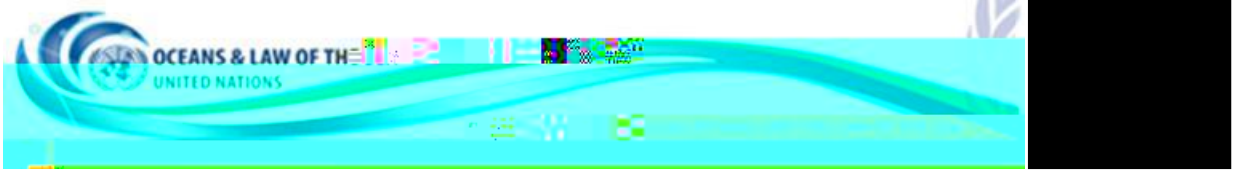
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Disclaimer

The views expressed herein are those of the author and do not necessarily reflect the views of the United Nations, The Nippon Foundation of Japan, or World Maritime University, Malmo

DOALOS Division of the Ocean Affairs and the Law of the Sea

GDP- Gross Domestic Product

GIS- Geography Information System

GIWACAF- The Global Initiative for West and Central Africa

IMO- International Maritime Organization

IOPC- International Oil Pollution Compensation

ITOPF- International Tanker Owners Pollution Federation Limited

JOA- Joint Operating Agreements

MARPOL- International Convention for the Prevention of Pollution from Ships

MERG- Marine Environment Research Group

MEM- Marine Environment Management

MNOC- Member of National Oil Companies

NGO- Non Governmental Organization

NIMASA- Nigerian Maritime Administration and Safety Agency

NOC- National Oil Companies

OPRC- The International Convention on Oil Pollution Preparedness, Response and Co-operation

OPRC-HNS- The International Convention on Oil Pollution Preparedness, Response and Co-operation relating to Hazardous and Noxious Substances

OPEC- Organization of Petroleum Exporting Countries

SAR- Synthetic Aperture Radar

SPDC- Shell Petroleum Development Company

STCW- International Convention on Standards of Training, Certification and Watch keeping for Seafarers

- United Nations

UNCLOS- The United Nations Convention on the Law of the Sea

UNCTAD- United Nations Conference on Trade and Development

WHO- World Health Organization

WMU- World Maritime University

OIL SPILL INCIDENTS,

FIGURE

Page

note that as of 2005 there had

Delta area contains rivers, creeks, estuaries and approximately 8600km^2 is covered by stagnant swamp with 1900km^2 of mangrove swamps spanning a large percentage of the area.

The region consists of various ecosystems of fresh water swamps, the mangrove swamps and rain forest that is reputed to have the largest wetlands in the whole of Africa and also rated among the ten most significant marine ecosystems in the world.[9] The area is specifically noted as a tropical rainforest with ecosystems known as diverse species of flora and fauna both referred to as aquatic and terrestrial species. Also, the region can be classified for further understanding into four distinct ecological zones such as coastal inland zone, freshwater zone, lowland rainforest zone and mangrove swamp zone.

Nigerian Coastal Areas

Nigeria is known to have a coastline of 853Km from Lagos in the west to Calabar in the east facing the Atlantic Ocean.[10]

8 composed of four distinct geomorphology units known as the Barrier-Lagoon Complex; the Mud Coast, the Arcuate Niger Delta and the Strand Coast which is characterised by the rain forests, mangrove forests and the brackish swamp forests.[11]

The Hydrology and

The hydrology of Nigeria is noted to have two river systems such as the Niger-Benue and the Chad river system and they are clearly divided by a primary breaking point stretching north-east and north-west from the Bauchi Plateau which is regarded as the primary source of their maineh 0 1 101.

April to November) and the dry season from (December to March) and because of its proximity to the equator most especially in the Niger Delta cloud cover is very pronounced with some parts of the delta under permanent cloud cover all through the year.[15]

The Nigerian coastal area climatic condition experiences high temperatures and humidity with a corresponding wet and dry seasons that are moderated by the cloud cover and damp air. Also, the annual rainfall of coastal areas ranges between 1,500mm and 4000mm and its lowest monthly temperature of (25 C) are always recorded during the months of June to September while the highest temperatures which ranges between (27-28 C) are recorded during the period of February and March.[16]

Geo-Characteristics

The Geo

part of which is within the Niger Delta region and found largely in places like Rivers, Delta, Cross River, Akwa lbom, Lagos and Ondo states, is assessed to cover areas between approximately 500,000 and 885,000 hectares and it is also worthy to point out that freshwaters in the area is from the northern limit of the mangrove ecosystems and stretched further to the Sahelian region[19]. The surrounding vegetation around the lagoon is largely mangrove, herbaceous and shrub plants dotted by raffia palm, Raffia sudanica, oil palm, Elaeis guineensis and few coconut palms Cocos nucifera. Palms and coconut trees dominate the beach ridges of the Badagry-Lagos-Lekki barrier lagoon complex. Mangroves dominate the vegetation of the Mahin Mud Beach. The white mangroves are found in Awoye and Molume areas. The Figure 3 below shows the structure of the vegetation of the Southern part of Nigeria, which includes the Morphological features and Sedimentary Environment.

Figure 3: Morphological Features and Sedimentary Environment of Southern Nigeria (Ngoran, 2011)

waterlogged place. Ferns, Nipa palm and herbs are found in areas where their salt content is not too high.

Oil and gas industry operations began business in Nigeria effectively dating back to 1956, with the firTfg82(t)788 593.2 0 63eneial

ulil

contributed immensely to a low production capacity of around 214,000 bbl/d.[21] There are Plans for several small, independently owned refineries are also being developed, with the Nigerian government planning for more refineries to come on-stream in the nearest future.

The Marine Policy Instruments such as the UNCLOS, IMO, MARPOL and OPRC are worthy of note and very important to discuss because they exist to minimize damage to the natural resources, ensure equitable access to valuable resources, monitor appropriately the use of the resources and also perfectly describe the usefulness of the various legal and policy approaches to the marine management. The International Convention for the Safety of life at Sea (SOLAS 1974) and the International Convention for the Prevention of Pollution from Ships (MARPOL) (Annex I –for oil) are unarguably the most important convention dealing with shipping safety and pollution from ships respectively. Also, the International Oil Pollution Compensation Funds 1971 and 1992 (IOPC Funds) are basically the two intergovernmental organizations that provide the needed compensation for oil pollution damage as result of spills emanating from persistent oil working within the framework of two international Conventions namely, the Civil Liability Conventions 1969 and 1992.[22] Nigeria is member of the IOPC Funds. The policy instruments in summary tend to rectify inefficiencies in consumption and also help to establish and improve governance mechanisms that significantly contribute to the sustenance of economic, cultural and environmental productivity.[23]Also, because of the uniqueness and function of the oceans, their management is entirely different from the terrestrial environments. The policy instruments are mostly classified as regulatory which is the legal framework, economic, referred to as market-based or informational.

The objectives of the regulatory instruments are diverse and it can be referred to the key process by which activities are administered, regulation as a legal construct promotes legislated obligations that

[21] P. C. Nwilo & O. T. Badejo, Impacts and Management of Oil Spill Pollution Along the Nigerian Coastal Areas. In Administering Marine Spaces: International issues. A Publication of FIG Commission 4 and 7 Group 4.3. International Federation of Surveyors. FIG Publication No. 36 pp 119-133. Ed(s) Sutherland et al (2006)

[22] N. Bellefontaine & O. Linden (eds.), Oil Spill Risk Management. Proceedings from the WMU-IMO Conference on Oil Spill Risk Management 7-9 March 2011 (Malmo, Sweden, 2011)

[23] M. Zacharias, Marine Policy: An Introduction to Governance and International Law of the Oceans Routledge (2 Park Square, Milton Park, Abingdon, Oxon, 2014)

The treaty was negotiated in the 1970s and was heavily swayed by the "New International Economic Order," a set of economic principles first formally promoted at the United Nations Conference on Trade and Development (UNCTAD). That agenda called for "fairer" terms of trade and development financing for the professed

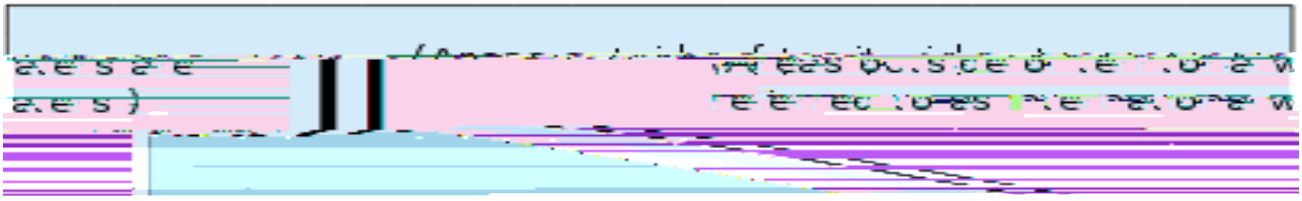

Figure 4 Diagram of the various regions of the ocean over which a State may exercise sovereignty. (Hollis 2013)

UNCLOS requires parties to the treaty to adopt regulations and laws to control pollution of the marine environment. Although it is noted that UNCLOS is not an environmental treaty, it frequently tackles environmental issues and also have a whole section committed to the protection and preservation of the marine environment which is the (Part XII), the treaty also contains numerous

references to environmental duties and obligations throughout its many articles.[27]

Also, Section 1 of Part XII of UNCLOS states clearly some of the environmental provisions laid out in the treaty. Part XII opens with Article 192: "States have an obligation to protect and preserve the marine environment." This is followed by Article 193: "States have the sovereign right to exploit their natural resources pursuant to their environme Nations are then consequently empowered with creating national law to tackle various pollution issues and are supposed to employ "the best practicable means at their disposal and in accordance with their 204

en the capacity for national and regional action to prevent, control, combat and mitigate marine pollution and to promote technical cooperation to this end.[30]

IMO is noted to have six main bodies that deal with the adoption and implementation of appropriate conventions. The Assembly and Council which are the main organs, and the committees involved are the Maritime Safety Committee, Marine Environment Protection Committee, Legal Committee and the Facilitation Committee. Also noteworthy is that key developments in shipping and other associated industries and organizations are extensively deliberated upon by Member States in these bodies, and the need for a new convention or an amendments to existing conventions can be discussed. The majority of conventions adopted under the auspices of IMO can be divided into three main categories. The first group is the maritime safety; the second group deals with the prevention of marine pollution; and the third group deals with liability and compensation, specifically damage caused by pollution. Also, apart from these major groupings there are a number of other conventions focusing on areas like facilitation, tonnage measurement, unlawful acts against shipping and salvage.

referred to as the main international convention that deals with the prevention of pollution of the marine environment by ships from operational or accidental causes.[32]

It is noted that the MARPOL Convention was adopted on 2 November 1973 at IMO and also worthy of note is that the Protocol of 1978 was adopted in response to a spate of tanker accidents in 1976-1977. As the 1973 MARPOL Convention had not yet entered into force, the 1978 MARPOL Protocol absorbed the parent Convention. The combined instrument entered into force on 2 October 1983. In 1997, a Protocol was adopted to amend the Convention and a new Annex VI was added which entered into force on 19 May 2005. Also, MARPOL has behas93(a)7(nd)-103(a)7( )-103(n)-20(e)7

OPRC

The International Convention on Oil Pollution Preparedness, Response and Co-operation OPRC (1990) was formally adopted in the 1990 and entered into force in 2005. It was achieved following

o Marine Environment

Protection Committee (MEPC) to develop for necessary consideration an international cooperation for combating major oil pollution incidents, taking into cognizance the experience garnered from within the existing regional arrangements handling the matters. A Protocol to the OPRC relating to hazardous and noxious substances (OPRC-HNS Protocol) was adopted in 2000.[34]

The OPRC Convention basically entails Contracting Parties to set up a national system for responding promptly and effectively to oil pollution incidents and, as appropriate, to establish a minimum level of pre-positioned oil spill response equipment which is proportionate with the risk that is involved. The task is usually done in collaboration with the appropriate oil and shipping industries and other relevant parties that is involved.[35] It is noted that with the ratification of the OPRC 1990, a state commits itself to establishing a national system for responding timely to and effectively to oil pollution incidents that include a basic minimum, national contingency plan; designated national authorities the key focal points responsible for oil pollution preparedness and response; oil pollution reporting procedures and arrangements for handling requests for assistance.[36]

BACKGROUND INFORMATION

The thesis discusses the devastating impacts of oil spillage on the marine and coastal environment in Nigeria. The Niger Delta region of Nigeria was made the case study to show clearly how the

[34] International Maritime Organization OPRC Convention International Convention on Oil Pollution Preparedness, Response and Co-operation, 1990. IMO Publication London 1991. P. iii

[35] International Maritime Organization Manual on Oil Spill Risk Evaluation and Assessment of Response Preparedness. IMO Publication London 2010. P. vii

[36] The International Tanker Owners Pollution Federation Limited 2014/15 ITOPF Handbook London 2014/15

decades ago and it had become the backbon

But since the oil discovery, the country and the region had suffered negative environmental consequences of oil development occasioned by the growth of the industry, combined with an astronomical rise in the population and lack of strict, effective and enforceable environmental regulations. The resultant effect of the ugly trend is the

the Niger Delta region.

PURPOSE AND OBJECTIVES

monitoring action plans in the Baltic Sea countries to improve on the present scenario and chart a new course for the development of an ocean based economy in Nigeria.

PART ONE

OIL

INTRODUCTION

Saturated hydrocarbons are consists basically of alkanes that are known as compounds of hydrogen and carbon with the maximum number of hydrogen atoms around each of the carbon. They are noted to contain single carbon-carbon bonds that dominate the make up of most crude oils. The crude oils contain low concentrations of polycyclic alkanes that are referred to as chemical biomarkers.[46] Also, the saturated hydrocarbons are known to be less toxic than the aromatics and are the compounds in oil that are most readily removed from the marine environment by the process of microbial biodegradation.[47] The larger saturated compounds are known as the waxes that have higher pour points than other hydrocarbons and as result of that oil with very high wax content forms gels on the surface of water even in the tropical regions.

Aromatic hydrocarbons

addition, they have a substantial result on the behaviour of oil because they contain very large molecules.[49]

PHYSICAL PROPERTIES OF OIL

within a range of stated temperature. It is clearly noted that in the tropical region like Nigeria, the rate of evaporation is always higher than in the temperate regions.

Solubility

The solubility in water is referred, as the measure of how much oil will dissolve in water. At higher concentration, the dissolved oil is very harmful to marine life even when it is known that the amount of oil that is lost to solubility is just a fraction when compared to what is lost to evaporation.

Flash point

The flash point of oil can be referred to as the temperature at which the liquid sheds off sufficient vapour to ignite when exposed to a naked flame. Light oil such as gasoline and some other freshly spilled oils pose serious danger under ambient conditions but when it evaporates, it poses a lesser threat.[52] In Nigeria where light crude form of oil is being exploited, the oil reaches its flash point easily because of the weather conditions and that had actually contributed adversely to degradation of the Niger Delta region of the country. Bunker C and other heavy crude oils on the other hand are not as combustible as the lighter components and that portend a lesser threat when there is a spillage.

Pour point

The pour point of oil can be described as the temperature at which it becomes semi-solid and it depicts a consistent temperature where the oil will pour slowly therefore has limited use as an indicator of the present state of the oil. Also, it is noteworthy to state that pour point had been used in the past to project how oil will behave in the environment in the event of a spillage and that unique characteristic plays crucial role in combating spills and the damage done to the aquatic environment.

[52] J. W. Doerffer, Oil Spill Response in the Marine Environment (Pergamon Press 1992) United Kingdom

SECTION B

BEHAVIOUR AND MOVEMENT OF OIL IN THE ENVIRONMENT

INTRODUCTION

The section critically explains the transformation processes that do occur when oil is released into the marine environment and that practically affects the physical and chemical properties of the oil. It is very important to discuss the processes that occur when oil is spilled into a marine environment because the physical and chemical properties that had been discussed earlier in the thesis tend to be altered and it clearly exhibit some certain characteristics that are principally dependent on the values of some certain specific properties of the identified oils. Also, it is noteworthy to state clearly that

the

Figure 5 Persistent oil (left) versus non-persistent oil (right). ITOPF 2015

Also, when the oil is dispersed into the marine environment, it undergoes changes in its form and component referred to as the weathering. Weathering processes begin to manifest at altered rates immediately oil is spilled and are not usually constant throughout period of the spillage. It is worthy to emphasise that the rates are always at the peak just immediately after the spill has occurred. During weathering the oil is subjected to a wide variety of processes and transformation such as the spreading, evaporation, dispersion, emulsification, dissolution, oxidation, microbial biodegradation, sinking and sedimentation.[56]

[56] Ibid. D. Cormack (1999)

Figure 6 Weathering processes acting on oil at sea. Once oil strands on the shoreline some of these processes will no longer apply. ITOPF 2015

Spreading

Spreading can be referred as the key process that affects the activity of the petroleum products both crude and refined oil during the early hours after oil is spilled into the sea and it is quite dependent on some important factors such as the amount of oil and the rate of discharge because a large sudden discharge will spread rapidly than a small, discharge of oil. The rapid spreading of the oil is also determined by pour point of oil and the water temperature. Also, oil spreads horizontally over the surface even when the winds are not blowing and in the complete absence of the water currents. That

spilled oil cannot be determined but it is known to degrade and some may rise and form slick on the surface of water or becomes sediments and settles at the bottom of the sea.

Dissolution

Dissolution is a process in which the rate and the level oil dissolves is practically dependent on the composition and the level of spreading and also the rising water temperature and wave action.[61] The resins regarded, as some of the key soluble components of the spilled oil are exceptionally toxic and hazardous to the fish and other aquatic animals. For instance, some parts in the Niger-Delta region of Nigeria with shallow water level experience frequently oil spillage with high concentration of aromatic compounds thereby exterminating a very large percentage of aquatic animals fuelling unrest, militancy, civil disobedience and total destruction of their economic livelihood. The oil

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the thesis.

Biodegradation

Biodegradation process is referred to

Oil moves horizontally when it is dispersed in the complete absence of wind and water currents. The force of gravity and the boundary tension between oil and water triggers the movement of the oil in a certain direction. The oil spill movement is determined basically by the surface current that dominates its movement and the very strong winds.[64] And the speed with which oil moves is basically dependent on the influence on the wind strength and oil thickness. It is very important to know the spill movement directions in order to determine the specific areas that are under grievous threat from the spillage.

Also, to simplify the prediction of oil slick movements, various computer models, which vary in sophistication, had been developed to forecast the path and fate (physical and chemical changes) of the oil. The spill models basically operate in diverse modes, which are the trajectory mode that foretells the trajectory and weathering of oil, the stochastic mode that utilizes the available data to forecast different states of the oil spill which include the direction, behaviour and changes and also the receptor mode.[65] Although, it must be noted that the models does not necessarily forecast accurately the movement of oil and the changes that it undergoes, they can provide an indication of whether an oil is likely to disperse naturally or maybe it would get to the shoreline. The likely outcome of the model process would aid oil spill responders to determine the most effective and operational response methods that can be utilized and whether such methods can be deployed rapidly.[66]

CHAPTER 2

IMPACTS

ENVIRONMENT AND ITS EFFECTS ON ECONOMIC AND SOCIAL ACTIVITIES

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[64] International Maritime Organization Manual on Oil Pollution Contingency Planning Section II IMO Publication (London, 1995)

[65] M. Fingas, The Basics of Oil Spill Cleanup. 2nd edition CRC Press LLC (Boca Raton, Florida U.S.A., 2001)

[66] International Maritime Organization Manual on Oil Pollution Combating Oil Spills Section IV IMO Publication (London, 2005)

wildlife.[70] The marine wildlife ecosystems are noted to be a highly complex environment and natural variations in abundance of species and distribution are a characteristic of the normal way it works. Also, the variations can be huge and complicated to relate to some particular causes and difficult to measure appropriately. Therefore, it is always very difficult and complex to figure out the accurate extent and the likely period of environmental damage triggered by an oil spill and to clearly make distinction of such impacts from changes caused by a variety of factors both natural and man-made. In addition to that is the fact that short-term impacts of oil spillage on the marine environment are clearly spelt out and predictable but serious fears are often raised about the likely long-term impacts. And it is noted from comprehensive and detailed research that marine ecosystem are highly resistant to short-term unfavourable alterations in the environment, which implies that a major oil spillage would hardly lead to a permanent results.[71]

It is pertinent to state that the severity of impacts of the spillage on any particular environment is clearly dependent on some key factors such as the quantity of oil that is spilled, eco toxicological effects, physical and chemical characteristics (type of oil), local conditions (temperature and wind), geographical location in regards to the nature and mixing of sediments, presence of resources in the path of the oil spill, season (time of the year), sensitivity of the affected marine organisms and their habitats, structure and geomorphology of the coast. Also, noteworthy is the fact when an oil is spilled on water, it spreads instantly with the evaporation of the gaseous and liquid components of it. Parts of the oil is dissolved in water, leaving some of the oil to be oxidised with certain percentage undergoing bacterial changes which eventually go down to the bottom of the sea by gravitational action. And that practically leaves the soil contaminated with an adverse effect on the terrestrial animals. The key point to be noted is that as aerial life is adversely affected by the evaporation of the volatile lower molecular weight components so also the is aquatic life affected by the dissolution of the less volatile components with the resulting emulsified water.[72]

The chapter explains the disastrous impacts of arine and coastal resources with particular emphasis on the Niger Delta region. The implications on social and

[70] A. D. Morgan et al, International Oil Spill Conference Global Oil Spills and Oiled Wildlife Response Effort: Implications for Oil Spill Contingency Planning Pendoley Environmental, Unit 2/1 Aldous Place, Booragoon, (Australia, 2014)

[71] B. Dicks The Environmental Impact of Marine Oil Spills- Effects, Recovery and Compensation Paper presented at the International Seminar on Tanker Safety, Pollution Prevention, Spill Response and Compensation Rio de Janeiro, Brazil, 1998)

[72] E. A. Akpofure et al, The Adverse Effects of Crude Oil Spills in the Niger Delta. Urhobo Historical Society (2000)

of the sheltered tropical and sub-tropical waters of the region and they stand as resourceful shelter for crabs, oysters and other invertebrates as well as providing a nursery areas for other the aquatic animals. The root structure of the mangrove, which are noted to be intricate ensnares and maintains sediments, therefore reducing erosion of the coastlines and bringing to minimum the deposition of terrestrial sediments on the adjacent sea grass beds and coral reefs.[75]

Figure 8 Polluted Mangrove Forest in the Niger Delta

The mangrove communities are very complicated and effects of the oil spillage on the plants and animals related to it differ completely because animals affected by the spillage tend to recover more rapidly than the mangroves with the longer term effects causing loss of habitat that serve as shield for the community. Observed changes such as increased defoliation, perforations, spots, yellowing, twisting and necrosis are clear symptoms have been noted to occur during the first three months of the spill and it must be noted that the demise of the seedlings and young trees do occur during the first year of the spillage. The ugly scenario alters completely the structure of the forest thereby compromising the ability of the forest to recover naturally because mangrove trees are slow-growing and the natural recovery rate following the damage cause by the spillage range from three to several

[75]Effects of Oil Pollution on the Marine Environment Technical Information Paper The International Tanker Owners Pollution Federation Limited London United Kingdom.

decades.[76] There is no doubt that the oil spillage to the marine

Mixed Forest	162,916	192,436	18.12

Source: (Twumasi and Merem, 2006) cited by (Kadafa, 2012)

Impacts of Oil Spillage on Marine Life

The achievement of self-sufficiency in fish production through the provision of appropriate infrastructure and creating enabling environment such as the development and modernization of the means of production, processing, storage, and marketing of fish and shell fish monitoring, control

resource conservation in partnership with relevant research institutes and Law enforcement agencies to enhance fish production had always been the target in Nigeria but the eco toxicological effects and destructive impact from the oil spillage on the environment had led to the death of plants and animals in the estuarine zone. For instance, through sedimentation and faecal pellet deposition, some fraction of the oil spills ultimately find its way at the sea floor, thereby affecting the benthic systems. The benthic sedimentary environments are described as soft bottoms without large topographic diversity that cover more than 70% of the surface of the earth and they are regarded as an important key in the global interactions between habitats.[85]

It must be emphasized that when the oil spills enter the environment, its impact is severally detrimental and its effects to the aquatic environments is very destructive. The sea that is regarded as a complex physico-chemical and biological system with substantial capacity to integrate a wide range of inputs that plays a key role in maintaining the marine ecosystem in a sustainable way.[86] The sea consists of a wide variety of ecosystems, species and habitats, which according to the impacts of the oil spillage can be classified into fish, plankton, benthic invertebrates, epontic organisms, marine mammals, intertidal and shoreline organisms, marine plants, and special ecosystems.[87] In terms of the organisms, they differ in their sensitivity to oil and forecasting the environmental impact of specific releases of a quantity of oil needs much site specific information about the nature of the receiving body and the key factor to b0912 0 612BT/F3 nBT7( )] TJ0 61212 0 612y0 GLp[(ra)6(nge)7()7(he)7(

vulnerability of the organisms due to the environmental processes acting on the discharged oil.[88]

Figure 10 Some polluted fishes washed onshore the Niger Delta area (http://tunza.ecogeneration.org/ambassadorReportView.jsp?viewID=13434)

In Nigeria most especially the Niger Delta region bordered by a deep belt of mangrove forests that secures large areas of freshwater swampland, the inhabitants of those areas are widely known to be predominantly farmers and fishermen depending largely on the fertile alluvial farm lands and abundant surface water that symbolizes the basin and it is a widely known factor that the mangrove forests act as a breeding ground for the marine life because the trees and roots serve as rich habitats for a wide variety of flora and fauna. T

are regarded as breeding grounds for marine organisms which most people in the area depend upon

[88] A. A. Kadafa, Environmental Impacts of Oil Exploration and Exploitation in the Niger Delta of Nigeria. Global Journal of Science Frontier Research Environment and Earth Sciences Vol.12 Issue 3 Version 1.0. Global Journals Inc. (U.S.A. 2012) (Accessed 29 September 2015)

for survival and a veritable means of livelihood.[89] Those key factors clear show some of the inter connectivity and relationship between the mangrove forest and aquatic anim

contamination characterised with operations of the oil companies. The activities of oil companies for several decades have had some negative impacts on the region and that had led to the degradation of

SECTION B

EFFECTS OF OIL POLLUTION ON SOCIAL AND ECONOMIC

of oil to the environment that had triggered a lot of complicated issues like worsening crisis of poverty, unemployment and public health challenges in the area for a very long time.[93]

It is pertinent to state that women and children residing in those communities are unarguably the worst hit, because mangrove aquatic animals such as handpicking of periwinkle (*Tympanotonus* spp and *Pachymenalia* spp) are mostly occupation and business of the womenfolk in the Niger Delta region of Nigeria. Please see the Figure 13 and 14 below. On the average, fish constitutes 40% of the animal protein intake in Nigeria. The percentage of fish consumption is generally higher for residents of the Niger Delta region. A regression in fish availability and production would definitely have a consequential effect on the nutritional status of the people, especially children who require adequate fish intake for their growth and development.[94] Also, n

Figure 13 An Ogoni woman in the Niger Delta selling periwinkles at a local market, Kozo, Gokana Rivers State Nigeria (UNEP 2011)

Figure 14 local fishermen with his catch (note the sheen in the water, Bonny River) Rivers State Nigeria. (UNEP 2011)

The loss of mangrove forests is also observed not only to be degrading and destructive for the life of plants and animals, but for humans as well and these systems are h(nt)q7dl12 792 reW*nBT/F4 10 Tf1 0 0 1 1

place of shelter and refuge for valuable and endangered species like the manatee and pygmy hippopotamus. However, poor policy and strategic decisions regarding the allocation of and proper utilization of oil revenue had caused political unrest and upheaval in the Niger Delta region of the country resulting in grievous clash amongst the governing bodies, oil corporations, and the people of Nigeria and that had led to sabotage of oil pipelines causing serious spillage to the environment, further exacerbating the threat to mangrove forests.[96]

Also, it was noted in a practical and analytical study of the socio-economic impact of oil pollution, on the Nigerian ecosystem that crude oil exploitations, production and transportation have had adverse and devastating environmental effect on soils, forests and water bodies on most oil-endowed communities in the Niger Delta. Farmers have lost their lands; fishermen have nothing sustainable to depend on and as a result of that are forced to relocate to other communities in search of economic livelihood and sustenance thereby exerting additional and grievous pressures on natural resources in those areas. It is worthy to state clearly that, the destructive consequences of oil spill in the Niger Delta region with its attendant hazards and negative effects on both the aerial and terrestrial environment is equivalent to an irreversible chain effect on both the bio-diversity and safety in populated areas and that adversely affect crops and agriculture through contamination of the ground water and soils and also the contamination and death of aquatic animals thus leading to downward trend in the economic activities and negatively affect the health of the inhabitants of the affected communities.[97]

In summary, the gruelling and difficult geographical terrain of the Niger Delta region of Nigeria have contributed significantly to the cost of infrastructure and that had actually made the development in the area to nothing but a mere pipe dream. Some of the highlights of the environmental and socio-economic effects of oil exploitation, production and transportation in the area are noted below to give a clearer understanding of oil impacts on the environment.

- ¶ Difficult geographical terrain in the area that increases cost of infrastructure and
- ¶ Abject poverty and destruction of the economic and sustainable livelihood in the area

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[96] S. O. Adelana et al, Environmental Pollution and Remediation: Challenges and Management of Oil Spillage in the Nigerian Coastal Areas. American Journal of Scientific Research < http://www.scihub.org/AJSIR > (2011) (Accessed 3 October 2015)

[97] O. M. Ajide and O. O. Isaac, An Assessment of the Physical Impact of Oil Spillage Using GIS and Remote Sensing Technologies: Empirical Evidence from Jesse Town, Delta State Nigeria. British Journal of Arts and Social Sciences ISSN: 2046-9578,Vol.12 No. II. British Journal Publishing, Inc. <http://www.bjournal.co.uk/BJASS.aspx> (2013)

¶ Deforestation and ecological degradation

Also, it is noteworthy that some of the environmental and social effects of oil exploitation that have been identified in the Niger Delta region of Nigeria are the main reasons that the region had been set back in terms of having access to basic quality of life that is of required standard anywhere in the world. Some of the environmental and social effects are listed below.

- Contamination of streams and rivers
- Oil spillage causing destruction of the mangrove, aquatic lives, farmlands, etc)
- Loss of biodiversity
- Environmental effects of gas flaring with devastating impacts on the inhabitants and
- Youth restiveness, militancy, civil disturbance and hostage taking
- Effluent discharge and disposal
- Gross socio-economic underdevelopment
- Conflict between host communities and oil companies

There is no doubt that undisputed facts noted above are clearly connected with acute poverty, deprivation, hunger and destruction of the sustainable and economic livelihood of the inhabitants of the Niger Delta region of Nigeria which hitherto had continued unabated for over several decades without an end in sight to the despicable and deplorable activities by the oil companies. Therefore, a research of this nature is needed to ascertain the effects of oil spillage on community development and eradication of extreme poverty and hunger in the Niger Delta Region.

AN INTEGRATED APPROACH TO GOVERNANCE- THE QUEST FOR A SUSTAINABLE OCEAN-BASED ECONOMY (BLUE ECONOMY) IN NIGERIA

The undisputed fact is that living with the ocean and from the ocean in prosperity and sustainability is a multi-dimensional and interdependent responsibility, which, all stakeholders involved, should contribute immensely and passionately to make the oceans cleaner and safer. Unfortunately, however, the human destructive and devastating impact on the ocean, the utilization and exploitation of the available resources had been horrifying and despicable due to the fact humans in general had taken for granted the sustainability of the ocean. And it is pertinent to state clearly that despite the several decades of practicable attempts and aspirations to develop an adequate and comprehensive

with effects of pollution from different sources such as land-based and seaborne which, contributes adversely to the destruction of coral reefs, mangroves and wetlands; loss of habitat, deforestation and alterations in hydrology, turbidity and sedimentation.[98]

The Blue Economy concept is simply regarded as where the environmental risks of, and ecological damage from, economic activity are mitigated or significantly reduced and when the core economic activity is clearly in balance with the long-term capacity of ocean ecosystems to support the activity and remain strong and healthy.[99]

The contribution of fishery and other aquatic activities to national economies is multifaceted and cannot be under estimated. In addition to supplying food, capture and aquaculture production contributes to gross domestic product (GDP), provides livelihoods for fishers and processors in the Niger Delta areas

with Egypt (580 000) having more people employed in the sector than all the other countries of Africa combined, followed by Nigeria (135 000) and Uganda (53 000). In addition to this direct

boat building and repair, provisioning vessels, fish marketing, administration and research.

In addition to the estimated value added of US$24 billion, in 2011 African countries also received US$0.4 billion under fisheries agreements with foreign nations fishing in their exclusive economic

ervative estimate by FAO. This figure was calculated using publicly available information on the agreements with countries in the European Union (Member Organization) and extrapolated values for other countries. Considering that 25 percent of all marine catches around Africa are still by non-African countries, the value added to national economies could be much higher than US$0.4 billion if African fleets also accounted for this portion of catches.

PART TWO

OIL SPILL INCIDENTS, ASSESSMENT, RESPONSE PLANNING AND GOVERNANCE IN NIGERIA (POLICIES AND STRATEGIES)

CHAPTER 1

OIL SPILL INCIDENTS, ASSESSMENT AND RESPONSE PLANNING

SECTION A

INTRODUCTION

The Chapter critically explains the oil spillage that is clearly regarded as one of the most widespread in the marine environment, its assessment and the response planning operations in Nigeria. Oil and its different extracts frequently find its way into the natural environment for obviously diverse reasons. And it is noteworthy that on the average according to GESAMP, 1 250 000 tons of oil are released into the marine environment from sea-based sources based on the estimate calculation from years 1988 1997.

Oil spills have occurred continually in the Niger Delta for over five decades and large parts of the land and wetlands are constantly affected by the spillage. Due to the influence of the tides and at times floods in connection with rains, spilt oil is rapidly dispersed over large areas and remobilized with rising tides.[100] Oil spillage no doubt has become of increased relevance and importance in recent times because of the extent with which it happens, the effects it has on the environment, and the quality of life of people residing in the affected areas. It is pertinent to state that the World Health Organization (WHO) has drawn the attention of many member states and countries to the acute burden of non-communicable diseases on the limited resources available to health. Much emphasis has been placed on environmental factors influencing the health of populations. Oil spillage affects both living and non-living components of the environment that in turn affect man directly and indirectly.

Al and politics, it is noteworthy that the country had not been able to develop a coherent and constructive policy framework for the management of oil resources and their consequences, the distribution of the accruing revenues or for engaging with the increasingly restive oil- bearing communities of the Niger Delta. Most oil-related legislation and policies in Nigeria tend to promote the rent-seeking interest of the state and the corporate or profit maximization interest of petro-business for the most part at the expense of the concerns of the local

[100] Palsson J. and Linden O. (2014) Oil Contamination in the Niger Delta International Oil Spill Conference Savannah Georgia U.S.A. May 2014

Pollution by land-based sources and as a consequence the destruction of habitats, over-exploitation of marine living resource, coastal degradation, water borne diseases, the introduction of exotic species and maritime pollution caused by the transportation of hazardous substances endanger the ecosystem of the Gulf of Guinea. In regions such as the Gulf of Guinea there is an urgent need to determine areas of high concern.

SPILL ASSESSMENT

The Spill assessment basically explains the actions needed to categorize and assess the size of the spill and to determine its movement and location. Also, assessment of the oil spills aid in the precise identification of potentially sensitive areas impacted by the devastation of the spillage.[104] The oil spill

planner to identify how individual elements of capability will be cascaded into the theatre of response operations.

supplemented by outside organizations. A Tier 3 spill response may continue for many weeks or months. [114]

CHAPTER 2

OIL SPILL GOVERNANCE IN NIGERIA (POLICIES AND STRATEGIES)

SECTION A

INTRODUCTION

[114] Guidelines for Offshore Oil Spill Response Plans: Guidance for Offshore Oil and Gas Exploration, Production and Pipeline Facility Operators. API Technical Report 1145. September 2013. (Accessed 7 September 2015)

Oil spill governance in Nigeria clearly refers to the system for making and implementing clear-cut decisions regarding the management of spill incidents in the country in order to safeguard the environment from the devastating effects of the oil pollution.

There is no doubt that effective and full clean-up of oil spillage, remains an intractable problem and a debilitating crisis in Nigeria and throughout the world at large. In responding to oil spills, different technical methods and approach have actually been characterised by some levels of successes and challenges, which are obviously dependent on the size of the spills, and the prevailing weather condition.

An effective response to a spill of oil is clearly dependent to a great extent on the preparedness of the organizations and individuals involved. This can be greatly improved by developing and maintaining a plan to address all likely contingencies. It must be noted that the process of producing a contingency plan provides a clear-cut opportunity to identify roles and responsibilities and to define response strategies and operational procedures without the intense pressures that unavoidably arise at the time of a spill. The International Convention on Oil Pollution Preparedness, Response and Co-operation 1990 (OPRC Convention) recognizes the importance of contingency planning and prompts contracting states to develop an integrated national framework of oil spill response plans extending from individual facilities handling hydrocarbons to a major incident on a national or international scale. These arrangements are intended to provide an ability to escalate a response to an incident through a series of interlocking and compatible plans. [115]

During emergency response operations, available information may be highly uncertain and

different degrees of resource protection will be selected accordingly. Decisions regarding cleanup method(s) must balance two factors: 1) the potential environmental impacts with the no-action alternative, and 2) the potential environmental impacts associated with a response method or group of methods.

Potential impacts can be determined before considering the need for, or type of, response strategies. For example, evaluating a gasoline spill in an exposed seawall environment might lead to the conclusion that, due to evaporation and low habitat use, minimal environmental effects will occur and further evaluation is unwarranted. On the other hand, assessing a spill of a middle-weight crude oil in a soft intertidal area would likely indicate a high potential for environmental effects; therefore, response methods would need to be evaluated.

MANAGEMENT OF OIL SPILL AND ITS RESPONSE POLICIES IN NIGERIA

In Nigeria, quite a number of laws and policies have been utilized in managing oil spill incidents, which some of it is well known to combat effectively oil spillage at the international levels.

The Ministry of Environment in Nigeria is legally and constitutionally empowered with the responsibility of protecting and sustaining the Nigerian environment. The Environment Impact Assessment Decree (1992) controls activities that have environmental impact. In 2002, the Nigerian Government has issued the Environmental Guidelines and Standards for the Oil Industry and has ordered the oil companies operating in the country to comply with it. The authority that is responsible for the oil spill clean up is the National Oil Spill Detection and Response Agency (NOSDRA) that has been created in 2006. The Ministry of Environment is responsible for oil spill

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change in combating oil pollution issues in Nigeria.[116]

SECTION B

POLICIES AND STRATEGIES

Petroleum Related Laws and Regulations

It is worthy to mention that part of the means of managing the environment is to have in place the necessary laws, regulations and guidelines. According to the Federal Government of Nigeria, the followiul

environment. The under listed can be beneficial to tackling oil pollution issues in Nigeria [118]:

- ¶ Developing a national system for responding promptly and effectively to pollution incidents (oil and hazardous and noxious substances).
- ¶ Designating a national authority to be responsible for preparedness and response, and to act as a focal point for requesting and rendering assistance.
- ¶ Developing a national oil spill contingency plan and ensuring operators have contingency plans that are coordinated with the national response system.
- ¶ Establishing a minimum level of pre-positioned response equipment commensurate with risk.
- ¶ Developing a programme of exercises and training.
- ¶ Facilitating international cooperation and mutual assistance by establishing, either individually or through bilateral or multilateral cooperation, mechanisms for coordinating response operations.

CONCLUSION AND RECOMMENDATIONS

There is no doubt that the Niger Delta area remains one of the poorest and most devastated places on the planet earth. Oil exploration and production activities commenced in the Niger Delta area of Nigeria without a comprehensive policy, strategic plan, which would have protected its natural resources from the harmful impacts of pollution. Many of the oil facilities and operations are located within sensitive habitats - including areas vital to fish breeding, sea turtle nesting, mangroves and rainforests; that have often been severely damaged, contributing to increased biodiversity loss and poverty. The damage from oil and gas operations is chronic and cumulative, and has acted alongside other sources of environmental pollutants that

mangrove forests and coastal ecosystems depends on collaboration by all stakeholders to introduce adjustments to industrial processes, oil spill prevention, response preparedness; restoration framework and implementation plan. Oil has played a major role in development dynamics of the il wealth has brought more ruin and poverty than blessing to the natural environment.

Also, it must be noted that the activities that come with the oil exploration and exploitation causes alterations to the environment. Which significantly have negative effects; some of the effects that come with petroleum development can bg0 G[()-124(cQq0.0reW*nBT/F3 12 Tf()-1244.025 543.67 Tm06(i)7(g

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