

Analysis of Environmental Pollution in Developing Countries

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Abstract

Environmental pollution is a major concern in developing countries of the world, especially in Nigeria. This issue of pollution is a terrible negative vibe or influence on all the living things and the environment. Pollution of the environment via air, land and water by human activities is detrimental to the existence of all living things within the society which is not an acceptable development at all. Air pollution is caused by several factors such as emission from motor vehicles, industrial activities, volcanic eruption, emitting poisonous, forest fire, deforestation, bush burning and cosmic clouds of dusts. Soil pollution is also caused by factors such as oil spillage, human erosion and contamination by hazardous substances. Water pollution is caused by oil discharge from vessels, dumping from ships and aircrafts, wastes disposal from land, oil spillage, organic sources and other means of polluting the environment. Pollution is a vital environmental disaster due to the fact that some known and unknown diseases are discovered and might be difficult to subdue. In this article, environmental pollution will be discussed under three classes of pollution that is the water, the soil, and the air and their impact on human health; also needed measures to reduce pollution in Nigeria as a case study.

Keywords: Air; Land; Water Pollution; Diseases; Environment; Human Health; Pollution.

1. Introduction

The environment is a permanent abode in a natural world where people, animals and plants lives; Reference [1] the preservation of the environment [2] is very important and it must be seen as such in our day to day living within the society to protect and keep all precious resources for future endeavours [3].

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Currently, pollution is an increasing threat to a healthy environment. Indeed, pollution may severely damage the environment, including ecosystems, and human health [4]. Environmental pollution has progressed from the elementary form to a sophisticated and complex nature in this century in view of industrialization and technology development [5] that has prompted the use of chemicals that are sources of organic pollutants [6]. Pollution is a threat to sustainable development in developing countries, particularly in Nigeria. This unavoidable problem has become seriously complicated in view of the trans-boundary movement of pollutants from other countries. The developing countries of the world such as Nigeria have become easy bait to the exporter of hazardous waste because of the precarious state of their economy. These developing countries did not have the necessary technology know-how on how to process the waste and hazardous substance brought from the industrialized countries to their doorsteps; hence the pollutants become a burden and hazards to human health, and their environment at large. In Nigeria, the government is notoriously aware of the potential threat that would be created by the wastes substances; and therefore advocated in the National Policy on the environment for a need to cooperate in good faith with other countries international organizations such as international maritime organization (IMO), agencies to achieve optimum use of trans boundary natural resources and effective prevention or abatement of transboundary air pollution. The word environment is defined by Section 37 of the National Environmental Standards and Regulations Enforcement Agency (Establishment) Act to water, air, land, all plants, human beings and animals living therein and the interrelationship which exist among these or any of them. The term pollution is derived from the word pollute which means, the process of making something dirty or no longer pure, especially by adding harmful or unpleasant substances to it. The word pollution has been defined by the Act to mean man-made or man aided alteration of the chemical, physical, or biological quality of the environment beyond acceptable limits [7]. The International Law Association in its rules of transfortier pollution adopted in Montreal in 1982 defines pollution as any introduction by man directly or indirectly of substances or energy into the environment resulting in deleterious effect of such a nature as to endanger human health, harm living resources, ecosystem and material property and impair amenities or interfere with other legitimate use of the environment [8]. This environmental pollution is the contamination of the physical and biological components of the earth/atmosphere system to such an extent that normal environmental processes are adversely affected. Pollution occurs, on the one hand, because the natural environment does not know how to decompose the unnaturally generated elements (i.e. anthropogenic pollutants) [9] and on the other hand, there is a lack of knowledge on the part of humans on how to decompose their pollutants artificially. Environment pollution can occur from various sources such as combustion of fossil fuels in industrial process and transportation, agriculture, construction activities, trading, and domestic sources. For the sake of this article, environmental pollution will be discussed under three classes of pollution, that is, the water, the soil, and the air.

2. Water Pollution

Water pollution may be defined as the presence in water of enough harmful or dangerous substances that may damage the quality of the water or affect the living resources of the water. One of the challenges facing the populace in the developing countries particularly Nigeria, is the problem of inadequate supply of water for domestic and industrial purposes. Another dimension of this problem is the lack of fresh and drinkable water in the riverine communities and big cities in Nigeria. This problem is traceable to the pollution of the water bodies.

2.1 Sources of Water Pollution In Developing Countries

The following are the sources of water pollution:

2.1.1 Oil discharge from vessels

Discharge of oil from ships is one major source of water pollution in developing countries especially in Nigeria. Water pollution occurs from this source during the process of transportation of crude oil or refined oil products from one location to another. Discharge from various ships has generally been recognized as one major source of water or marine pollution both under international conventions and domestic legislation. The Oil Pipeline Act of 1956 at page 36 aimed at preventing accidental discharges or oil leakage resulting from faulty, rusty or improperly maintained equipment. Section 36 of the Act provides:

“that the licensee or lease shall maintain all apparatus used for oil operation including the oil boreholes. Additional legislation on the above includes Oil terminal dues decree of 1966.”

2.1.2 Dumping from ships and aircrafts

Water pollution arises also from deliberate dumping from ships of wastes or goods during the voyage or from aircraft during air transportation. Cargoes or harmful substances either in liquid or solid form may be dumped on the water body during transportation.

2.1.3 Wastes disposal from land

Waste disposal and management remain one of the challenges facing the environment in developing countries especially Nigeria in both the Rural and Urban centres. Household, Agricultural, Industrial and wastes from construction processes find their way into the rivers or sea through the deliberate act of people and in some cases, the wastes are carried into the water body by floods during rainfall.

2.1.4 Oil Spillage

Oil spillage occurs regularly in the oil-producing areas in those countries either through a deliberate act of sabotage by vandals/militants or through the rupture of an oil pipeline. Vandalization of oil pipeline is caused by militants as a way to protest against the government over marginalization. It may also occur from activities of saboteurs or bunkers. It may also result from the ageing of the pipelines, oil blow out from the flow stations.

2.1.5 Organic sources

Another source of water pollution is through organic matter. Organic matter includes leaves, algae, animal and human wastes. The organic matters undergo a process of breakdown with or without oxygen. Where the organic matters are broken down with the aid of sufficient oxygen present in the water, the organic matter will decompose. This is known as aerobic decomposition. The breakdown of organic matter without the oxygen will equally lead to decomposition in what is called anaerobic decomposition. This anaerobic decomposition

produces gases with offensive odours such as hydrogen sulphide (H_{25}) that smells like rotten eggs and methane (CH_4). Marine living resources require enough oxygen to survive. Excess breakdown of organic matter implies excess oxygen consumption. Where this happens, there may be no sufficient oxygen necessary for the survival of the resources; hence anaerobic decomposition will take place.

2.2 Effects of Water Pollution In Developing Countries Especially Nigeria

The following are the effects of water pollution in developing countries:

2.2.1 Scarcity of drinkable water supply

Human beings and animals are the major victims of water pollution. This is so because; pollution reduces the available sources of drinking water supply with the consequences that the demand for drinkable water will be greater than the supply. The cost of available drinkable water supply becomes high as a man cannot do without water, hence the available one will have to be purchased at a higher price. Sometimes, a man may have to travel outside his location to get drinkable water, thus, spending money and time to get access to drinkable water [10].

2.2.2 Unemployment

Water pollution implies that the water body is rendered useless to support man in his pursuit of livelihood. Water pollution has adverse effect on people in the riverine areas who are predominantly fishermen. Oil pollution destroys aquatic and marine living resources. While those resources that survive the onslaught are forced to migrate from the polluted site (water) to another water body where there is no pollution.

2.2.3 Ill Health

Water is indispensable in the day to day activity of man either for domestic or industrial use. Consumption of polluted water will cause various diseases (sometimes incurable diseases) that can impair human health. The world health organization reported that eighty per cent of sickness and diseases in developing countries are traceable to lack of safe water. It is therefore known that diseases like typhoid, diarrhoea, cholera, etc are caused by lack of safe and hygienic water.

2.2.4 Atmospheric Destruction

Water pollution can render the atmosphere nauseating and dangerous for breathing. The noxious odours produced from the polluted water can cause people to migrate to a better place conducive for healthy living at the expense of their convenience.

2.2.5 Disruption of Recreational Activities

The pollution of water body may destroy the aesthetic value of the environment and make the environment attractive for recreation, for instance, swimming cannot take place in any polluted water just as it will be unsafe for transportation on a body of water polluted by water hyacinth. As observed earlier, anaerobic decomposition

will cause the water to produce irritating and offensive odours not tolerable to breathing by human beings. Apart from this, the pollutants may lead to the growth of water hyacinth that can hinder easy and safe transportation.

2.3 Legal Response to The Problem of Water Pollution

Legal response to the problem of water/marine pollution can be classified into International and National Responses.

The International legal responses are facilitated through treaties and agreements among which are:

(1) 1954 convention was made for the prevention of pollution of the sea by oil. The Convention which took place in London was to prevent the pollution of the sea by oil discharge from the ship. The convention prohibited the discharge of oil or oily mixtures from ship or tanker except where the discharge is to ensure the safety of the ship and to prevent the damage or destruction of cargo or where the leakage is unavoidable. The convention was of limited effectiveness and is now largely of historical interest, as the international convention for the prevention of pollution from ships (hereinafter referred to as the MARPOL Convention) provides that as between its parties it supersedes the 1954 Convention.

(2) The MARPOL Convention was also adopted under the auspices of the international maritime organization in 1973 and it is intended to deal with all forms of international pollution of the sea from ships, other than dumping. Detailed pollution standards are set out in six (6) annexes. These are concerned with oil (Annex 1), noxious liquid substances in bulk (Annex 11), harmful substances carried by sea in packaged forms (Annex iii), sewage (Annex iv), garbage (Annex v), and air pollution (Annex vi), added in 1997.

(3) 1958 Convention on the continental shelf refers to the area of comparatively shallow water bordering a continent and separating it from the drop to the deep ocean floor. Article 1 of the convention defines the continental shelf to mean: The seabed and subsoil of the submarine areas adjacent to the vast but outside the area of the territorial sea, to a depth of 200metres or, beyond that limit to where the depth of the superjacent waters admits of the exploitation of the natural resources of the said areas.

(4) To the seabed and subsoil of similar submarine areas adjacent to the coasts of islands. Coastal states can take measures adequate for the protection of the living resources of the sea from harmful agents.

(5) 1958 Convention on the high seas took place in Geneva and it defines the high seas as all parts of the sea that are not included in the territorial sea or in the internal waters of a state. Contracting parties are to take measures to prevent the pollution of oil from ships, pipelines or resulting from exploitation of the seabed and its subsoil.

(6) 1984 Convention was also on civil liability for oil pollution damage. The objective of the Convention is to ensure that adequate compensation is paid to persons who suffer damages caused by pollution resulting from the escape or discharge of oil from ships. State parties are to adopt uniform international rules and procedures for determining questions of liability.

(7) International Convention on the establishment of an international fund for compensation for oil pollution damage was put in place. The state parties to this convention are the same as the parties to the civil liability Convention. The objective of this Convention is to ensure that full compensation is available to persons who suffer from damage caused by oil pollution by making the cargo owners to bear part of the burden of

damage in addition to the ship owner.

(8) International Convention on the prevention of marine pollution by dumping of wastes and other matters as good objective. The objective of the Convention is to effectively control all sources of pollution of the marine environment and in addition to take practical steps to prevent the pollution of the sea by the dumping of waste and other matter which can cause a hazard to human health, living resources and marine life.

(9) 1982 United Nations Convention on the law of the sea imposes upon the state parties the obligation to protect and preserve the marine environment. Parties to the Convention are expected to take individually and jointly measures necessary to prevent, reduce and control pollution of the marine environment. The Convention distinguishes between flag states, port states and coastal states. It establishes the right of every state to a 12-mile territorial sea. It establishes also an Exclusive Economic Zone (EEZ) of not more than 200 nautical miles which is an area adjacent to the territorial sea from the baselines from which the breadth of the territorial sea in a seizure. The Convention is divided into 17 parts and 320 articles.

2.4 National Legal Responses to the Problem of Water Pollution In Nigeria

(1) National Environmental Standards Regulation Enforcement Agency Act (NESREA) came into force in 2007 after the repeal of the Federal Environmental Protection Agency Act (FEPA). The Act prohibits the discharge in such harmful waste of any hazardous substances into the air or upon the land and the waters of Nigeria or at the adjoining shoreline except where such discharge is permitted or authorized under any law in force in Nigeria.

(2) Oil in Navigable waters Act Cap. O06, LFN, 2004, which was formerly a decree of the Federal Military Government, is now part of the Laws of the Federation of Nigeria, 2004 and it is to give effect to the International Convention for the prevention of pollution of the sea by oil. The Act makes it an offence for the owner or master of a ship, the occupier of land adjoining Nigeria waters or the operators of the apparatus to discharge oil into Nigeria waters. It is equally an offence for a Nigeria or a foreign-owned ship to fail to install oil pollution inspection equipment in the ship.

(3) Sea Fisheries Act, Cap.54, Laws of the Federation of Nigeria, 2004 provides that no person shall take or destroy any fish within the territorial waters of Nigeria or its exclusive economic zone by the use of any explosive substance, noxious or poisonous substances.

(4) Harmful Waste Act, Cap. H1, Laws of the Federation of Nigeria, 2004, prohibits the carrying, depositing and dumping of harmful waste on land, territorial waters, exclusive economic zone or contiguous zone of Nigeria or its inland waterways.

(5) Oil Pipeline Act, Cap. O7, Laws of the Federation of Nigeria, 2004, makes provision for the grant of licence for the establishment and maintenance of oil pipelines. The Act provides for the payment of compensation to any person who suffers damage as a consequence of or leakage from the pipeline or any ancillary installation.

(6) Petroleum (Drilling and Production) Regulation 1969, impose the oil companies the duty not to pollute or to prevent the pollution of inland waters, rivers, watercourses the territorial waters of Nigeria or the high seas by oil, mud or other fluids or substances while contaminating the water, banks or shoreline or which might cause harm or destruction to fish, water or marine life and where any such pollution occurs or has occurred to take prompt steps to control, and if possible end it.

(7) River Basin Development Authority Act, Cap. R9, Laws of the Federation of Nigeria, 2004, is concerned with the development of water resources.

(8) Water Resources Act, Cap. W2, Laws of the Federation of Nigeria, 2004. The Act is designed to improve and develop the quality and quantity of water resources. The Act empowers the authority to make regulations for the prevention of pollution and for the protection of fauna and flora.

(9) Rotterdam Convention, on the prior, informed consent procedure for certain hazardous chemicals and pesticides in international trade (ratification and enforcement) Act, 2005. The Act is primarily to ratify and enforce the Convention. The objective of the Convention is to promote shared responsibility and co-operative efforts among state parties in the International trade of certain hazardous chemicals in order to protect human health and the environment from potential harm and to contribute to their environmentally sound use by facilitating information exchange about their characteristics, by providing for a national decision-making process on their import and export and by disseminating these decisions to parties.

3. Soil Pollution

Soil is an indispensable portion of the land environment as it is the most important portion that supports man in his quest for the basic needs of life, food, clothing and shelter. Soil is the portion of the land environment that supports plant growth. Soil can be classified as sand, clay, silt and loam. The fertility of soil is basic to the production of food for man and animal in the environment. The fertility of the soil is dependent on the presence of abundant organic matter. Conservation of the soil nutrient is imperative in winning the war against poverty and in achieving the goal for sustainable development. However, the topsoil has over the years, particularly in the developing countries been degraded through human erosion and contamination by hazardous substances. Erosion either by wind or flooding will lead to the loss of nutrient and organic matter. The discovery of oil in Nigeria in the early fifties is a mixed blessing in view of the environmental impact of the exploratory activities on the land environment of the immediate communities of the oil-producing companies. Oil spillage affects not only the water but also the soil and the air. The important role of land in the quest for economic development has been noted in Nigeria. The government in its National Policy on environment observed as follows: *Land is the basic resources which most development efforts are assessed. Activities utilizing these vital resources usually interact and often conflicting. It is necessary, therefore, to plan the utilization and management of land in an integrated manner. Integrated management of land should be harmonized; the impacts of the various social and economic activities on natural resources such as soil, water, air, and biota should routinely be assessed at every stage of the development process.*

The government in accordance with the observation recommended some strategies to encourage land use and soil conservation. Among the strategies are:

- i. Adoption of soil conservation principles in highways and other construction activities.
- ii. Ensure sound management of soil through monitoring and control of changes in land use. Promotion of afforestation and reforestation programmes including community-based agro forestry for soil conservation.
- iii. Imposed management of soil and water resources.

3.1 Legal Responses to the Problem of Soil Pollution In Developing Countries Such As Nigeria

The following are the legal responses to the menace of soil pollution in Nigeria;

1. Land Use Act Laws of the Federation of Nigeria, 2004. The Act places the ownership, management and control of land in each state of the federation on the governor.
2. Harmful Waste (Special Criminal Provision) Act, Cap. H1, Laws of the Federation of Nigeria, 2004. The Act prohibits without lawful authority, the carrying, dumping or depositing of harmful waste in the air, land or waters of Nigeria. Offenders are liable to imprisonment for a term of six years in addition to the forfeiture of the land.
3. Environmental Impact Assessment Act, Cap. E12, Laws of the Federation of Nigeria, 2004. The Act requires environmental impact assessment to be conducted for public or private projects that are likely to have a negative impact on the environment.
4. Nigerian Urban and Regional Planning Act, Cap. N14, Laws of the Federation of Nigeria, 2004. By section 39 of the Act, an application for land development would be rejected if such development would harm the environment or constitute a nuisance to the community.
5. Niger Delta Development Commission Act, Cap. N68, Laws of the Federation of Nigeria, 2004. The commission is empowered to plan and to implement projects for the sustainable development of the Niger-Delta region in the field of transportation, health, agriculture, fisheries, urban, and housing development. The commission is also to liaise with the oil and gas producing companies and other stakeholders on how to control oil spillages and other forms of environmental pollution.
6. Nigerian Mining Corporation Act, Cap. N129 Laws of the Federation of Nigeria, 2004. The Act by the provision of section 16 makes the corporation liable for the physical or economic damage suffered by any person as a result of its activities.

4. Air Pollution

Air pollution is defined by the 1979 convention on long-range transboundary air pollution to mean the introduction by man, directly or indirectly, the substances or energy into the air resulting in deleterious effects of such a nature as to endanger human health, harm living resources and ecosystem and material property and impair or interfere with amenities and other legitimate uses of the environment. It can also be defined as the presence of chemicals in the atmosphere in quantities and duration that are harmful to human health and the environment. On the other hand, air is defined as the mixture of gasses that surround the earth in which we breathe in. Air is actually the component of the atmosphere while the atmosphere is defined as the gaseous envelope that surrounds the earth or any of the heavenly bodies. Air pollution is a major problem of the urban cities and particularly the oil-producing areas. Air pollutants are either particles or gases. The principal gaseous pollutants are oxides of carbon, nitro and sulphur. They share common sources but create distinctly different kinds of problems. According to the World Health Organization, six major air pollutants include particle pollution, ground-level ozone, carbon monoxide, sulfur oxides, nitrogen oxides, and lead. Long and short term exposure to air-suspended toxicants has a different toxicological impact on human including respiratory and cardiovascular diseases, neuropsychiatric complications, the eyes irritation, skin diseases, and long-term chronic

diseases such as cancer. Several reports have revealed the direct association between exposure to the poor air quality and increasing rate of morbidity and mortality mostly due to cardiovascular and respiratory diseases. In this review article, we aimed to discuss toxicology of major air pollutants, sources of emission, and their impact on human health.

4.1 Sources of Air Pollution

1. Natural sources. The natural resources of air pollution include volcanic eruption, emitting poisonous, forest fire, and cosmic clouds of dusts [11].
2. Overpopulation, results from the emission of greenhouse gases and global warming.
3. Deforestation and bush burning. This may arise from limbering, deliberate cutting down of trees for firewood and cleaning of bushes for farming. Bush burning may be accidental or deliberate. Deliberate bush burning occurs when the bush is set ablaze for particular purpose as it occurs in the developing countries such as Nigeria in a bid to hurt for animals while accidental bush burning occurs where through carelessness, the bushes are set ablaze.
4. The use of automobiles is very essential in our day to day existence. The use of automobile involves fossil fuels which release poisonous gases into the atmosphere resulting in air pollution with deleterious effects on the environment and the living resources therein.
5. Industrial processes. Air pollution arises from industrial activities of manufacturing industries. For instances, in Nigeria, the air environment is polluted in the process of gas flaring by the oil-producing companies in the Niger-Delta areas/regions [12].
6. Warfare and terrorist activities are other dangerous sources of air pollution. The use of modern, sophisticated and deadly weapon of warfare such as nuclear weapons, biological and chemical weapon during the time of warfare have resulted in long-range transboundary air pollution affecting people outside the territories of the warfare [13].

4.2 Effects of Air Pollution

Air pollution has detrimental effects on the health of human beings, animals and the ecosystem in general. Diseases affecting the health of man such as respiratory, nervous and skin diseases are caused by air pollution. Air pollution can lead to the rapid spread of disease affecting livestock. Plants are equally not spared of the effects of air pollution as diseases affecting plants can be spread rapidly through the air. Air pollution can lead to acid rain and the formation of smog [14].

5. Conclusion

According to *Uppenbrink* [22] which stated interalia that:

The protection of man and the environment from harmful effect resulting from all substances introduced into the atmosphere, water or soil requires the formulation of a comprehensive and interdisciplinary Concept to comprise general objectives and principles of protective action [15].

These principles would of course include the instrumentality of law in protecting the environment. There is therefore the need to increase monitoring of the effects of existing rules on pollution, with the aim of seeing what deficiencies that might be available in any existing rules and laws, and whether further international conventions relating to the eradication of pollution are to be ratified and domesticated into any law in developing countries especially in Nigeria law.

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