THE ROLE OF INSTITUTIONAL FRAMEWORK IN REDRESSING THE CHALLENGES OF OIL SHALE AND SUSTAINABLE DEVELOPMENT OF ENVIRONMENTAL RESOURCE*

Abstract

The principle of sustainable development is an international environmental law principle that has become apparent in international environmental law scenes, to mitigate environmental pollution activities caused by industries and non-industrial activities. The principle of sustainable development which opines the sustainable utilization of environmental resources for the benefits of our future generation has been metered down by factors which discordant tunes developing countries and the quest for more energy. The quest for more energy has introduced a new phase of industrial activity which is the oil shale exploration. This paper examines the concept and impact of oil shale activities in the environment with a view to suggesting advance technology that are environmentally friendly as the shale industries continue to operate. The paper critically examines the following institutional framework governing best sustainable environmental principle, the Convention on Biological Diversity, the United Nation Framework for Combating Climate Change, the International Convention to Combat Desertification, the European Union Directives, the Environmental Impact Assessment Principle, and the Montreal Protocol on Substances that Deplete Ozone Layer, and thereafter, recommends appropriate pragmatic and preventive policies and measures towards utilizations of sustainable environmental development in African to avoid significant opposition to oil shale operations because of social, fiscal and environmental concerns, governments should also consider fostering the creation of a regionally based organization dedicated to planning, oversight advice, and public participation in oil shale industry.

Keywords: Oil shale, Sustainable development, Environment, Pollution and Natural Resource

1. Introduction

The earth is enriched and beautified with plenty of natural resources, which includes mineral and environmental resources, both providing for the need and sustaining of earth's habitat and also beautifying our environment for recreational activities. These natural resources include air, wind, plants, animals, coal, oil, etc. However, some of these environmental resources are limited, meaning that they will eventually run out because they are non-renewable. Humanity in its restless pursuit of economic growth and development, globalization is changing the face of the earth. Its activities to explore the gifts of nature for the purpose of its sustenance have resulted to variety of change and reduction on the ecosystem. The environment being treated as nothing more than static, inert and passive entity which acts as an infinite storehouse of resources, sinks for waste and backdrop to human affairs, while, the economy is regarded as a dynamic productive system, which continued growth can lead to adequate material standard of living for all. In this case, resource depletion and degradation are treated as temporary manageable problems that can be overcome through improve technology, increase efficiency and better regulation.[1] Human activities ranging from water, land, air and noise pollutions, the resultant effect of oil explorations, industrial activities, improper disposal of waste from both industries and homes, deforestation caused by incessant logging of trees; extinction of various bio diversity, flooding caused by discharge of industrial effluents, and waste in water bodies, depletion of green house plants caused by industrial gaseous emission, health hazards caused by the consumption of these polluted environmental resources, among others.

It is now generally accepted that for many reasons the current patterns of economic development are fundamentally sustainable in the long run. Firstly, they have failed to ameliorate poverty.[2] We have now realized that development that does not take into consideration of the environment in its ramification is self-defeating. However, a lot of concept that places environmental concerns at the centre of development is sustainable human development. Sustainable development has jolted humanity in the realization that economic growth cannot be sustained in the face of environmental degradation. However, amidst the development of these concepts, the search for a suitable, cheaper and accessible resource for consumption and trade is on the increase and has given birth to the growth in interest of oil shale exploration and production. This paper seeks to examine the concept of Sustainable Development of Environmental resource and the Impact of Oil Shale utilization on the environment.

2. The Concept of Sustainable Development

Environmental sustainability is important because it involves natural resources that human being need for economic or manufactured capital. Materials taken from nature are used for situations that address human needs.

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[1] I. A. Ayua, and Olawole Ajayi (ed). Implementing the Bio Diversity Convention; Nigerian and African Perspectives (Lagos, Nigerian Institute of Advanced Legal Studies, 1997, 56

[2] Ibid.

If nature is depleted faster than it can generate, human will be left without raw materials.[3] More often than not, the way and manner in which man subjects the environment to certain activities tend towards the destruction of man himself or the dislocation of the ecosystem. Such negative result while genuinely unintended by man when acting, that is, for the development and economic interest, comes in direct conflict with that environmental sustainability.[4] This environment is very important both to the present as well as the future generations. Any doubt, everything we do has to deal with the environment; as a result, care must be taken to ensure that the resources within the environment are optimally utilized. There cannot be development without the utilization of the available resources within the environment, and consequently, there must be a balance between the development of the resources and attainment of balanced environment.[5]The principle of sustainable development aims at protecting the environment from misuse.

Sustainable development is defined as Development that meets the needs of the present without compromising the ability of future generations to meet their own needs… A process of change in which exploration of resources, the direction of investments, the orientation of technology development, and the institution change are all in harmony and enhance both current and future potential to meet human needs and aspirations[6]. It derives its impetus from the 1992 United Nations Conference on Environment and Development[7], also known as The Rio Conference which was essentially a reenactment of the 1972 United Nations Conference on the Human Environmental Declarations adopted at Stockholm conference. The period between the 1972 Stockholm conference and the Rio conference of 1992 contained a marked departure from conservation industralistic attitude of states which identified the primacy of economic gains and emancipation, to a more liberal appreciation of universe dangers.

3. Challenges to Sustainable Development

The process of sustainable development has been marginalized by means factors which include discordant statements from leaders of developing nations such as that by the then Malaysian prime minister in Rio in 1992

> We know that 25 percent of the world population who are rich generate 85 percent of its waste …the rich will not accept a progressive and meaningful act back in their emission of carbon dioxide and other greenhouse gases because it will be a cost to them and retard their progress. Yet they expect the poor people of the developing countries to shuffle even their minute growth as if it will cost them nothing…..obviously, the north wants us to have a direct say in the management of interest in the poor south at the next to no cost to themselves. The pittance they offer is much less than the loss of earning by the poor countries and yet is made out as generous concession[8]

Leads and Panos highlight that in ten years since Rio sustainable development hasn't been very high on international agenda, it further stated that

> In many countries – rich and poor – this is often because of a perception that sustainability is expensive to implement. Poor countries on their part usually lack the physical infrastructure, ideas and human capacity to integrate sustainability into their development planning. Besides, they are often quite skeptical about the rich countries real commitment to sustainability and demand a more equitable sharing of cost and responsibilities. Many people also believe that environmental problems can wait until developing countries are richer.[9]

Other factors include, over dependence on natural resources by poor nations, abnormal urbanization, population pressure, over exploration of mineral resources, incidence of oil spillage, and increase in demand for other sources of energy, population growth, and vitality of emerging economies and the driving the rise in energy demand on a global scale. The international energy agency is forecasting that demand will increase from 40 to 50% by 2030[10]. Concern about a dependable future for energy is only natural since energy provides essential services for human

[3] Wikipedia sustainable management, http//en.wikipedia.org/wiki (sustainable management) accessed on 24th January, 2020.
[4]SM Adebayo & GA Arowolo, the efficacy of the legal framework of combating climate change in Nigeria, *Journal of Private and Property Law*, Vol. 3, 2014, 228.
[5] Ibid.
[6] Amari Omaka, *The Nigerian Conservative Law* (Lagos, Lions Unique Concept, 2004), 11.
[7]VO Aigbokhavbo, 'International Environmental Law Principles: Sustainable Challenges', *Journal of Private and Property Law, Vol. 3, 2012, 154.*
[8] Ibid. note 3, at 155.
[9] Road to summit, lead international and Paros London, 30th August, 2012. http://www.global.org/article.408. Accessed on 24th January, 2020
[10]Global issue: Social political economic and environmental issues that affect us all. http://total.com/en/energy-production/strategic-sectors/unconventional-gas/state-gas/abundant-sevice/significant-rserves. Accessed on 24th January, 2020

life – heat for warmth, cooking and manufacturing, or power for transport and mechanical work. At present, the energy to provide these services comes from fuels-oil and gas, coal, nuclear, wood and other primary sources – solar, wind or water power.[11] Today, the primary sources of energy are renewable sources which include wood, plants, dung, falling water, geothermal sources, solar, tidal, wind and wave energy as well as human animal muscle power, and mainly non-renewable natural gas, oil, coal, peat and conventional nuclear power, and of great interest presently is oil shale which is the focus of this paper.[12]

4. What is Oil Shale?

The term oil shale generally refers to any sedimentary rock that contains solid bituminous materials (called kerogen) that are released as petroleum like fluids when the rock is heated in the chemical process of pyroysis[13] at about 60-160 degree Celsius, to reach its oil window.The process involves, firstly, mining the rock and then heating the rock to such a high temperature that the oil melts in a process called retorting. The resulting liquid must then be separated and collected.[14] The hydrocarbons in oil shale can be used as an alternative to petroleum or natural gas. While heat is involved in extracting shale oil shale, both heat and hydraulic fracturing (cracking) are used to extract shale gas.

Oil shale are fossil fuels developed from remains of algae, spores, plants, pollen, and a variety of other organism that lived millions of years ago in ancient lakes, seas, and wet lands. When these organisms died and drifted to the sea bed, they were buried under new layer of plants and sediment. They encountered intense pressure and heat, decomposed and slowly transformed into kerogen. Oil shale can be through as a precursor of oil and gas. With more pressure, it will attain the temperature at which it would release crude oil or natural gas. Oil shale is classified according to the hydrogen, carbon and oxygen content determined by its geographical sources. Its deposits are found in all world oil provinces, although most of them are too deep to be exploited economically. Oil shale resources refer to all oil shale deposits, while oil shale reserves are recoverable oil shale.[15] Although resources of oil shale occur in many countries, only 33 countries possess known deposits of possible economic value. Well explored deposits potentially classifiable as reserves, include the green river deposits in the western United States, the tertiary deposits in Queensland, Australia, Sweden and Estonia, the El-lajuin deposit in Jordan, the deposits in France, Germany China and Russia. A 2005 estimate set the total world resources of oil shale at 411 gigatons – equivalent to field of 2.8 to 3 trillion barrels of oil shale though only a part of it is renewable. A 2010 world energy outlook by the International Energy Agency reports that the world oil shale resources may be equivalent of more than 5 trillion barrels of oil in place for which more than 1trillion barrels may be technically recoverable.[16] The largest deposits of the world occur in the United Stated, Estonia is the only country with a large share of shale oil its energy balance.[17]

Humans have used oil shale as a fuel since prehistoric times, since it generally burns without any processing, no wonder it was referred to as the rock that burns.[18] The first UK patent for extracting oil from oil shale was British patent 303 granted to Becker and Serley in 1684. Modern industrial mining of shale oil began in 1837 in Autun France, followed by exploration in Scotland, Germany and other countries[19]. Oil shale production in the 19th century focused on kerosene, lamp oil, and grease were also produced. European oil shale industry expanded immediately after World War 1 due to limited access to conventional petroleum resources. After World War 11, most countries abandoned their oil shale project due to high processing costs and the availability of cheaper petroleum[20]. A remarkable period was 2nd May 1982 also known as Black Sunday, when Exxon cancelled its US 5billion colony shale oil project because of low prices and increased expenses, laying off more than 2,000 workers and leaving a trail of home for closures and small business bank. Global oil shale industry began to reduce at the beginning of the 21st century. With oil shale activities revive in US in 2003, and commercial leasing for extraction of shale in accordance with Energy Policy Act 2005[21] as of 2008. Oil shale derivatives are shale oil, shale gas,

[11]Our common future, chapter 7: Energy Choices for environment and development. http//www.un.document.met/oct-07,html.#11 Accessed on 24th January, 2020

[12] Ibid.

[13] A 2012 Oil Shale and Tar sands pragmatic EIS; about oil shale: http://osteis.gov/guide/oil-shale. Accessed on 24th January, 2020

[14] Sierra Club; Dirty Fields: Oil shale. http://www.sierra-cluborg/dirty-fuels/oil-shale. Accessed on 24th January, 2020

[15] Wikipedia. Oil shale. http://renwikipedia.org/wiki/oil-shale. (Accessed January 28, 2020).

[16] Ibid.

[17] Policy department, economic and scientific policy, impacts of shale gas and oil extraction on the environment and on human health. http://www.eroport.europzi.eu/studies. Accessed on 24th January, 2020

[18] Ibid, note 3

[19] Ibid, note 15

[20] Ibid.

[21] Ibid

electricity, fuel oil, lubricating oil, burning oil, light house, paraffin wax, solvent naphtha, paraffin coke, motor spirits, diesel fuel, agricultural grade ammonium sulphate, sulphuric acid, detergent and from spent shale came bricks, and hard core foundations to road and other building construction material.[22] Oil shale serves as oil and cement production in Estonia, China and Germany; and for use in chemical industries in china, Estonia and Russia. As of 2009, 80% of oil shale used globally is extracted in Estonia, mainly due to oil shale power plants.[23]

5. Shale Processing

The processing of oil shale can be done through in-situ or ex-situ processing. *Ex-situ* processing involves the mining of the oil shale by excavation of the rock above ground surface and transporting the oil shale to a facility for retorting (a heating processing that separates the oil fraction from the rock). After the retorting, the oil is upgraded by further processing before it is sent to the refinery. Ex-situ processing involves the digging of pit and the usage of large amount of water. *In-situ* processing on the other hand involves the heating of oil shale underground, which can access the material at greater depth than surfaced mining[24]. A new in-situ process called in-situ conversation process has been developed by shell. This involves the heating of oil shale and natural gas from kerosene, the free hydrocarbon are then pumped to the surface and refined as fuel. This process involves huge amount of energy to heat the shale and freezing the boundary to prevent the migration of the boundary to prevent migration of the liberated hydrocarbon outside the production zone. This process has not been able to refine oil shale in commercial quantity.[25] These processes are used to produce shale oil and shale gas depending on the degree of the heating. Shale gas can also be produced through the process of hydraulic fracturing most common in oil shale processing in the United States. Hydraulic fracturing is similar to in-situ processing; it also requires enormous amount of water and drilling of holes.

6. Environmental Implication of Oil Shale Utilization

Shale utilization and land use: The most striking impact of oil shale industry is the disruption of land use. Mining processing and waste disposal require land to be withdrawn from traditional use such as agriculture, residential areas or recreation. The original ecosystem diversity with habitats supporting a variety of plants and animals is reduced.[26]

After mining, land can be reclaimed, however, this process takes time and cannot necessarily reestablished the original biodiversity[27] In addition to mining and extraction, retorting of oil shale produce large amount of displaced rocks and spent shale. 1.2–1.5 tons of spent shale result from a barrel of oil produced retorting, [28]and where such spent shale is not re used and disposed of in landfills its chemical component leach into the ground water, rendering the land unproductive and polluting air and equally ground water.[29] *In-situ* retorting seems less disruptive to the landscape, however, the techniques will involve the drilling of a large number of wells. These wells are to be connected to a network of pipelines for transportation. These installations will be in operation for 15 to 25 years, the effect is that it takes up an enormous landscape, and also expose the land to toxic components of oil shale processing through spills, self-ignition and leakages from pipe source. Development of shale gas also involve enormous acres of land because it requires a dense spacing of well. Typical spacing in conventional field in the USA is one well per 640 acres.[30] In Estonia, the mining and processing of oil shale has created about 4360-370 million tons of solid waste. The drilling method required in production of shale gas and oil can induce earthquakes. In Arkansan USA, the rate of small earthquakes has increased over the last years tenfold; concerns rose that these are induced by steep increase in drilling activities.[31] The Fort Worth region of USA has experienced 18 smaller earthquake since December 2008; the city of celbure alone experienced 7 earthquakes between June and July 2009 an area where during 140 years before no earthquake was registered.[32] In April 2011, the city of Black pool in UK experienced a small earthquake and a larger one in June; the company conducting hydraulic fracturing operations in the earthquake area stopped its operation and commissioned an investigation announcing

[22]A study on the E.U. States Industry-viewed in the light of Estonian experience: Accessed on 24th http/www.easac.eu.energy/reports.andstatements. Html accessed (28 January, 2020).
[23] Ibid, at 15
[24] Ibid, at 15
[25] Ibid.
[26] Wikipedia; environmental impact of the oil shale industry: http://en.wikipedia.org/wiki/environmental-impact-of-the-shale-industry. Accessed on 24th January, 2020
[27] Ibid, at note 3
[28] Ibid
[29] Ibid
[30] Ibid, at note 15.
[31] Ibid
[32] Ibid.

that it will close activities if earthquake were in relation to its activities.[33]Shale oil utilization has led to increase in rural-urban migration, thus overburdening environmental resources in the urban areas which can contribute to deforestation for building of house and industries etc.

7. Shale Utilization and Water Management

The primary threat to water quality is generally considered to be leachate from spent shale, water pumped out of mine in the process of processing oil shale. Spent shale composition consists of harmful substances arsenic and selenium[34]. The lowering of water level of oil shale strata affects surrounding arable land and forest. Pollution of water can also occur by discharge of mine water into bodies of surface water due to the need to constantly pump water which seeps into the mine from surface water and ground water and also spills into ground water caused by incorrect handling and explosions. The mining machines and mining by product also contaminate ground that is harmful to aquatic life dwelling in surrounding habitat. A detailed analysis performed in 2008 for Garfeild Country in Colorado maintains a record of report spills from oil and gas activities. In the period of January 2003 to march 2008 a total of 1549 spill is referenced with 20% of the spills involved in water contamination[35]. It also has been observed that the process of restoration of condition of ground water filling the mines diminishes the water mineral content. Quality studies of mine water have shown that within five years of closure of mine, the content of sulphates and iron in water decreases below the maximum permitted level of drinking water[36]. Waste water produced during retorting contains harmful chemical substances that if released in surface water contaminates same. A 2008 pragmatic environment impact statement issued by the United States bureau management stated that surface mining and retort operation produce 2 to 10 US gallons of waste water per ton of processed oil shale.[37]Due to huge quantity of waste water, and improper configuration of sewage plants, waste water disposal is major issue in America. In August 2010 talisman energy was fined in Pennsylvania for a spill on 2009 that sent over 42 gallons of hydraulic fracturing flow back fluid into wet land and Tioga River a cold-water fishery. The result of this disposal is no surprise[38]. Water contaminated by these harmful substances is unusual and expensive to decontaminate.

8. Oil Shale Utilization and Air Pollution/Green House Emission

The Carbon in fossil fuel (i.e. oil shale) has been sequestrated or stored underground for millions of years. By removing this sequestrated carbon from the earth and releasing it into the atmosphere, earth's carbon budget is put out of balance. Burning fossils fuels releases carbon into the atmosphere at a much quicker rate than the tree, water and ground reabsorb it. More carbon retains more heat in earth's atmosphere and contributes to rising temperature-global warming, climate change and acid rain can rise faster than organism can adapt. Retorting of oil shale produces carbon and methane, greenhouse gases. Increasing public concern about adverse consequence of global warming may lead to opposition of oil shale development.[39] The quantity of carbon released during the shale processing is higher than that released in production of traditional petroleum due to amount of energy it requires and the more energy, the higher the carbon produced. The emission from truck and drilling equipment emission from natural gas processing and transportation, evaporative emission from waste water ponds, emission from spills and well blow outs also contributes to the pollution of the atmosphere.[40] Report shows that in the United States the region around Dallas forth worth five of the investigated 21 countries where almost 90% of all natural gases and oil takes place dominates the emissions by far than average, leading to poor air quality levels.[41]

9. Oil Shale Utilization and Impact on Human Health

Oil shale activities impose health hazards on inhabitants of the area, where oil shale is processed. Possible health effects are mainly caused by the impact of the relevant emission into the airand ground water. The emission of toxic substances like Methane into the air and water can cause headache and long-term effects[42]. When children are frequently washed with contaminated water, this may have an effect on allergies and health. Also waste water pits and blowout fluids are a matter of concern when the steep is exposed, breathing in the toxic ash produced by oil shale processing results in respiratory infections. A significant case is that reported about a woman (Laura Amos) from Silt Garfield country, Colorado who developed a very rare adrenal tumor one of the effects of butoxy ethanol a content released during shale gas production, She had to have the tumor and her adrenal gland removed.

[33] Ibid.
[34] Ibid
[35] Ibid
[36] Ibid.
[37] Ibid, note 26.
[38] Ibid.
[39] Ibid
[40] Ibid.
[41] Ibid.
[42] Ibid

She testified she lived within 900 feet of a busy gas well pad where franking took place frequently and during one franking episode her domestic well erupted[43]. Also chemicals such as sulphides produced during oil shale production can cause effects eye irritation to suffocation.[44] Mining can also contaminate ground water, during such processing, toxic bile products are left underground they can reach into sources of water making them unsafe for drinking hygiene and development. According to study in Texas, numerous complaints have been made to the town in regards to the constant noise and vibration emanating[45] from the compressors station as well as foul odour. Noise pollution contributes to health deficiency i.e. Insomnia.

10. Legal and Institutional Framework Covering Oil Shale Activities

The European Union Directives

The European union directives set out a regulatory framework guiding industrial activities in member states. These directives regulate the various aspects of industrial activities they include directives of mining, water framework directives, ground water directives, noise directives. Other EU directives on protection of environment include, directives on industrial emission, environmental impact assessment directives, directive on conservation on wild birds, directives on waste. It has been submitted that extractive industries are facing problems due to insufficient legislations as currently there is no European mining framework directive. The directives 92/11/EC defines a threshold of 500,000m daily extraction rate for natural gas well above which an EIA is compulsory. Exploration of shale gas does not reach this threshold; therefore, if EIA's are not carried out, this poses potential risk to the environment. There is also no provision by the directives of reuse of waste produced during the industrial activities. Despite the identified impact on the environment, oil shale processing is on the increase due to high demand in energy supply, the fear of increase in world crude oil and its benefits to the growth of the economy, the following recommendations are made to help mitigate the negative impact of oil shale.

Convention on Biological Diversity

In June 1992, representatives from most of the world's nations and several hundred non-governmental organizations (NGOs) gathered in Rio de Janeiro for the United Nations Conference on Environment and Development (UNCED) or the Earth Summit. The results of the UNCED included the Rio Declaration enunciating 27 principles of environment and development, Agenda 21 (formally adopted by most participating nations, establishes a comprehensive plan for global development)[46], and a statement of principles for the sustainable management of forests, which were all adopted by consensus in the conference. The 1992 Rio Declaration is rooted in two overriding principles of Equity and Resources institution innovation resulting from the conference included an agreement on the operating rules for the Global environment Facility (GEF)[47], United Nations Convention on Biological Diversity[48], and the establishment of the United Nations Commission on Sustainable Development (CSD)[49] on the basis of Agenda 21 recommendation. In a further development, the United Nations Framework Convention on Climate Change (UNFCCC) and United Nations Convention on Biological Diversity (CBD) were opened for signatures at 1992 UNCED. In accordance with Article 10 of CBD, Parties must have incorporate a consideration of sustainable development into their national decision-making[50], provide traditional cultural uses of biological resources and encourage cooperation between the public and private sectors.[51] The Article 14 of CBD draws the attention of state Parties to the need for accessing possible environmental impact of its programme[52] and policies that may have a significant adverse effect on biodiversity.

United Nations Framework Convention on Climate Change

Climate change and global warming were the subject of the United Nations Conference on Environment and Development in Rio de Janeiro in 1992 and the Conference adopted the United Nations Framework Convention

[43] Ibid, 35

[44] Why is oil shale a problem? http://www.water.westernresources.advocartes.org/land/oil-state-value. Php. Accessed on January 28, 2020

[45] ibid

[46] Ibid

[47]United Nations, United Nations Documents Index July-September 2006, Nairobi, Kenya☹United Nations, 2008), 77

[48]SWS Burgiel & G Cohen, Global Environment Facility, and I. International Union for conservation of Nature and Natural Resources, The Global Environment Facility form Rio to New Delhi: A Guide for NGOs, Switzerland: IUCN Gland, 1997, 34

[49]TSH Reis, Compensation for Environmental Damages under International Law: The Role of the International Judge, Netherlands: (Kluwer law International, 2011). 62

[50] Ibid

[51]OF Oluduro & GN Gasu, 'A Critical Appraisal of the Legal Regime for Biodiversity Conservation in Nigeria,' *Canadian Social Science*, 8 (4)., (2012) 249-257

[52]Ibid

on Climate change (UNFCCC) on 9 May 1992[53]. The UNFCCC, which came into force on March 1994 and ratified by Nigeria in August 1994, sets the international legal framework for combating Greenhouse Gases (GHG) issues and calls for the cooperation by all countries. The main objective of the UNFCCC as stated in Article 2[54] aimed at the stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Such level has to be achieved within a time-frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner. Under the UNFCCC, the countries inscribed in Annex 1 are designated as most responsible for the world's emission of GHG (United Nations Framework Convention on Climate 2006). The UNFCCC classified the parties into Annex II countries, relative to the level of their industrialization and emission responsibilities and commitments.[55]However, Nigeria belongs to the principles commonly recognized in international environmental law (Article 3 of the UNFCCC):

I. The principle of equity in the commitment of parties to protect the climate;
II. The recognition of developing countries' special needs and circumstances `especially those that are particularly vulnerable to the adverse effects of climate change';
III. The precautionary principle according to which action should be taken to `anticipate, prevent, minimize the causes of climate change and mitigate its adverse effects';
IV. The promotion of sustainable development and growth.

In accordance with Article 4 of the UNFCCC, contracting Parties (countries) shall act in accordance with their Common but Differentiated Responsibilities (CBDR) and their social and economic condition in order to implement the international climate regimes[56]. In order to limit climate change, Parties involved will have to take a range of domestic actions that affect investment, technology, infrastructural developments, and behavior patterns,[57] in ways that limit GHG emissions[58]. In practice, the Nigerian government has the responsibility to perform its obligations under the convention including phasing out gas flaring within the level of its capabilities in terms of finance, manpower and technology, and its ability to access the Global Environment Facility (GEF) that was established in 1991 by the World Bank and the United Nations Development Programme (UNDP) to assist certain developing country projects aimed at the protection of the global environment and promotion of sustainable development.[59] In general, the UNFCCC as an international climate regime is based on international cooperation as one of the major principles for its implementation.

The Kyoto Protocol

The Kyoto Protocol, which builds upon the same infrastructure designed by the UNFCCC, generally reinforced the basic idea of the UNFCCC, such as the need for a quantified limitation and reduction targets for GHG emissions within a defined commitment period. In practice, the Annex I countries are expected to perform the bulk of their emissions reduction obligation through the domestic policies of the Annex I Parties. In addition to policy measures adopted and national strategies, the Kyoto Protocol creates three[60] market-based vehicles (flexible mechanisms) for the attainment of the UNFCCC's objective. These mechanisms are:

I. the Clean Development Mechanism (CDM),
II. Joint Implementation (JI), and
III. Emissions Trading (ET).

Although the developing countries were not required by the Kyoto Protocol to undertake specific commitments, they were to be assisted by developed countries to also participate in the emissions reduction efforts through the CDM[61]. The Nigerian government, which ratified the Kyoto Protocol in October 2004, could initiate a project to

[53]United Nations Framework Convention on Climate Change, United Nations Framework Convention on Climate Change Handbook, Bonn, Germany: United Nations, 2006.
[54]Ibid
[55]United Nations Environment Programme, Understanding Climate Change: A Beginner's Guide to the UN Framework Convention and its Kyoto Protocol, Geneva, Switzerland: United Nations Environment Programme, 1999.
[56] Climate Change Secretariat, 'A Guide to the Climate Change Convention Process,' Preliminary 2nd Edition, UNFCCC, 2002
[57]M Grubb, 'International Emissions Trading under the Kyoto Protocol: Core Issues In Implementation,' *Review of European Community and International Environmental Law*, 7 (2)., (1998).140-146
[58] Ibid
[59]GI Malumtashi, 'Phase-out of gas flaring in Nigeria by 2008: the prospects of a multi-win project,' *Nigeria Gas Flaring Petroleum Training Journal*, 4 (2)., (2007).1-39
[60]Executive Board of Clean Development Mechanism, First Report of the Executive Board of the Clean Development Mechanism (2002-2002), Geneva, Switzerland: United Nations, 2002.
[61]AD Ellerman, H. D. Jacoby, & A. Decaux, *The Effects on Developing Countries of the Kyoto Protocol and Co2 Emissions Trading*, (Washington, DC: World Bank Publications, 1998). 65

phase-out gas flaring and attract sponsorship from UNFCCC Annex I countries[62]. The Kyoto protocol and UNFCC share the same institution structure principle and ultimate objective such as the reduction of global of GHG emission and the distinction between developed and developing countries the seventh conference of parties (COP 7) to the UNFCC November 2001) adopted the Bonn agreement into a legal text Marrakesh accord which contains technical and legal details in the implementation of the Kyoto Protocol to make the treaty enforceable and hence binding on all the state parties. The Marrakesh accords explain the framework of the implementation of the Kyoto Protocol and provide guidelines for establishing the national adaptation programs for action. The Marrakesh accords determine the scope and mechanism pursuant to Articles 6, 12 and 17 of the Kyoto Protocol. In accordance with annex 1 of the accord, parties shall take appropriate domestic actions with a view to reducing emissions in a manner working towards achievement of the ultimate objective of the convention the accord does not impose a numerical cap for reducing emissions however it provides for the use of mechanism provides for the supplementary to domestic action by state parties. Therefore, the Marrakesh accords provides for prompt start of the ocean development mechanism (CDM), identifies the eligibility criteria that have to be achieved by parties to participate in the flexible mechanism, and it also includes the rules for the implementation of the flexible mechanisms [63]

The Montreal Protocol on Substances that Deplete the Ozone Layer

The Montreal Protocol on Substances[64] that Deplete the Ozone Layer deal with atmospheric pollution. The parties to the protocol recognize that world-wide emission of certain substance can significantly deplete and otherwise modify the ozone layer in a manner that is likely they are conscious of the potential climatic effects of emissions of these substances. Article 2A of the protocol controls CFCs. Under the Article, each party is required to ensure that for the twelve-month period commencing on the first day of the seventh month following the date of entry into face of this protocol, and in each twelve–month period thereafter, its calculated level of consumption of the controlled substance in Group I of Annex A does not exceed its calculated level of consumption in 1986. It is submitted that by reducing the atmospheric pollution through this instrument, the problem of climate change is addressed because the greenhouse gases in the atmosphere are known to be leading cause of climate change; therefore any legal measures that targets the reduction of these gases is of great significance in combating climate change. The main flaw in these instruments nevertheless is that is lack of clear mechanisms to check complains with the obligations held by the state parties. Any international or domestic policy instrument can be effective only if accompanied by an ample mechanism of monitoring and enforcement.[65]

11. Conclusion and Recommendations

In conclusion, environmental polluting activities contribute to the thriving unsustainable utilization of environmental resources. Despite being faced with the problem, oil shale production has emerged to answer the increase economic demand hence, more unsustainable practices. Due to the great interest in shale production, it could be said that oil has come to stay despite its massive environmental hazard. Research on environmentally friendly technologies and public participation in shale oil development amongst others will contribute to mitigation potential hazards of oil shall industries. This will be the answer to our quest for more oil in a less polluted environment. Industrial projects such as exploration of oil shale are potentially significant effect on the environment and residents should engage public consultation as part of the authorization procedure. The new method of in-situ cracking called in-situ convention should be developed and adopted since it has lesser effect on the environment that the ex-situ processing. Energy companies should focus on developing more efficient retorting technologies since new retorting methods are keys to any viability of oil shale, both in terms of lower production costs and less environmental aggressive impacts. There should be implementation of best available technique in the shale industry. There should be new technology for the reclamation and reforestation of exhausted open cast areas. Ash residues from power plants should be used for production of construction of material like cement, concrete elements, and road materials instead of its disposal in landfills.

[62]SM Scholz, Rural Development through Carbon Finance: Forestry Projects Under the Clean Development Mechanism of the Kyoto Protocol: Assessing Smallholder Participation by Structural and Equation Modeling, (New York: Peter Lang Pub Incorporated, 2009). 54

[63]United Nations, Conference of the Parties to the United Nations Framework Convention on Climate Change: Report of the Conference of the parties on its 7th session, held at Marrakesh from 29 October to 10 November 2001: Addendum, FCCC/CP/2001/13/ADD. 1, United Nations, Geneva, Switzerland, 2002

[64]J Thornton & G Beckwith, *Environmental Law ;(* Sweet & Maxwell, London, 1997), 45

[65]Ibid