

**ENVIRONMENTAL POLLUTION: TYPES, CAUSES,  
IMPACTS AND MANAGEMENT FOR THE HEALTH AND  
SOCIO-ECONOMIC WELL-BEING OF NIGERIA**

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**ENVIRONMENT**

According to Federal Environmental Protection Agency (FEPA) Act of 1990, under section 38 a very lucid definition of environment was given as thus: 'Environment includes water, air, land and all plants and human beings and/or animals living there in and the inter-relationships which exist among these or any of them.' Thus, "environment" comprises land, air, water and all the physical structures surrounding us.

Therefore Environment can be rightly referred in a general sense to as the totality of space, time and socio-cultural settings of man and other living organisms therein.

Environmental Pollution is any discharge of material or energy into water, land, or air that causes or may cause acute (short-term) or chronic (long-term) detriment to the Earth's ecological balance or that lowers the quality of life. Pollutants may cause primary damage, with direct identifiable impact on the environment, or secondary damage in the form of minor perturbations in the delicate balance of the biological food web that are detectable only over long time periods.

The industrialization of our society, the introduction of motorized vehicles, and the explosion of the human population, have caused an exponential growth in the production of goods and services. Coupled with this growth has been a tremendous increase in waste by-products. The indiscriminate discharge of untreated industrial and domestic wastes into waterways, the spewing of thousands of tons of particulates and airborne gases into the atmosphere, the "throwaway" attitude toward solid wastes, and the use of newly developed chemicals without considering potential consequences have resulted in a lot of environmental disasters throughout the world.



**Plate 1: Open Drains**

Environmental pollution usually occurs as a result of energy conversions and the use of resources which leaves their by-products behind in water, soil or air.

Technology has begun to solve some pollution problems, and public awareness of the extent of pollution will eventually make government bodies to be more proactive rather than reactive and also undertake more effective environmental planning and adopt more effective antipollution measures.

#### TYPES OF POLLUTION

The following are the types of pollution perceived in our environment:

- Water pollution
- Thermal pollution
- Land pollution
- Radiation Pollution
- Noise pollution
- Air pollution

#### CAUSES AND IMPACTS

##### WATER POLLUTION

Water pollution is the introduction into fresh or ocean waters of chemical, physical, or biological material that degrades the quality of the water and affects the organisms living in

it. This process ranges from simple addition of dissolved or suspended solids to discharge of the most insidious and persistent toxic pollutants (such as pesticides, heavy metals, and non-degradable, bio accumulative, chemical compounds).



**Plate 2: Rain Water Picking Up Pollutants**

The pollutants responsible for polluting waters can be grouped under conventional and non-conventional.

#### Conventional

Conventional or classical pollutants are generally associated with the direct input of (mainly human) waste products. Rapid urbanization and rapid population increase have produced sewage problems because treatment facilities have not kept pace with need. Untreated and partially treated sewage from municipal wastewater systems and septic tanks in unsewered areas contribute significant quantities of nutrients, suspended solids, dissolved solids, oil, metals (arsenic, mercury, chromium, lead, iron, and manganese), and biodegradable organic carbon to the water environment.

Conventional pollutants may cause a myriad of water pollution problems. Excess suspended solids block out energy from the Sun and thus affect the carbon dioxide-oxygen conversion process, which is vital to the maintenance of the biological food chain. Also, high concentrations of suspended solids silt up rivers and navigational channels, necessitating

frequent dredging. Excess dissolved solids make the water undesirable for drinking and for crop irrigation.

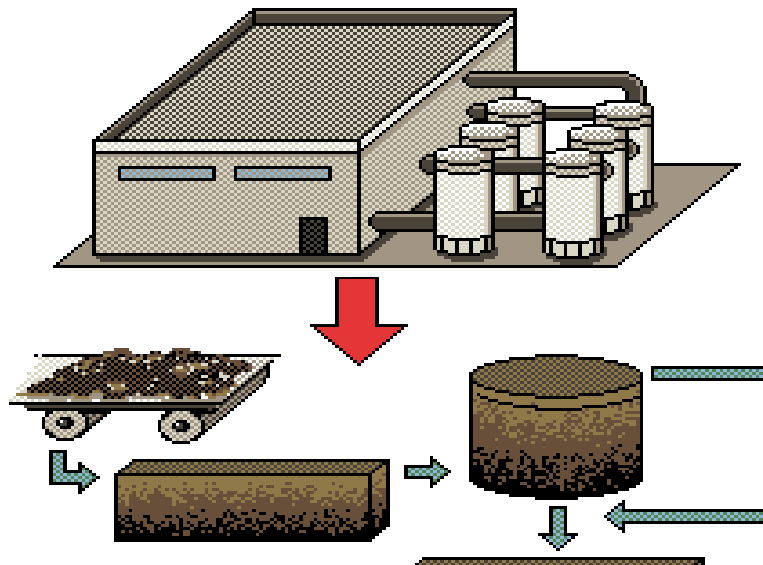


**Plate 3: An unprotected spring polluted**

Although essential to the aquatic habitat, nutrients such as nitrogen and phosphorus may also cause over-fertilization and accelerate the natural aging process (eutrophication) of lakes. This acceleration in turn produces an overgrowth of aquatic vegetation, massive algal blooms, and an overall shift in the biologic community--from low productivity with many diverse species to high productivity with large numbers of a few species of a less desirable nature. Bacterial action oxidizes biodegradable organic carbon and consumes dissolved oxygen in the water. In extreme cases where the organic-carbon loading is high, oxygen consumption may lead to an oxygen depression: (less than 2 mg/l compared with 5 to 7 mg/l for a healthy stream) is sufficient to cause a fish kill and seriously to disrupt the growth of associated organisms that require oxygen to survive. Water hyacinth and other floating aquatic vegetation is a consequence of this pollution.

## Nonconventional

The nonconventional pollutants include dissolved and particulate forms of metals, some of them highly toxic and may accumulate in fish. More than 13,000 oil spills of varying magnitude occur in the United States each year. Thousands of environmentally untested chemicals are routinely discharged into waterways; an estimated 400 to 500 new compounds are marketed each year. Nonconventional pollutants vary from biologically inert materials such as clay and iron residues from building and demolishing wastes to the most toxic and insidious materials such as halogenated hydrocarbons (DDT, kepone, mirex, and polychlorinated biphenyls--PCB). The latter group may produce damage ranging from acute biological effects (complete sterilization of stretches of waterways) to chronic sub-lethal effects that may go undetected for years. The chronic low-level pollutants are proving to be the most difficult to correct and abate because of their ubiquitous nature and chemical stability.



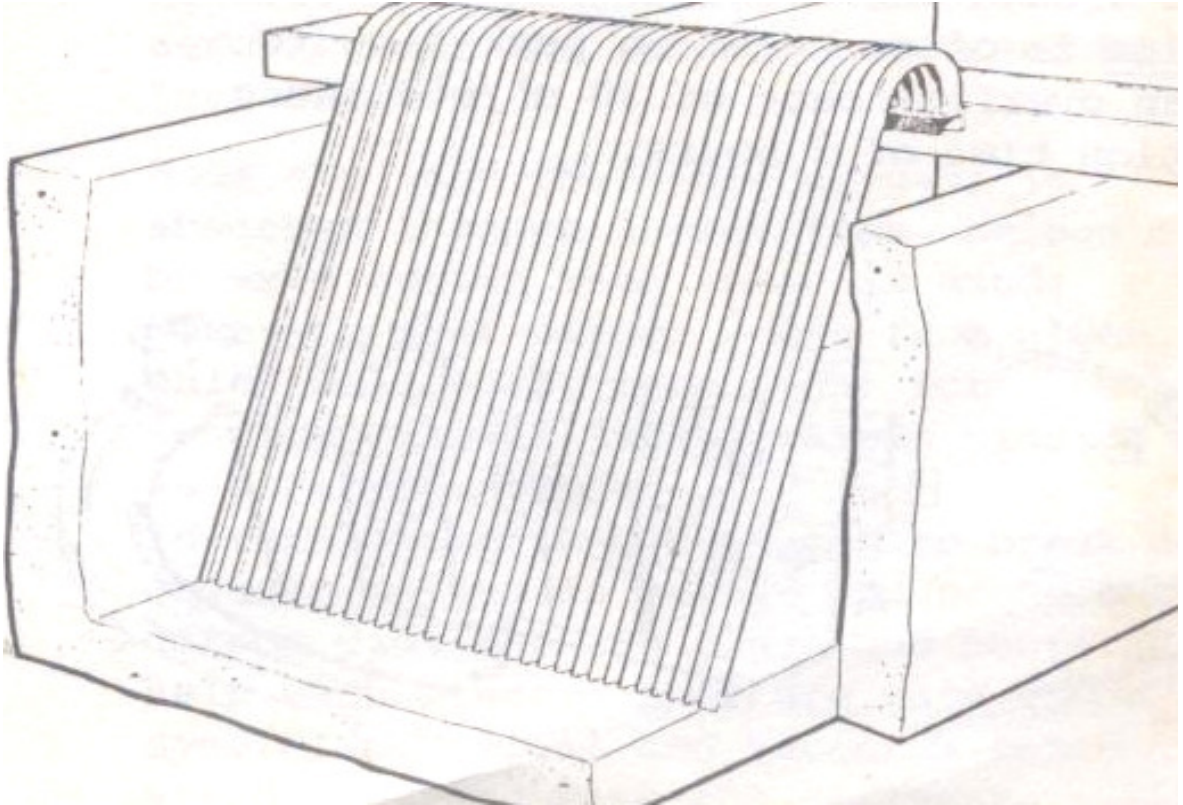
**Plate 4: Sewage Treatment Systems**

## CONTROL OF WATER POLLUTION

Wastewater discharges are most commonly controlled through effluent standards and discharge permits. Under this system, discharge permits are issued with limits on the quantity and quality of effluents. Water-quality standards are sets of qualitative and quantitative criteria designed to maintain or enhance the quality of receiving waters. Criteria can be

developed and implemented to protect aquatic life against acute and chronic effects and to safeguard humans against deleterious health effects, including cancer.

Sewage or wastewater should be treated before it is discharged into the river or ocean. This is possible through modern technologies.

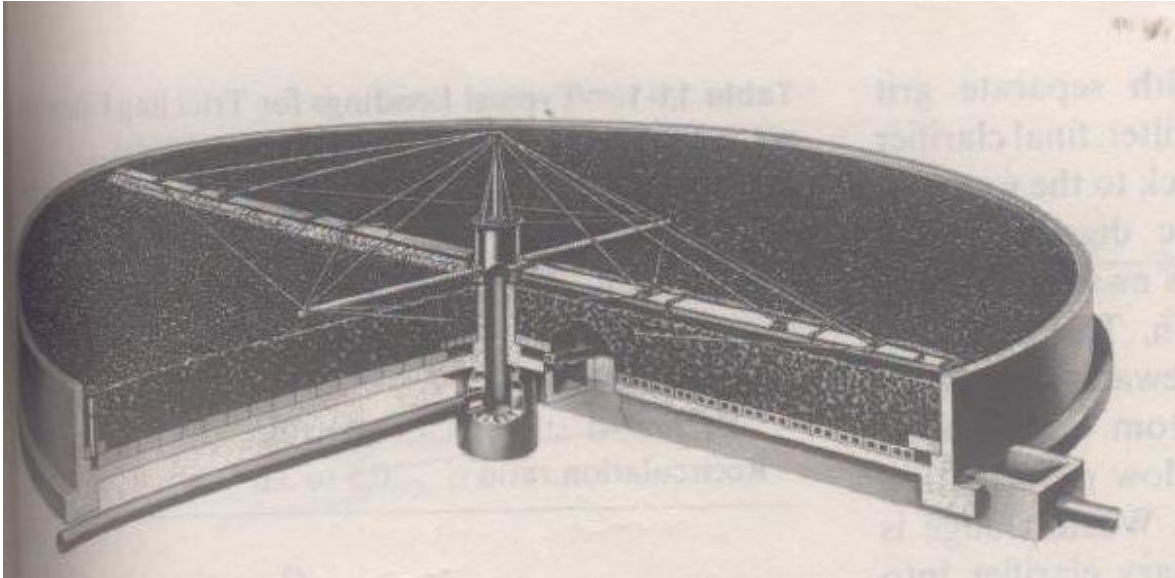


**Plate 5: Screen**

Sewage is first passed through series of steps: screens, comminutor, grit chamber, and settling tanks. Up to this stage, the process is called primary treatment. Once the primary treatment is completed, sewage is purified by about 30 per cent. To achieve almost 99.9 per cent purification, the sewage has to be treated by secondary or biological treatment. In Nigeria there are about 26 sewage treatment plants but none of them functioning satisfactorily. Abuja alone has about 11 mini-sewage treatment plants. But only one at WUPA is working at 30 per cent capacity. Trickling or percolating filters, activated sludge process, waste stabilization plants, water hyacinth ponds, reed bed or root zone technologies are the methods available.



For tertiary treatment, methods, such as chlorination, evaporation, and exchange absorption may be employed. These depend upon the required quality of the final treatment. Nigeria has to go a long way in the treatment of sewage.



**Plate 6: Trickling Filter or Percolating Filter**

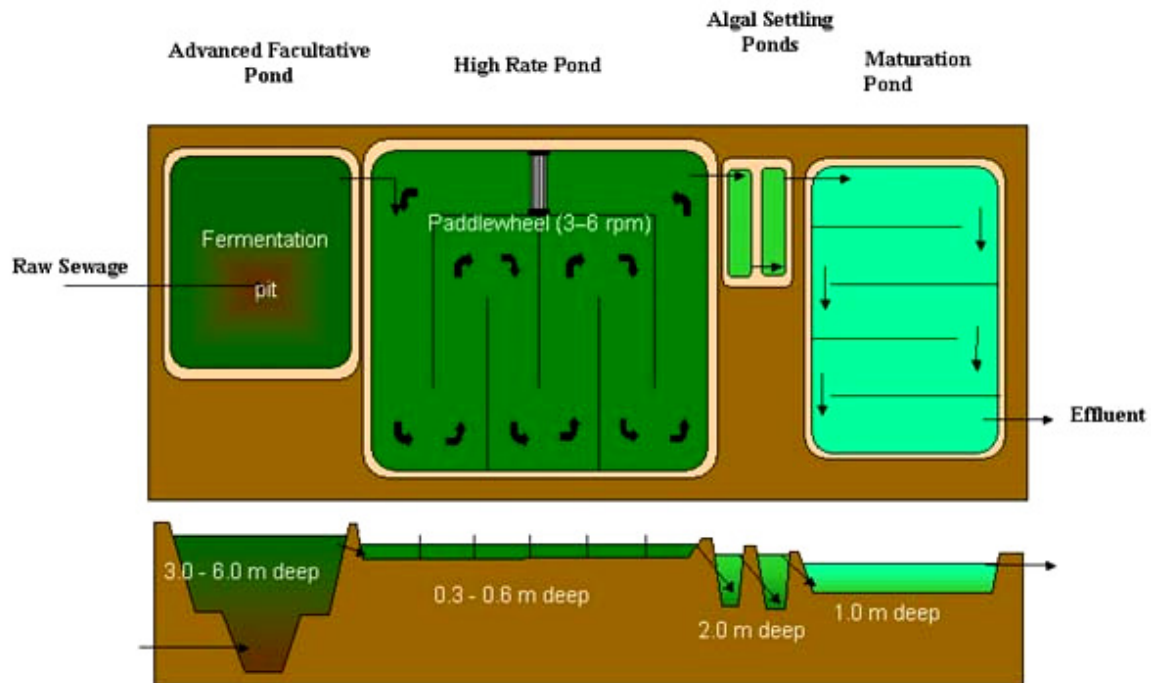
Apart from the above mentioned conventional and unconventional methods, the following practices should also be adopted:



**Plate 7: Sewage Treatment Methods**

- i. Waste food material, paper, decaying vegetables and plastics should not be thrown into the open or underground drains.
- ii. Effluents with high organic content and slurries from distilleries and industries should be sent to biogas plants for generation of energy.
- iii. Oil slicks should be skimmed off from the surface with oil separators or suction devices. Sawdust may be spread over oil slicks to absorb the oil components and then the material is incinerated.





**Plate 8: Advanced Integrated Wastewater Pond System**

## THERMAL POLLUTION

Thermal pollution is the discharge of waste heat via energy dissipation into cooling water and subsequently into nearby waterways. The major sources of thermal pollution are fossil-fuel and nuclear electric-power generating facilities and, to a lesser degree, cooling operations associated with industrial manufacturing, such as steel foundries, other primary-metal manufacturers, and chemical and petrochemical producers.

The discharge temperatures from electric-power plants generally range from 5 to 11 C degrees (9 to 20 F degrees) above ambient water temperatures. An estimated 90% of all water consumption, excluding agricultural uses, is for cooling or energy dissipation.

The discharge of heated water into a waterway often causes ecological imbalance, sometimes resulting in major fish kills near the discharge source. The increased temperature accelerates chemical-biological processes and decreases the ability of the water to hold dissolved oxygen. Thermal changes affect the aquatic system by limiting or changing the type of fish and aquatic biota able to grow or reproduce in the waters. Thus rapid and dramatic changes in biologic communities often occur in the vicinity of heated discharges.

## LAND POLLUTION

Land is often used as a recipient for treatment of wastes. Land also receives waste spills. Land pollution is the degradation of the earth's land surface through misuse of the soil by poor agricultural practices, mineral exploitation, industrial waste dumping, and indiscriminate disposal of urban wastes.



**Plate 9: At Sam Aikhoji's Livestock Farm, Shasha, Ibadan**

### **Soil Misuse**

Soil erosion--a result of poor agricultural practices--removes rich humus topsoil developed over many years through vegetative decay and microbial degradation and thus strips the land of valuable nutrients for crop growth. Strip mining for minerals and coal lays waste thousands of acres of land each year, denuding the Earth and subjecting the mined area to widespread erosion problems. The increase in urbanization due to population pressure presents additional soil-erosion problems; sediment loads in nearby streams may increase as much as 500 to 1,000 times over that recorded in nearby undeveloped stretches of stream. Soil erosion not only despoils the Earth for farming and other uses, but also increases the suspended-solids load of the waterway. This increase interferes with the ecological habitat and poses silting problems in navigation channels, inhibiting the commercial use of these

waters. Soil erosion is a major problem affecting some states in Nigeria. To name a few, Anambra, Imo, Akwa Ibom and others in southern side are badly affected leading to gully erosion and loss of land area.. There is need for the Government to address this through organized tree planting and controlling erosion through sound engineering techniques.



**Plate 10: Phytoremediation of  
Lead Contaminated Soils at Olodo Village**

### **Solid Waste**

In the United States in 1988 municipal wastes alone--that is, the solid wastes sent by households, business, and municipalities to local landfills and other waste-disposal facilities--equalled 163 million metric tons (1980 million U.S. tons), or 18 k (40lb) per person, according to figures released by the Environmental Protection Agency. Additional solid wastes accumulate from mining, industrial production, and agriculture. Although municipal wastes are the most obvious, the accumulations of other types of waste are far greater, in many instances are more difficult to dispose of, and present greater environmental hazards. In Nigeria, municipal, industrial and hazardous wastes are a major concern and every government is handicapped in dealing with them.

The most common and convenient method of disposing of municipal solid wastes is in the sanitary landfill. Sanitary landfills provide better aesthetic control and should be odour-free. Often, however, industrial wastes of unknown content are commingled with domestic

wastes. Groundwater infiltration and contamination of water supplies are common. There is need for building engineered landfills besides waste reuse and recycling to reduce the waste going to landfills and to increase the life of the landfills.

Besides landfills, solid wastes may be managed through other technologies, viz. incineration for medical and hazardous wastes, waste to energy, composting of organic wastes, biogas from livestock and slaughterhouses, and more advanced technologies to manage radioactive and highly toxic wastes.

Recycling of materials is practical to some extent for much municipal and some industrial wastes, and a small but growing proportion of solid wastes are being recycled. When wastes are commingled, however, recovery becomes difficult and expensive. New processes of sorting ferrous and nonferrous metals, paper, glass, and plastics have been developed, and many communities with recycling programs now require refuse separation. Crucial issues in recycling are devising better processing methods, inventing new products for the recycled materials, and finding new markets for them.

## PESTICIDES AND BIOCIDES

These are organic and inorganic chemicals originally invented and first used effectively to better the human environment by controlling undesirable life forms such as bacteria, pests, and foraging insects. Their effectiveness, however, has caused considerable pollution. The persistent, or hard, pesticides, which are relatively inert and non-degradable by chemical or biologic activity, are also bio-accumulative; that is, they are retained within the body of the consuming organism and are concentrated with each ensuing level of the biologic food chain. For example, DDT provides an excellent example of cumulative pesticide effects. (Although DDT use has been banned in the United States since 1972, and in Nigeria more recently, it is still a popular pesticide in much of the rest of the world.) Its continued use in several countries results in ingestion by higher forms of life: algae, fish, shellfish, birds, or humans. The resultant increased concentration in the higher life forms (bio-enhancement) may reach levels of thousands to millions of parts per billion.

Pesticides affect birds nesting habits and nervous system of animals and fish; they can cause instability, disorientation, and, in some cases, death. These examples are generally a result of relatively high body residuals producing acute (short-term) readily recordable results.

The long-term (chronic) effects of persistent pesticides are virtually unknown, but many scientists believe that they are as much an environmental hazard as are the acute effects. Non-persistent (readily degradable) pesticides or substitutes, insect sterilization techniques, hormone homologues that check or interfere with maturation stages, and introduction of animals that prey on the pests present a potentially brighter picture for pest control with significantly reduced environmental consequences.

## RADIATION POLLUTION

Radiation pollution is any form of ionizing or non-ionizing radiation that results from human activities. The most well-known radiation results from the detonation of nuclear devices and the controlled release of energy by nuclear-power generating plants. Other sources of radiation include spent-fuel reprocessing plants, by-products of mining operations, and experimental research laboratories. Increased exposure to medical X-rays and to radiation emissions from microwave ovens and other household appliances, although of considerably less magnitude, all constitute sources of environmental radiation.

Public concern over the release of radiation into the environment greatly increased following the disclosure of possible harmful effects to the public from nuclear weapons testing, the accident (1979) at the Three Mile Island nuclear-power generating plant near Harrisburg, Pa., and the catastrophic 1986 explosion at Chernobyl, a Soviet nuclear power plant. In the late 1980s, revelations of major pollution problems at U.S. nuclear weapons reactors raised apprehensions even higher.

The environmental effects of exposure to high-level ionizing radiation have been extensively documented through post-war studies on individuals who were exposed to nuclear radiation in Japan. Some forms of cancer show up immediately, but latent maladies of radiation poisoning have been recorded from 10 to 30 years after exposure. The effects of exposure to low-level radiation are not yet known. A major concern about this type of exposure is the potential for genetic damage.

Radioactive nuclear wastes cannot be treated by conventional chemical methods and must be stored in heavily shielded containers in areas remote from biological habitats. The safest of storage sites currently used are impervious deep caves or abandoned salt mines. Most radioactive wastes, however, have half-lives of hundreds to thousands of years, and to date no storage method has been found that is absolutely infallible.

## NOISE POLLUTION

Noise pollution has a relatively recent origin. It is a composite of sounds generated by human activities ranging from blasting stereo systems to the roar of supersonic transport jets. Although the frequency (pitch) of noise may be of major importance, most noise sources are measured in terms of intensity, or strength of the sound field. The standard unit, one decibel (dB), is the amount of sound that is just audible to the average human. The decibel scale is somewhat misleading because it is logarithmic rather than linear; for example, a noise source measuring 70 dB is 10 times as loud as a source measuring 60 dB and 100 times as loud as a source reading 50 dB. Noise may be generally associated with industrial society, where heavy machinery, motor vehicles, and aircraft have become everyday items. Noise pollution is more intense in the work environment than in the general environment, although ambient noise increased an average of one dB per year during the 1980s. The average background noise in a typical home today is between 40 and 50 decibels. Some examples of high-level sources in the environment are heavy trucks (90 dB at 15 m/50 ft), freight trains (75 dB at 15 m/50 ft), and air conditioning (60 dB at 6 m/20 ft). In Nigeria noise is becoming a serious problem through road traffic, electricity generating sets, music during social events and industrial sources.

The most readily measurable physiological effect of noise pollution is damage to hearing, which may be either temporary or permanent and may cause disruption of normal activities or just general annoyance. The effect is variable, depending upon individual susceptibility, duration of exposure, nature of noise (loudness), and time distribution of exposure (such as steady or intermittent). On the average an individual will experience a threshold shift (a shift in an individual's upper limit of sound detectability) when exposed to noise levels of 75 to 80 dB for several hours. This shift will last only several hours once the source of noise pollution is removed. A second physiologically important level is the threshold of pain, at which even short-term exposure will cause physical pain (130 to 140 dB). Any noise sustained at this level will cause a permanent threshold shift or permanent partial hearing loss. At the uppermost level of noise (greater than 150 dB), even a single short-term blast may cause traumatic hearing loss and physical damage inside the ear.

Although little hard information is available on the psychological side effects of increased noise levels, many researchers attribute increased irritability, lower productivity, decreased tolerance levels, increased incidence of ulcers, migraine headaches, fatigue, and



allergic responses to continued exposures to high-level noises in the workplace and the general environment.

Reducing noise pollution by muffling the sounds at the source is one of the best methods in industry and for urban living. Protective equipment is generally mandatory when noise levels exceed 85 dB(A) in industry. Creation of green cover adjacent to municipal roads and in mines is the way to mitigate noise pollution. It has been observed that noise level reduces by 10 decibels per every 10m wide green belt development. Apart, redesigning industrial equipment, shock mounting assemblies and physical barriers in the workplace are also for reduction and exposure of unwanted industrial noise.

High way noise pollution can be mitigated by constructing noise barriers. Artificial noise barriers are solid obstructions built between the highway and the residential areas along a highway. They block major portion of noise produced by passing vehicles on a highway. Effective noise barriers typically reduce noise levels by as much as half or more. The construction of noise barrier may be built in the form of earth mounds, vertical wall along the highways for creation of blockage of sound generated by heavy vehicles. Creation of greenbelt in the space between the residences and highways also reduces the noise nuisance.

## AIR POLLUTION

Air pollution is the accumulation in the atmosphere of substances that, in sufficient concentrations, endanger human health or produce other measured effects on living matter and other materials. Among the major sources of pollution are power and heat generation, the burning of solid wastes, industrial processes, and, especially, transportation. The six major types of pollutants are carbon monoxide, hydrocarbons, nitrogen oxides, particulates, sulphur dioxide, and photochemical oxidants.

### **Local and Regional**

Smog has seriously affected more persons than any other type of air pollution. It can be loosely defined as a multisource, widespread air pollution that occurs in the air of cities. Smog, a contraction of the words smoke and fog, has been caused throughout recorded history by water condensing on smoke particles, usually from burning coal. The infamous London fogs--about 4,000 deaths were attributed to the severe fog of 1952--were smog of this type. Another type, ice fog, occurs only at high latitudes and extremely low temperatures and is a combination of smoke particles and ice crystals.

As a coal economy has gradually been replaced by a petroleum economy, photochemical smog has become predominant in many cities. Its unpleasant properties result from the irradiation by sunlight of hydrocarbons (primarily unburned gasoline emitted by automobiles and other combustion sources) and other pollutants in the air. Irradiation produces a long series of photochemical reactions. The products of the reactions include organic particles, ozone, aldehydes, ketones, peroxyacetyl nitrate, and organic acids and other oxidants. Sulphur dioxide, which is always present to some extent, oxidizes and hydrates to form sulphuric acid and becomes part of the particulate matter. Furthermore, automobiles are polluters even in the absence of photochemical reactions. They are responsible for much of the particulate material in the air; they also emit carbon monoxide, one of the most toxic constituents of smog.

All types of smog decrease visibility and, with the possible exception of ice fog, are irritating to the respiratory system. Statistical studies indicate that smog is a contributor to malignancies of many types. Photochemical smog produces eye irritation and lacrimation and causes severe damage to many types of vegetation, including important crops. Acute effects include an increased mortality rate, especially among persons suffering from respiratory and coronary ailments. Air pollution also has a deleterious effect on works of art.

Air pollution on a regional scale is in part the result of local air pollution--including that produced by individual sources, such as automobiles--that has spread out to encompass areas of many thousands of square kilometres. Meteorological conditions and landforms can greatly influence air-pollution concentrations at any given place, especially locally and regionally. For example, cities located in bowls or valleys over which atmospheric inversions form and act as imperfect lids are especially likely to suffer from incidences of severe smog. Oxides of sulphur and nitrogen, carried long distances by the atmosphere and then precipitated in solution as acid rain, can cause serious damage to vegetation, waterways, and buildings. Air pollution in Nigeria is also as a result of cooking fuels. Many houses still use fire wood or charcoal for cooking purposes and this method releases oxides of carbon, nitrogen, and sulphur into the environment. Asthma and bronchitis are the major ailments in Nigerian populations.

## **Global**

Humans also pollute the atmosphere on a global scale, although until the early 1970s little attention was paid to the possible deleterious effects of such pollution. Measurements in

Hawaii suggest that the concentration of carbon dioxide in the atmosphere is increasing at a rate of about 0.2% every year. The effect of this increase may be to alter the Earth's climate by increasing the average global temperature. Certain pollutants decrease the concentration of ozone occurring naturally in the stratosphere, which in turn increases the amount of ultraviolet radiation reaching the Earth's surface. Such radiation may damage vegetation and increase the incidence of skin cancer. Examples of stratospheric contaminants include nitrogen oxides emitted by supersonic aircraft and chlorofluorocarbons used as refrigerants and aerosol-can propellants. The chlorofluorocarbons reach the stratosphere by upward mixing from the lower parts of the atmosphere. It is believed that these chemicals are responsible for the noticeable loss of ozone over the Polar Regions that have occurred in the 1980s.

<b>The gaseous composition of unpolluted air</b>	
<b>The Gases</b>	<b>Parts per million (vol)</b>
Nitrogen	756,500
Oxygen	202,900
Water	31,200
Argon	9,000
Carbon Dioxide	305
Neon	17.4
Helium	5.0
Methane	0.97-1.16
Krypton	0.97
Nitrous oxide	0.49
Hydrogen	0.49
Xenon	0.08
Organic vapours	ca.0.02

## **CONTROL OF AIR POLLUTON**

The following should be done to manage and control air pollution

- i. Use of better designed equipment and smokeless fuels, hearths in industries and at home.
- ii. Automobiles should be properly maintained and adhere to recent emission-control standards.
- iii. More trees should be planted along road side and houses.
- iv. Renewable energy sources, such as wind, solar energy, ocean currents, should fulfil energy needs.
- v. Tall chimneys should be installed for vertical dispersion of pollutants.

The commonly used equipments / process for control of dust in various industries are (a) Mechanical dust collectors in the form of dust cyclones; (b) Electrostatic precipitators – both dry and wet system; (c) particulate scrubbers; (d) Water sprayer at dust generation points; (e) proper ventilation system and (f) various monitoring devices to know the concentration of dust in general body of air.

The common equipment / process used for control of toxic / flue gases are the (a) process of desulphurisation; (b) process of denitrification; (c) Gas conditioning etc. and (d) various monitoring devices to know the efficacy of the systems used.

In addition to the above mentioned, the following steps, should be taken for reduction of air pollution - To change our behaviour in order to reduce AIR POLLUTION at home as well as on the road.

#### **At Home:**

1. Avoid using chemical pesticides or fertilizers in your yard and garden. Many fertilizers are sources of nitrous oxide, a greenhouse gas that contributes to global warming. Try organic products instead.
2. Compost your yard waste instead of burning it. Outdoor burning is not advisable, as it pollutes air. Breathing this smoke is bad for you, your family and your neighbours. Plus, you can use the compost in your garden.
3. If you use a wood stove or fireplace to heat your home, it would be better to consider switching to another form of heat which does not generate smoke. It is always better to use sweater or warm clothing than using fireplace.
4. Be energy efficient. Most traditional sources of energy burn fossil fuels, causing air pollution. Keep your home well-maintained with weather-stripping, storm windows, and insulation. Lowering your thermostat can also help – and for every two degrees Fahrenheit you lower it, you save about two percent on your heating bill.
5. Plant trees and encourage other to plant trees as well. Trees absorb and store carbon dioxide from the atmosphere, and filter out air pollution. During warmer days, trees provide cool air, unnecessary use of energy on air conditioning is avoided, hence the air pollution.
6. Try to stop smoking; at home, at office or outside. Tobacco smoking not only deteriorates self's health, it affects others health too.

#### **On the Road:**

1. Keep your vehicle well maintained. A poorly maintained engine both creates more air pollution and uses more fuel. Replace oil and air filters regularly, and keep your tires properly inflated.
2. Drive less. Walking, bicycling, riding the bus, or working from home can save you money as well as reducing air pollution.

3. Don't idle your vehicle. If you stop for more than 30 seconds, except in traffic, turn off your engine.
4. Don't buy more car than you need. Four-wheel drive, all-wheel drive, engine size, vehicle weight, and tire size all affect the amount of fuel your vehicle uses. The more fuel it uses the more air pollution it causes.

## **Conclusion**

Environmental pollution is a challenge in most developed societies of the world; contemporary societies of Africa and Nigeria in particular also grapple with the problems of environmental pollution and are seeking ways to tackle it. This contemporary issue has a negative ripple effect on the health and socio-economic well-being of Nigerian people and as a result has necessitated an interdisciplinary discourse in order to jointly solve this nagging problem.

Nigeria has no data base on pollution in general. In order to manage waste and curb Environmental pollution in Nigeria, a thorough study should be carried out in order to ascertain the level of pollution in our environment, its causes and effects. Since the problem of Environmental pollution is diverse in nature, this study will involve professionals from all walks of life (Engineering, Sciences, Humanities, Arts and Business management).

Environmental pollution is mostly caused by man and his quest to survive and exploit his environment. Nevertheless, in dependent capitalist societies such as Nigeria, creating environmental awareness to the teeming rural based population with low literacy levels is the best option to curbing problems of environmental pollution. This will be achieved by mounting and organizing workshops, conferences, seminars, use of media etc., to educate the public on how to manage, and improve on the relationship between human society and the environment in an integrated and sustainable manner. Emphasis should be laid on why we need to sustain the environment. Pointing out too that human existence is predicated and as well, supported by the environment. It is a two way approach, as we fail to sustain the environment, the environment too will not sustain us.

- Through radio, television and other electronic media, the public should be informed on why it is important to redeem the environment by replacing a felled tree with at least other 10 stakes of trees.
- Urban development planners and related agencies of government should continue to sponsor jingles on radio and television houses on why it is not proper to build houses



on flood areas. Every print media should set aside one day in a week for environmental education and awareness programmes.

- Sanitary and bush burning laws should be reinforced to apprehend and prosecute offenders. Only Enugu State has a law prohibiting bush burning.
- A prompt legislative framework should be put in place to make laws that would tackle headlong issues of noise pollution in Nigeria.
- Rural farmer education on how to apply fertilizer and other related inputs should be reemphasized to reduce health hazards involved.

A lot of awareness can be created about pollution, a great awareness is already there in urban society (in large cities) on pollution, but we cannot effectively control pollution in the absence of authentic data about air pollution, water pollution, water treatment, industrial effluents, sewage management, land and pesticides pollution or abatement of noise pollution. Such measures can be effective only if we have reliable data on exact levels of pollution. Such reliable data can be obtained by monitoring of environmental pollution at site. The knowledge of levels of pollution will enable us to use and adopt effective, reliable and economic measures for their control. To control pollution, which is growing in alarming proportion, the most effective way is to analyse environmental pollution and then adopt a strategy for its control. NESREA is in place and what is needed is to implement the regulations. It should also be noted that law is for everybody. What is applicable to private sector is also applicable to government owned and managed.

## REFERENCES

- Adedipe, N.O. The African Environment: A changing and Scary Scenario. 1992.
- Adeniyi, E.O. "Environmental Management and Development in Nigeria" A paper presented at the proceedings of a National Conference on Development and the Environment, Rosprint Industrial Press Ltd., 1986.
- Amadi, S. N. and Tamuno, S. O. Oil Exploration in Nigeria: Its socio-Economic impact on the oil-bearing communities Tiber , Volume 3, No.1 January – June, 1999.
- Asthana, D. k and Asthana, M. A textbook of Environmental Studies. S. Chand & company. Delhi, 2006.
- Botkin D, and Keller, E (1998) Environmental Science, Earth as a living planet John Willey & Sons, Inc., Canada, 1998.
- Etuonovbe, Angela Kesiena. The Devastating Effects of Environmental Degradation - A Case Study of the Niger Delta Region of Nigeria, 2003.
- ATSDR. Landfill Gas Primer: An overview for Environmental Health Professionals. Washington: Agency for Toxic Substances and Disease Registry, 2001.
- Beven K, Germann P. Macropores and water flow in soils. Water Resour Res 1982.
- H.C. Mba. Towards More Environment Conscious Development Policies in 21st Century Nigeria. Proceedings of the 27th Annual Conference of the Nigeria Institute of Town Planners. Benin, 1996.
- Holderness, A. and Lambert J. A new Certificate Chemistry, Ibadan: Heinemann Educational Books Nig. Ltd., 1982.
- [Http://www.thisdaylive.com/articles/house-of-reps-stakeholders-strategise-on-environment/147422](http://www.thisdaylive.com/articles/house-of-reps-stakeholders-strategise-on-environment/147422).
- [Http://www.uniteforsight.org/environmental-health/certificate](http://www.uniteforsight.org/environmental-health/certificate).
- [Http://bmb.oxfordjournals.org/content/68/1/1.full](http://bmb.oxfordjournals.org/content/68/1/1.full).

- Jones A. Eating Oil: Food Supply in a Changing Climate. London: Sustain and Elm Farm Research Centre, 2001.
- McFarland M, Kaye J. Chlorofluorocarbons and ozone. Photochem Photobiol 1992.
- Odiette, W.O. “Environmental Impact Assessment for Sustainable Development”  
Environmental News, October – December, 1993.
- Olujimi, J. A, Adewumi, E. A. and Odunwole S. Environmental Implications of oil exploration and exploitation in the coastal region of Ondo State. Journal of Geography and Regional Planning Vol. 4(3), 2011.
- Pirog R, van Pelt T, Enshayan K, Cook E. Food, Fuel and Freeways. An Iowa Perspective on how Far Food Travels, Fuel Usage and Greenhouse Gas Emissions. Ames, IA: Leopold Centre, Iowa State University, 2001.
- Prüss A, Kay D, Fretwell L, Bartram J. Estimating the burden of disease from water, sanitation and hygiene at a global level. Environ Health Perspect, 2002.
- Samet J. M., Dearry A, P. A. Eggleston, et al. Urban air pollution and health inequities: A workshop report. Environ Health Perspect 2001.
- Smith KR, Corvalán C, Kjellström T. How much global ill health is attributable to environmental factors? Epidemiology, 1999.
- Uchegbu, S.N. Environmental Management and Protection, Spotlite Publishers, 1988.
- WHO. Methylmercury. Environmental Health Criteria, vol. 101. Geneva: World Health Organization, 1990.