

# WATER POLLUTION AND ITS EFFECT

by

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## **Abstract**

*Water pollution is a problem that deals with contamination of water bodies in the rivers and oceans etc. This paper discussed the effects of water pollution. It also pointed out the cases of its damaging effects on not only to individual species and population but also to the natural biological communities. The control of water pollution in the household or business not served by a municipal treatment plant may have an individual septic tank which treats the waste water on site and discharges in the soil. Alternatively, domestic waste water may be sent to a nearby privately owned treatment system (e.g in rural community). And finally, the industrial waster water and agricultural waste water generated ordinary domestic sewage that can be treated by municipal facilities agricultural pollution is the largest source of sediment close soil that wash off fields in the united states.*

## **Introduction**

Pollution according to Oluwafemi (2006), simply means the release of substance into the environment in quantities that are harmful to man and animals. These substances released are called pollutants which include waste products of industries, refuse and even human waste.

We have different types of pollution; they are air, land or soil pollution. These types of pollution are caused by pollutants, pollutants are substances introduced into environment by man which causes the destruction or improves the party of the environment, causing harm to living organizations including man.

The pollutants are released as a result of our effort to produce more food and raise our standard or living; we increase our agricultural and industrial agricultural and industrial activities which release agricultural chemicals, industrial waste and energy (heat, sounds etc) into various ecosystems,

➤ It disturbs their delicate balance,

- It makes the non-living environment undesirable on unfit for life including human beings.

Many pollutants accumulate in the environment because they are non-biodegradable and cannot be broken down into simple harmful substances. Water pollution can be therefore defined as the pollutions into various water bodies such as oceans, rivers, streams, lakes and springs.

A major problem at present in the developed world is the pollution of rivers and streams by too much nitrate-rich mineral such as nitrates and phosphates may be leached from the soil into the pollutants through the discharge of sewage and other wastes from farms and at times from industries.

### Causes of Water Pollution

There are many factors which cause water pollution according to (G. Idodo-Umeh).

1. **Human Wastes:** As the industries and population continue to grow, more and more human waste are produced and dumped into water Nature's own purification system cannot handle this and as a result, the water is overloaded with impurities. Most streams, rivers, lakes have been loaded with human and animal wastes including debris of all kinds. The human waste such as faces and urine may contain disease causing organisms.
2. **Phosphate Detergents:** Phosphorus in the stimulates excess of algae leading to algal bloom entrophication. Over population of algae upsets the equilibrium of the aquatic environment.
3. **Oil:** Oil spillage causes the surface of the water to be covered with a film of oil. This film of oil may cut off supply of oxygen to the organisms living in the water and also reduce the amount of light entering the water.
4. **Poisonous Chemicals:** Poisonous chemicals such as mercury and gamma line 20 are now finding their ways into our waters. Some factories which make use of mercury discharge it as a waste product into water. Some uncivilized fishermen now use gamma line 20 to kill fish without knowing the ecological consequences of their action.
5. **Fertilizers:** Fertilizers (Nitrates and phosphates) from the farmland cause overgrowth of aquatic vegetation.
6. **Cleared Vegetation:** Some farmers dump the cleared vegetation into water. The decay of the vegetation causes the shortage of Oxygen in water.
7. **Heat (Thermal):** When heat added to a stream, river, lake or sea it is called thermal pollution of water. Some machines in the factories use water as coolant. When the used hot water is returned into a stream, river or lake, the temperature of the water rise making it unsuitable for aquatic plants and animals.

8. **PH:** Industrial discharges may cause excessive acidity or alkalinity leading to toxicity to fish, plants and micro organisms.

### **Effects of Water Pollution**

The high increases of water pollution in Nigeria have affected us in many ways. According to (Idobo Umeh, 1996)

1. **Diseases:** Untreated human and other animal wastes may harbor viruses, bacteria and eggs of worm that cause disease such as dysentery, cholera, typhoid, hepatitis (Jaundice), diarrhea and bilharziasis.
2. **Destruction of Aquatic Life:** The immediate effect of aquatic pollution is the destruction of aquatic organisms. Sewage can contaminate drinking water and other organic substance and this encourage rapid growth of bacteria. The bacteria require oxygen for decay and the oxygen comes from the water hence the dissolved oxygen in the water is reduced to a point that cannot aquatic organisms. Fish and all other aquatic organisms die of suffocation. Fish is a source of animal protein. The death of algae from algal bloom and other aquatic plants in fresh and marine waters may lead to shortage of oxygen into the atmosphere. About 65% of the atmospheric oxygen comes from the sea through photosynthesis; man will therefore die of suffocation if water pollution continues unchecked.
3. **Poisonous Chemicals:** Drinking water contaminated with lead, mercury or cyanide is injurious to man's health and death may result. Fish can store mercury in their tissues. When such contaminated fish are eaten by man, death may result. Fertilizers washed from farmland could be poisonous to man. For instance, if the nitrate concentration in water gets high, it can lead to children mortality and toxicity to adults. Nitrate causes sickness known as methemoglobinemia among babies of three weeks old (blue babies). The nitrate (NO<sub>3</sub>) can be reduced to nitrite (NO<sub>2</sub>). The nitrite in turn oxidizes the ferrous ions (iron II) to ferric ions (iron III). Ferric ions are not capable of transporting oxygen in the blood to the tissues. The victim suffers from shortage of oxygen and may die of suffocation (asphyxiation).
4. **Low Fishery Productivity:** Unemployment, waste materials discharge from the various industries and fertilizers from farmland causes damage to aquatic animals in the seas, rivers, and ocean thereby resulting to low fishery production.
5. **Inadequate Water Supply:** The discharge of unwanted material such as the effluents from ship at the various harbors and the use of agro chemical in killing aquatic animals and plants. To the rivers causes inadequate water supply for domestic and industrial purposes.
6. **Populated of Algae and Photosynthesis:** Population of algae and photosynthesis bacteria are able to grow very rapidly, making water appear cloudy and scummy, hence affecting other aquatic life.

7. **Heat (Thermal):** Increased water temperature, reduce the amount of dissolved oxygen in water and increases chemical and biological activity of the body. Less dissolved oxygen in water leads to suffocation while increased chemical and biological activity may be harmful to organisms.

### **Measurement of Water Pollution**

According to Daniel (2000), Water pollution may be analyzed through several broad categories of methods physical, chemical and biological. Most involved collection of sample, followed by specialized analytical tests. Some methods may be conducted in situ, without sampling, such as temperature. Government agencies and research organizations have published standard, validated analytical test methods to facility the comparability of result from disparate testing events.

### **Sampling**

Sampling of water for physical or chemical testing can be done by several methods, depending on the accuracy needed and the characteristics of the contaminant most commonly in association with rain events. For this reason “grab” samples are often inadequate for fully quantifying contaminant levels. Scientists gathering this type of data often employ auto-sampler devices that pump increment of water at either time or discharge intervals. Sampling for biological testing involves collection of plant and or animals from surface water body. Depending on the type of assessment, the organisms may be identified for bio-surveys (population count) and returned to the water body or they may be dissected for bio-assay to determine toxicity.

### **Physical Testing**

Physical testing: Common physical test of water including temperature, solid concentration like total suspended solid (T.S.S) and turbidity.

### **Chemical Testing**

Water chemistry analysis and environmental chemistry, water sample may be examined using the principle of analytical chemistry. Many published test methods are available for both organic and inorganic compounds. Frequently used method includes PH, biochemical oxygen demand (BOD), chemical oxygen demands (COD), Nutrient (nitrate and phosphorus compound), metals (including copper, zinc, cadmium, lead and mercury), soil and grease, total petroleum hydrocarbons (TPH) and pesticides.

### **Biological Testing**

Biological testing involves the use of plant, animals, and microbial indicators to monitor the health of an aquatic ecosystem.

### **Control of Water Pollution**

According to Schueler, Thomas R., the control of water pollution can be classified into the following: the Domestic sewage, industrial waste water, Agricultural waste water, construction site stormwater and urban runoff (stormwater).

1. **Domestic Sewage:** Domestic sewage is 99.9% pure water, the other 0.1% pollutants. While found in low concentrations, these pollutants pose risk on a large scale. In urban areas, domestic sewage is typically treated by centralized sewage treatment plants. In the U.S. most of these plants are operated by local government agencies, frequently referred to as designed to control conventional pollutants: and suspended solids. Well designed and operated system (i.e secondary treatment or better) can remove 90 percent or more of these pollutants. Some plants have additional sub-system to treat nutrient and pathogens.

#### **Untreated sewage including:**

- i. Utilizing a green infrastructure approach to improve storm water management capacity throughout the system, and reduce the hydraulic overloading of the treatment plants.
- ii. Repair and replacement of leaking and malfunctioning equipment.
- iii. Increasing overall hydraulic capacity of the sewage collection system (often a very expensive option).

### **Industrial Waste Water**

Some industries generate ordinary domestic sewage that can be treated by municipal facilities. Industries that generate waste water with high concentration of conventional pollutant (e.g oil and grease) toxic pollutants (e.g heavy metals, volatile organic compounds) or other none conventional pollutant such as ammonia, need specialized treatment systems. Some of these facility can install a pretreatment system to remove the toxic components, and then send the partially treated waste water to the municipal system. Industries generating large volume of waste water typically operate their own complete on site treatment system.

Heated water generated by power plants or manufacturing plants may be controlled with:

- Cooling ponds, man-made bodies of water designed for cooling by evaporation, convection and radiation.
- Cooling towers, which transfer waste heat to the atmosphere through evaporation and or heat transfer.
- Cogeneration, a process where waste heat is recycled for domestic and for industrial heating purposes.

### **Agricultural Waste Water**

Sediment (loose soil) washed off fields is the largest source of agricultural pollution in the United States. Farmers may utilize erosion controls to reduce runoff flows and retain soil on their fields. Common techniques include contour plowing, crop mulching, crop rotation, planting perennial crops and installing riparian buffers. Nutrients (nitrogen and phosphorus) are tragically applied to farmland as commercial fertilizer, animal manure; or spraying of industrial waste water or sludge nutrients may also enter runoff from crop residues, irrigation water, wildlife, and atmospheric deposition. Farmers can develop and implement nutrient management plans to reduce excess application of nutrients.

### **Construction Site Storm Water**

Construction site storm water, sediment from construction sites is managed by installation of:

- i. Erosion controls, such as mulching and hydroseeding
- ii. Sediment controls such as sediment basins and silt fences

Discharge of toxic chemicals as motor fuels and cornet washout is prevented by use of;

- i. Spill prevention and control plans,
- ii. Specially designed containers (e.g for concrete washout) and structures such as overflow controls and diversion berms.

### **Urban Runoff (Storm water)**

**Urban Runoff:** Effective control of urban runoff involves reducing the velocity and flow of storm water, as well as reducing pollutant discharges. Local governments use a variety of storm water management techniques to reduce the effects of urban runoff. These techniques, called best management practices (BMPS) in the U.S. may focus on water quantity control, while others focus on improving water quality, and some perform both functions.

Pollution prevention practices include low impact development techniques, installation of green roofs and improved chemical handling (e.g management of motor fuels and oil, fertilizers and pesticides). Runoff mitigation system include infiltration basins, bioretention systems, constructed wetlands, retention basins and similar devices.

### **Recommendation**

Based on the challenge of controlling the pollution in the environment and knowing the effects of water pollution on the researcher recommended that the industries should avoid discharging of unwanted materials such as the effluents from ship at the various harbors and the use of agro-chemicals in killing aquatic animals and plants in the rivers.

## Water pollution and its effect

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Adding chemical to the rivers, or sea will also causes death to human and even fishes in the river and it can add more pressure on the environment and its resources. This can also contribute to inadequate water supply, poisonous chemicals, population of Algae and photosynthesis.

Finally, the government should try to provide waste bin for the discharge of wanted materials and the fishermen should avoid using of agro-chemicals in killing aquatic animals and plants to the rivers.

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