherto contributed in hindering her environmental sustainability. From the review, it appears obvious that the issue of environmentally friendly sustainable development cannot be overlooked if the Niger Delta Region is to meet its development challenges. In the near further, the region will have depleted most of its resources and will be hindered from performing its life-sustaining functions. This review will direct policy makers, community groups and development partners and every Niger Delta's alive today on what to do about environment. I believe that if Niger Delta is to meet these environmental challenges, it must take action at all levels. It has to incorporate global, national and community actions. It must also involve civil society, public agencies and the private sector in development programs to help mitigate environmental problems. However, often times Nigerian governments lack the capacity to implement these agreements or honor the commitments therein.

Keywords: *Montreal Protocols, Environmental Impact, environmental challenges, Mitigation*

Introduction

Environmental Sustainability Issues in Nigeria

Environmental degradation is the damage to the biosphere as a whole due to human activity. Environmental degradation occurs when nature's resources

(such as trees, habitat, earth, water and air) are being consumed faster than nature can replenish them, when pollution results in irreparable damage done to the environment or when human beings destroy or damage ecosystems in the process of development. In Nigeria today there are so many practices especially those relating to industrialization that is quite unsustainable to the environment. Environmental degradation can take many forms including, but not limited to, unsustainable extraction of natural resources, desertification, deforestation, extinction and radioactivity. Some of the major causes of such degradation include: overpopulation, urban sprawl, industrial pollution, waste dumping, intensive farming, over fishing, industrialization, introduction of invasive species and a lack of environmental regulations. The goal of environmental sustainability is to minimize these and other causes, to halt and, ideally, reverse the processes they lead to. An unsustainable situation occurs when natural capital (the sum total of nature's resources) is used up faster than it can be replenished. Sustainability requires that human activity, at a minimum, only use nature's resources at a rate at which they can be replenished naturally.

Theoretically, the long-term result of environmental degradation would result in local environments that are no longer able to sustain human populations to any degree (*Conditions in the Niger Delta*, 2014). Such degradation on a global scale would, if not addressed, of course mean extinction for humanity. In the short-term, environmental degradation leads to declining standards of living, the extinctions of large numbers of species, health problems in the human population, conflicts, sometimes violent, between groups fighting for a dwindling resource, water scarcity and many other major problems.

The issue of Environmental Sustainability cannot be conclusive without linking it to Sustainable Development. Of course to achieve Sustainable Development, the environment must be taken into serious consideration

Causes of Environmental Pollution in Niger Delta

Oil spills are a common event in Nigeria. (*Baird 2010*). Half of all spills occur due to pipeline and tanker accidents (50%), other causes include sabotage (28%) and oil production operations (21%), with 1% of the spills being accounted for by inadequate or non-functional production equipment. Corrosion of pipelines and tankers is the rupturing or leaking of old production infrastructures that often do not receive inspection and maintenance. (Nwilo & Badejo, 2001)

A reason that corrosion accounts for such a high percentage of all spills is that as a result of the small size of the oilfields in the Niger Delta, there is an extensive network of pipelines between the fields, as well as numerous small networks of

flowlines—the narrow diameter pipes that carry oil from wellheads to flowstations—allowing many opportunities for leaks. In onshore areas most pipelines and flowlines are laid above ground. Pipelines, which have an estimate life span of about fifteen years, are old and susceptible to corrosion. Many of the pipelines are as old as twenty to twenty-five years (Bronwen, 1999)

Shell admits that "most of the facilities were constructed between the 1960s and early 1980s to the then prevailing standards. SPDC [Shell Petroleum and Development Company] would not build them that way today." (International Petroleum Company, 1995). Sabotage is performed primarily through what is known as "bunkering", whereby the saboteur attempts to tap the pipeline. In the process of extraction sometimes the pipeline is damaged or destroyed. Oil extracted in this manner can often be sold.

Sabotage and theft through oil siphoning has become a major issue in the Niger River Delta states as well, contributing to further environmental degradation (Anderson, 2005) Damaged lines may go unnoticed for days, and repair of the damaged pipes takes even longer. Oil siphoning has become a big business, with the stolen oil quickly making its way onto the black market (International Petroleum Company, 1995).

While the popularity of selling stolen oil increases, the number of deaths are increasing. In late December 2006 more than 200 people were killed in the Lagos region of Nigeria in an oil line explosion. (http://www.conflictrecovery.org/bin/Bogumil_Terminski-Oil-Induced_Displacement_and_Resettlement_Social_Problem_and_Human_Rights_Issue.pdf)

(CNN, 2006) Nigerian regulations of the oil industry are weak and rarely enforced allowing, in essence, the industry to self-regulate (*Baird, 2010*)

Reports on the extent of the oil spills vary. The Department of Petroleum Resources estimated 1.89 million barrels of petroleum were spilled into the Niger Delta between 1976 and 1996 out of a total of 2.4 million barrels spilled in 4,835 incidents. (approximately 220 thousand cubic metres). A UNDP report states that there have been a total of 6,817 oil spills between 1976 and 2001, which account for a loss of three million barrels of oil, of which more than 70% was not recovered. ("Niger Delta Human Development Report". UNDP. 2006) 69% of these spills occurred off-shore, a quarter was in swamps and 6% spilled on land. The Nigerian National Petroleum Corporation places the quantity of petroleum jettisoned into the environment yearly at 2,300 cubic metres with an average of 300 individual spills annually (Bronwen, 2007) However, because this amount does not take into account "minor" spills, the World Bank argues that the true

quantity of petroleum spilled into the environment could be as much as ten times the officially claimed amount. (Perception and Reality, 2009) The largest individual spills include the blowout of a Texaco offshore station which in 1980 dumped an estimated 400,000 barrels (64,000 m³) of crude oil into the Gulf of Guinea and Royal Dutch Shell's Forcados Terminal tank failure which produced a spillage estimated at 580,000 barrels (92,000 m³) (Nwilo & Badejo, 2001)

In 2010 Baird reported that between 9 million and 13 million barrels have been spilled in the Niger Delta since 1958 (*Baird, 2010*). One source even calculates that the total amount of petroleum in barrels spilled between 1960 and 1997 is upwards of 100 million barrels (16,000,000 m³) (Perception and Reality, 2009)

Natural gas flaring

Nigeria flares more natural gas associated with oil extraction than any other country, with estimates suggesting that of the 3.5 billion cubic feet (100,000,000 m³) of associated gas (AG) produced annually, 2.5 billion cubic feet (70,000,000 m³), or about 70%, is wasted by flaring. This equals about 25% of the UK's total natural gas consumption and is the equivalent to 40% of Africa's gas consumption in 2001. Statistical data associated with gas flaring are notoriously unreliable, but Nigeria may waste US\$2 billion per year by flaring associated gas. (Media Briefing: Gas flaring in Nigeria, 2004; Estimated flared volumes from satellite data World Bank, 2008).

Gas flares have potentially harmful effects on the health and livelihood of nearby communities, as they release poisonous chemicals including nitrogen dioxides, sulphur dioxide, volatile organic compounds like benzene, toluene, xylylene and hydrogen sulfide, as well as carcinogens like benzopyrene and dioxins. Humans exposed to such substances can suffer from respiratory problems. These chemicals can aggravate asthma, cause breathing difficulties and pain, as well as chronic bronchitis. Benzene, known to be emitted from gas flares in undocumented quantities, is well recognized as a cause for leukemia and other blood-related diseases. A study done by Climate Justice estimates that exposure to benzene would result in eight new cases of cancer yearly in Bayelsa State alone (Estimated flared volumes from satellite data World Bank, 2008).

Gas flares are often close to communities and regularly lack fencing or protection for villagers who risk working near their heat. Many communities claim that nearby flares cause acid rain which corrodes their homes and other structures, many of which have zinc-based roofing. Some people resort to using asbestos-based material, which is stronger in repelling acid rain deterioration (Asbestos: health effects Agency for Toxic Substances and Disease Registry, 2007. Retrieved May 29, 2007)

Unfortunately, this contributes to their declining health and the health of their environment. Asbestos exposure increases the risk of forming lung cancer, pleural and peritoneal mesothelioma, and asbestosis.(Essential Action, 2018; Bronwen Manby 2018)

Whether or not flares contribute to acid rain is debatable, as some independent studies conducted have found that the sulphur dioxide and nitrous oxide content of most flares was insufficient to establish a link between flaring and acid rain. Other studies from the U.S. Energy Information Administration (EIA) report that gas flaring is "a major contributor to air pollution and acid rain."

Table 1. The International Oil Companies Operating in Nigeria, and When They Were Established

Company Year established in Nigeria

Shell Petroleum Development Company Ltd- 1937

Mobil Producing Nigeria Unlimited- 1955

Chevron Nigeria Ltd 1961

Texaco Overseas Nig. Petroleum Co. Unltd -1961

Elf Petroleum Nigeria Limited - 1962

Philip (1964); Pan Ocean Oil Corporation - 1972

Ashland Oil Nigeria Limited - 1973

Agip Energy & Natural Resources - 1979

Statoil/BP Alliance 1992

Esso Exploration & Production Nig.Ltd.- 1992

Texaco Outer Shelf Nigeria Limited - 1992

Shell Nig. Exploration & Production Co.- 1992

Total (Nig.) Exploration & Prod. Co.- Ltd.- 1992

Amoco Corporation -1992

Chevron Exploration & Production - Co. 1992

Conoco - 1992

Abacan - 1992

(Source: Nigerian National Petroleum Corporation)

Remediation Issues in the Niger Delta

More than four decades of oil exploration and production activities have left a severely degraded environment in Nigeria's southern, Niger Delta oil region. Spills - the uncontrolled discharge of oil or its by-products including chemicals and wastes, which mainly occurs through equipment failure, operational errors,

or willful damage - have been identified as the main source of environmental damage in the region over time.

The environmental effect of spilled oil is a function of time, type of oil spilled, its degree of weathering, the sedimentary characteristics of the receiving environment and the season of the year," said Chindah at a recent workshop. The immediate impact on vegetation are wilting, defoliation and loss of the productive cycle or outright death of affected plants. On freshwater swamps, the studies showed, the effects are more devastating due to the longer water retention time. Lower plant forms, such as algae and lichens die off immediately. Animals, fish and other water organisms dependent on such ecosystems also die off sooner or later. In turn the communities in the affected areas suffer loss of livelihoods, poor health and other adverse consequences.

To help deal with the huge environmental damage caused by oil spills, Shell, (the biggest operator in Nigeria which has most of its operations onshore and is, therefore, responsible for most of the spills) has evolved a scheme whereby communities are involved in the remediation efforts. Participating communities are required to nominate people who are trained as "Remediation Technicians". To improve coordination of its own remedial efforts, Shell had by the end of 2000, conducted an assessment of 786 operational sites (700 on land and 86 in swamp areas), with 424 sites still due for assessment. "Of the sites assessed, 219 have been identified as requiring remedial action," the company says. "To date, some 55 sites in 15 fields have been returned to environmentally acceptable conditions since the inception of the programme." What about the rest? but adverse impacts on the ecology have also resulted from oil drilling; the dredging of the swamp waters by oil multinationals for access to pipelines and facilities; and natural gas flares that occur in the course of oil production. After many years, during which these adverse effects either received scant attention or were simply ignored, fresh efforts have been mounted in recent years by both environmentalist non-governmental organizations (NGOs) and oil multinationals to remedy the situation. The Centre for Environmental Resources and Sustainable Ecosystems (CERASE-NGO) is spearheading a unique programme, with the aid of the World Bank, aims at improving the capacity of local people in the Niger Delta to launch environmental remediation efforts.

A pilot project started by the group at Ogbogu, a community in one of the largest oil producing areas of Ogba/Egbema/Ndoni local council of Rivers State, uses bioremediation to clean up oil spills from the environment, particularly those affecting farmlands and fishing areas. "The concept of biological remediation

being proposed by CERASE also cover the direct use of other natural resources to combat degradation in a participatory development approach.

The advantage this method has is that it involves rural people in a programme to protect their lands and provide them economic opportunities, thereby reducing cases of civil unrest due to frustration over ecological degradation

A director of Shell was quoted as saying the following:

- 1) "In Shell in Nigeria, we operate in a way that reduces as far as possible the environmental impact of our activities. We also look for ways to bring environmental and social benefits to the communities where we operate. The standards and practices we use are similar to other Shell operations anywhere in the world. Where land is impacted by oil spills despite the prevention systems in place, we clean up as quickly as possible and remediate the land.
- 2) The Shell Petroleum Development Company of Nigeria Limited (SPDC), as operator of SPDC Joint Venture (SPDC-JV) facilities, operates in a way that reduces as far as possible the environmental impact of our activities. We also look for ways to bring environmental and social benefits to the communities where we operate. The standards and practices we use are similar to other Shell operations anywhere in the world
- 3) SPDC assess and where required remediate areas impacted by spills from its facilities, irrespective of cause. In the case of operational spills it also pays compensation, as stipulated by Nigerian law. Once clean-up and remediation are completed, the work is inspected, approved and certified by the Federal Government regulators - the Department of Petroleum Resources (DPR) and National Oil Spill Detection and Response Agency (NOSDRA).
- 4) SPDC is committed to complying with the Environmental Guidelines and Standards for the Petroleum Industry in Nigeria (EGASPIN), Revised Edition 2002. EGASPIN provides for the management and remediation of contaminated land (i.e. soil, groundwater and drinking water). To this end, we have researched and adopted techniques for cleaning up oil spills that we believe to be the most effective for the soil and climate conditions in the equatorial heat of the Niger Delta. Certification of the satisfactory completion of remediation is performed for all sites by NOSDRA, based on results of analytical laboratory testing. More details on how SPDC prevents and responds to oil spills are available in the ([2015 Shell Sustainability Report](#)).

- 5) The spills are sometimes made worse because communities occasionally deny access to verify the spill and stop the cause of the leak. Unauthorized third-party interference with pipelines and other infrastructure was responsible for around 85% of all oil spill incidents from SPDC-JV facilities in 2015.

Above statements are nothing but lies.

The SPDC-JV never works with communities and civil society across the Niger Delta to build greater trust in clean-up processes. Wherever possible, local communities take part in the remedial works. In a number of successful projects, local youths have been employed in the remediation process. In addition, some projects have been undertaken to improve host communities. An example of such projects is the construction of a 3.45km road at Ejama Ebubu community. This project was completed and commissioned in December 2011. This may be somehow true, but the question is when did untrained become expert in remediation of hydrocarbon?

Contamination of the total environment (air, soil, water and biota) by crude oil has become a paramount interest in the Niger Delta region of Nigeria. Studies have revealed variable impacts of oil toxicity on the environment and exposed populations. The revelation gained much international attention in 2011 with the release of Environmental Assessment of Ogoni land report by the United Nations Environment Programme (UNEP). This has up scaled local and international pressures for urgent clean-up and restoration of degraded bio-resource rich environments of the Niger Delta, starting from Ogoni land. Previous remediation attempts in the area had failed due to erroneous operational conclusions (such as conclusions by oil industry operators that the Niger Delta soil is covered by a layer of clay and as such oil percolation remains within the top soil and makes remediation by enhanced natural attenuation (RENA) suitable for the region) and the adoption of incompatible and ineffective approaches (i.e. RENA) for the complex and dynamic environments. Perennial conflicts, poor regulatory oversights and incoherent standards are also challenges. Following UNEP recommendations, the Federal Government of Nigeria recently commissioned the clean-up and remediation of Ogoni land project; it would be novel and trend setting. While UNEP outlined some measures of contaminated land remediation, no specific approach was identified to be most effective for the Niger Delta region. Resolving the technical dilemma and identified social impediments is the key success driver of the above project. In this paper, we reviewed the socio-economic and ecological impacts of contaminated land in the Niger Delta region and the global state-of-the-art remediation approaches. We use coastal

environment clean-up case studies to demonstrate the effectiveness of bioremediation (sometimes in combination with other technologies) for remediating most of the polluted sites in the Niger Delta. Bioremediation should primarily be the preferred option considering its low greenhouse gas and environmental footprints, and low-cost burden on the weak and overstretched economy of Nigeria.

Therefore, Land contamination remediation in the Niger Delta region of Nigeria is ad hoc and utilises the do-nothing approach to clean-up, impacts of oil toxicity on the environment and exposed populations is variable and deleterious, different factors including overlapping governance structure, stakeholder conflict, funding and lack of expertise is a challenge to land contamination remediation, bioremediation is a potential approach to effective and efficient clean-up given its low greenhouse emissions and environmental footprints.

According to Egbuche, CERASE has opened communication with the oil companies in Nigeria on how their community participatory approach could be incorporated in the industry's oil spill response plans. "The philosophy behind this concept was the promotion of integrated environmental conservation and rural development buttressed by community participation," she told reporters. "It is envisaged that this highly sustainable rural development approach will create multiple avenues for poverty alleviation."

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imperative due to the environmental degradation occasioned by hydrocarbon production in the Niger Delta area of Nigeria.

There has been series of conflicts between the indigenous people of the region and the major Oil Companies operating therein over the years. The region claims that the activities of the Oil companies instead of improving have impoverished its people by causing a serious decline in their marine and agricultural resources, which constitute their economic main stay. Because of environmental pollution, there is drastic decline in the region's biodiversity and ecological resources, which are the main sources of their income and the people's mode of survival (Ashton *et al.*, 1999). Also, there is an aspect of the health hazards posed to the inhabitants as a result of oil pollution of the environment, and hence there are environmental challenges as well as socio- economic problems created by adverse effects of oil mining, which has culminated into low agricultural productivity and poor farm yields sufficient enough to threaten the food security of the Niger Delta (Ashton *et al.*, 1999).

The Concept of Sustainable Development

Sustainable development has been defined in many ways, but the most frequently quoted definition is from Our Common Future, proposed by World Commission on Environment and Development also known as the Brundtland Report (1987). This report defines sustainable development as follows: According to Brundtland Commission (1987), "Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs". It contains within it two key concepts: the concept of **needs**, in particular the essential needs of the world's poor, to which overriding priority should be given; and the idea of **limitations** imposed by the state of technology and social organization on the environment's ability to meet present and future needs."

All definitions of sustainable development require that we see the world as a system – a system that connects space; and a system that connects time. Based on the above concepts of sustainable development, the Niger Delta region belongs to the world's poor and therefore needs a special attention in all the three pillars of sustainability so as to achieve environmental sustainability in the region.

Prospect for Achieving Sustainable Development in Niger Delta Region

Sustainable development has been defined by Brundtland's Commission (1987) as shown above; it implies a better quality of life for everyone, now and for

generations to come. It offers a vision of progress that integrates immediate and longer-term needs, local and global needs, and regards social, economic and environmental needs as inseparable and interdependent components of human progress.

The issue of sustainable development in Nigeria is still far fetch, although most of the foundations have been laid by government; for example, the formation of local Agenda 21 committees at the federal and state levels, inauguration of Environmental Action Plan committees at all levels of government, being a signatory to the Kyoto Protocol and other international Treaties involved in environmental management, upgrading an environmental agency (Federal Environmental Protection Agency – FEPA) into a full fledged ministry (Federal Ministry of Environment – FMENV), introduction of poverty eradication programs, and the commitment of the government to investing in environmental management strategies. Nigeria will start reaping the dividends of sustainable development only when the above programs and strategies are fully implemented.

Although the above definition of sustainable development is commendable, but it is not operational, rather it shares at least two things in common with most definitions of sustainable development: (1) they are all anthropocentric; and, (2) they all speak of an ideal process or state. Based on these two observations and on the seminal work of Ackoff and Emery (1972), the best operational definition of sustainability to this day is “a Socio-Ecological Process Characterized by Ideal-Seeking Behavior on the part of its Human component”¹⁶. Sustainable development will not be brought about by policies

only: it must be taken up by society as a principle guiding the many choices each citizen makes every day, as well as the big political and economic decisions that have ramifications for many. Realizing this vision requires profound changes in thinking, in economic and social structures, and in consumption and production patterns.

The interdependencies of the economic, environmental, and social justice elements of our world require new ways of thinking about things and taking action that will truly create a future where human society and nature coexist with mutual benefit, and where the suffering caused by poverty and natural resource abuse is eliminated. Sustainable development calls for improving the quality of life for all of the world’s people without increasing the use of our natural resources beyond the Earth’s carrying capacity. While sustainable development may require different actions in every region of the world, the efforts to build a truly sustainable way of life require the integration of action in three key Areas

Economic growth and equity – Today's interlinked, global economic systems demand an integrated approach in order to foster responsible long-term growth while ensuring that no nation or community is left behind.

Conserving natural resources and the environment – To conserve our environmental heritage and natural resources of Niger Delta for future generations, economically viable solutions must be developed to reduce resource consumption, stop pollution and conserve natural habitats.

Social Development – Throughout the world, people require jobs, food, education, energy, health care, water and sanitation likewise the Niger Delta. While addressing these needs, the world community must also ensure that the rich fabrics of cultural and social diversity, and the rights of workers, are respected, and that all members of society are empowered to play a role in determining their futures (Warren Flint, 2007).

Sustainable development does not focus solely on environmental issues¹⁷. More broadly, sustainable development policies encompass three general policy areas: economic, environmental and social. In support of this, several United Nations texts, most recently the 2005 World Summit Outcome Document, refer to the "interdependent and mutually reinforcing pillars" of sustainable development as economic development, social development, and environmental protection.

Some Indicators of Sustainable Development in a Country

Sustainability is a characteristic of dynamic systems that maintain themselves over time; it is not a fixed endpoint that can be defined. Environmental sustainability refers to the long-term maintenance of valued environmental resources in an evolving human context. The best way to define and measure sustainability in the environmental viewpoint is to focus on natural resource depletion and whether the current rates of resource use can be sustained into the distant future (Goldemberg, 2000).

The issue of sustainable development in the Niger Delta is critical. There has been series of crises in recent time in the region leading to hostage taking of Oil Workers and loss of lives. The cause of the crises was simply due to the negligence of the local communities in this Oil rich region in the business of Oil production. According to ESI (2005), some of the following indicators below are used to assess the environmental sustainability of a country:

A □ □ country is more likely to be environmentally sustainable to the extent that its vital environmental systems are maintained at healthy levels, and to the extent to which levels are improving rather than deteriorating;

A country is more likely to be environmentally sustainable if the levels of anthropogenic stress are low enough to engender no demonstrable harm to its Environmental systems;

A country is more likely to be environmentally sustainable to the extent that people and social systems are not vulnerable to environmental disturbances that affect basic human wellbeing; becoming less vulnerable is a sign that a society is on a track to greater sustainability;

A country is more likely to be environmentally sustainable to the extent that it has in place institutions and underlying social patterns of skills, attitudes, and Networks that foster effective responses to environmental challenges;

A country is more likely to be environmentally sustainable if it cooperates with other countries to manage common environmental problems, and if it reduces negative trans-boundary, environmental impacts on other countries to levels that cause no serious harm.

Causes of Niger Delta's Environmental Problems

There are several factors responsible for the several environmental problems in Niger Delta according to UNDP Nigeria, (2006). These are:

The general inability of the agencies responsible for the environment to enforce laws and regulations, particularly with respect to urban planning and development, prospecting for minerals and adherence to industrial standards, sitting of public buildings and residential quarters in flood-prone areas, unsettled dump sites improperly reclaimed and converted to plots for erection of residential quarters, public buildings and market stalls in ecologically sensitive areas;

- a. Inappropriate agricultural practices, the destruction of watersheds, and the opening up of river banks and other critical areas leading to silting of river beds and loss of water courses;
- b. Uncontrolled logging, accentuated by lack of re-stocking in many parts of the country. This practice carries with it loss of precious biological diversity: nature's raw materials for future development;
- c. Bush burning for farming and ever-increasing depletion of young forests for fuel wood;
- d. Gas flaring and the resultant problems of ecosystem destabilization, heat stress, acid rain and the acid precipitation-induced destruction of fresh water fishes and forests in the coastal areas of the country: global estimates indicate that the flaring of petroleum associated gas in Nigeria alone accounts for 28 per cent of total gas flared in the world;

- e. Mining waste land and mining pits without addressing reclamation as provided for in the Minerals Acts, as in the mine fields of Nasarawa, Jos, Ilesa and Enugu;
- f. Poverty as a cause and consequence of environmental degradation, with the poor scavenging marginal lands to eke out a living;
- g. Dumping of non-natural but trade-related expired and contraband chemicals and Pesticides; and
- h. Uncontrolled use of agro-chemicals and the resultant problems of chemical persistence in the soil in humid areas and soil-crust formation in arid climates leading to destruction of vast agricultural lands.

The above accounts represent the present environmental conditions of the Niger Delta region and that of Nigeria as a whole. The environmental sustainability of the country is therefore imperative. The recommendations of this research which are contained in the last chapter of this study present great opportunity to policy-makers and all stakeholders in the Niger Delta to make informed decisions that can turn the environmental woes of the region and country into environmental sustainability.

Environmental Sustainability and Sustainable Development Issues in the Niger Delta Region of Nigeria

The Nigerian government has packaged some reform strategies aimed at reducing poverty, and ensure the sustainable development of the rural areas with special consideration to the Niger Delta region. These strategies were designed to cushion the effects of poverty, empower the rural populace economically, aimed at making the region environmentally sustainable and then to eradicate extreme poverty. and then provide the necessary amenities for a better livelihood, and develop the rural areas. .

Sustainability Principles Components

Technology The creation, production and delivery of products and services...based on innovative technology and organization that use financial, natural and social resources in an efficient, effective and economic manner over a long-term.

Governance Corporate sustainability...based on the highest standards of corporate governance including management responsibility, organizational capacity, corporate culture and stakeholder relations.

Shareholders Shareholders' demands should be met by sound financial returns, long term economic growth, long-term productivity increases, sharpened global competitiveness and contributions to intellectual capital.

Industry Sustainability companies should lead their industry's shift towards sustainability by demonstrating their commitment and publicizing their superior performance

Society Sustainability companies should encourage lasting social well being by their appropriate and timely responses to rapid social change, evolving demographics, migratory flows. The concept of corporate social responsibility has been placed on the global agenda by leading international organizations. It should be seen as a critical challenge to environmental justice as it compels governments and industries to address the distributional inequities of environmental risks, especially in the natural resource sector of the economy.

Recommendations and Conclusion

The Department of Petroleum Resources (DPR) has also issued a set of Environmental Guidelines and Standards for the Petroleum Industry in Nigeria (1991), which overlap with and in some cases, differ from those issued by FEPA. For the most part, the specific standards set are comparable to those in force in Europe or the U.S.A.

The Federal Ministry of Environment is legally vested with the responsibility of protecting and sustaining the Nigerian environment through formulation and implementation of regulatory frameworks. The National Policy on the Environment (1989) comprises one of the instruments developed by the agency to carry out its tasks. Oil companies operating in Nigeria are required by law to have the following obligations:

1. Adopt all practicable precautions including the provision of up-to-date equipment to prevent pollution, and must take prompt steps to control and, if possible, end it, if pollution does occur;
2. They must maintain all installations in good repair and condition in order to prevent the escape or avoidable waste of petroleum and to cause "as little damage as possible to the surface of the relevant area and to the trees, crops, buildings, structures and other properties thereon."
3. Oil companies are also required to comply with all local planning laws; they may not enter on any area held to be sacred or destroy any thing which is an object of veneration; and

They must allow local inhabitants to have access, at their own risk, to roads constructed in their operating areas.

The Environmental Impact Assessment Act (Decree No. 86 of 1992) requires an environmental impact assessment (EIA) to be carried out “where the extent, nature or location of a proposed project or activity is such that it is likely to significantly affect the environment.”⁵⁹ The public and private sector are required to give “prior consideration” to the environmental effects of any activity before it is embarked upon. An EIA is (EIA Decree of 1992) compulsory in certain cases, including oil and gas fields’ development and construction of oil refineries, some pipelines, and processing and storage facilities. The carrying out of EIAs is supervised by the Federal Environmental Protection Agency (now Federal Ministry of Environment), and by state environmental protection agencies. As with the rest of the regulatory framework governing protection of the environment in Nigeria, there is in practice little enforcement of the requirements to carry out EIAs, either by FEPA or by the DPR’s regulatory arm, the Petroleum Inspectorate, and virtually no quality control over the assessments carried out. In the oil industry, overlapping mandates and jurisdiction between FEPA and the DPR frequently contribute to counterproductive competition.” To ensure environmental sustainability of the Niger Delta region, and Nigeria as whole, government should as a matter of urgency increase its budgetary allocations to the environmental sector of the economy. The funds should be invested in capacity building, trainings and acquisition of laboratory equipments for the Environmental Ministries and Agencies in the country. The government should also ensure strict compliance to the environmental laws of Nigeria by the oil companies and allied companies operating in the country.

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