

Water Pollution: Sources, Effects, Control and Management

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Abstract

Human activities including industrialization and agricultural practices contributed immensely in no small measure to the degradation and pollution of the environment which adversely has an effect on the water bodies (rivers and ocean) that is a necessity for life. This paper tries to discuss basically what water pollution is and equally to address the source, effect control and water pollution management as a whole. Some recommendations such as introduction of environmental education were mentioned.

Keyword: Environmental Education, Pollution,, Management, Phytoremediation, Biomass and Control

1. Introduction

The importance of water for sustenance of life cannot be overemphasized. Whether it is in use of running water in our homes, rearing cattle and growing crops in our farms, or the increased uses in industry, remain immeasurable. It is important therefore, to not that depletion of this commodity either through contamination, or careless use results in serious consequences.

2. Water Pollution

Water is considered polluted if some substances or condition is present to such a degree that the water cannot be used for a specific purpose. Olaniran (1995) defined water pollution to be the presence of excessive amounts of a hazard (pollutants) in water in such a way that it is no long suitable for drinking, bathing, cooking or other uses. Pollution is the introduction of a contamination into the environment (Webster.com, 2010). It is created by industrial and commercial waster, agricultural practices, everyday human activities and most notably, models of transportation. No matter where you go and what you do, there are remnants earths environmental and its inhabitants in many ways. The three main types of pollution are: Land Pollution, Air Pollution and Water Pollution. Both for the purpose of this research, emphasis are on water pollution and control.

3. Sources of Water Pollution

Water pollution in Nigeria according to Gbamanija (1998) arises from various activities, among which are:

- i. Sewage leakages
- ii. High population density
- iii. oil spillage
- iv. Menace of Nipa palm and water hyacinth
- v. Industrial waste dumped into our waters
- vi. Pollution of ground water through drilling activities

- vii. Flooding during rainy season which carries waste deposits into our waters.
- viii. Building lavatories and visionaries over running water or even the sea as it the practice in some riverine areas.
- ix. Radioisotopes
- x. Heavy metal
- xi. Combustion
- xii. Toxic waste disposal at sea
- xiii. Mineral processing plant (e.g. coal production)
- xiv. Eroded sediments
- xv. Deforestation
- xvi. Mining
- xvii. Littering
- xviii. Pesticides
- xix. herbicides and fertilizers
- xx. Failing septic system
- xxi. House hold chemicals
- xxii. Animal wastes.

Water pollution is generally induced by humans. It results from actions of humans carried on to better self. These could be treated under the various activities that man engages in, that lead to pollution. The growth of human population, industrial and agricultural practices is the major causes of pollution (Eguabori, 1998). Water pollution becomes worse as a result of overcrowding in urban areas. Agricultural, domestic and industrial wastes are the major pollutants of agnatic habitats. Sewage is the biggest pollutant of fresh water when discharged into them. Sewage is the waterborne waster of society and the discharge of untreated sewage into a river is very enormous and unhealthy. The striking consequence is a substantial and immediate drop in the amount of dissolved oxygen in the water. This happens because organic matter stimulates decomposers especially bacteria which break down suspended solids in the sewage. As they respire, the decomposers use up dissolved oxygen (O₂) and the Biological Oxygen Demand (BOD) reduces. The flora and fauna of the rivers experience change and reduction in number due to death by suffocation (Tudge, 1991).

Highly polluted rivers have obnoxious smell and contain little or no flora or fauna. Another source of water pollution is the discharge of hot water from cooling engines in the industries. This increases water temperature and lowers the metabolic rate of organisms. This then raises their oxygen demand. The effects of pollution are greater in shallow, enclosed or slow flowing streams. Excess fertilizer, herbicides and pesticides when washed by rain into rivers causes serious danger to life. Excess phosphorus in fertilizer cause serious entroplication. Apart from fertilizers, detergent are also very toxic to marine life when washed into water. Chemical pollutants from distaffs have been found to be animal carcinogens. The dyeing industries in Nigeria (tie and dye) produce chemicals such as zinc sulphate and copper salts which are non-biodegradable, when they are discharged into rivers; they produce devastating effects on aquatic environments.

Pollution poses a serious risk to life especially when the water is a source of drinking and for domestic purposes for humans polluted waters are potent agents of diseases such as cholera, typhoid and tuberculosis. A major water pollutants has been oil spilled in large quantities from tankers of broken oil pipes from oil industries which kills sea weeds, mollusks, marine birds, crustaceans, fishes and other sea organisms that serve as food for humans. This leads to calcium deficiencies in our diet. Some insecticides like DDT are particularly dangerous when allowed into bodies of water because its concentration increases along the food chain. Oysters for an example can accumulate DDT to a concentration. 70,000 times that of DDT in sea water. The effects of water pollution in some areas has been to an extent of irreversibly changing aquatic ecosystems. This is dangerous to plants and animals including humans.

Since water pollution has direct consequences on human well beings, an effective teaching strategy in

the formal education sector is essential for a better understanding so as to develop the right attitude towards water. This is why the guided discovery approach is a teaching strategy which when adequately utilized and combined with other methods of science teaching will leave lasting impression on the learner as well as help him solve the problems of his immediate environment (Ogwuasor, 1998).

4. Effects of Water Pollution

Water pollution has a dual effect on nature. It has negative effects on the living and also on the environment. The effects of pollution on human beings and aquatic communities are many and varied. Water pollution causes approximately 14,000 deaths per day, mostly due to contamination of drinking water by untreated sewage in developing countries. An estimated 700 million Indians have no access to a proper toilet, and 1,000 Indians children's die of diarrhea every day and so many other countries too. Nearly 500 million Chinese lack access of safe drinking water.

Definitely with all these, we can expect that there is going to be a reduction in productivity. Biomass and diversity of communities are to be expected when large amount of toxic materials are released into the streams, lakes and coastal waters in the ocean. Much of aquatic pollution involves sewage in which organic waste predominate. This waste can increase secondary productivity while altering the character of the aquatic community. Most fishes especially the species desired as food by man are among the sensitive species that disappear with the least intense pollution.

Water pollution leads to damage to human health. Disease carrying agents such as bacteria and viruses are carried into the surface and ground water. Drinking water is affected and health hazards result. Direct damage to plants and animals nutrition also affects human health. Plants nutrients including nitrogen, phosphorus and other substances that support the growth of aquatic plant life could be in excess causing algal bloom and excessive weed growth. This makes water to have odour, taste and sometimes colour. Ultimately, the ecological balance of a body of water is altered. Sulphur dioxide and nitrogen oxides cause acid rain which lowers the PH value of soil and emission of carbon dioxide cause ocean acidification, the ongoing decrease in the PH of the Earth's Oceans as CO₂ becomes dissolved.

5. Pollution Management and Control

There are many approaches that could be adopted in water pollution control and management. It could be through prevention, practice efforts or join a project/program; Regulation and monitoring or engaging in control measures by reducing or minimizing waste.

Prevention of water pollution according to Wikipedia includes the following ways:

- i. Wash your car far away from any storm water drains.
- ii. Don't throw trash, chemicals or solvents into sewer drains
- iii. inspects your septic system every 3 – 5 years
- iv. avoid using pesticides and fertilizers that can run off into water systems
- v. sweep your driveway instead of hosing it down
- vi. always pump your waste-holding tanks on your boat
- vii. use non-toxic cleaning materials
- viii. clean up oil and other liquid spills with kitty litter and sweep them up
- ix. don't wash paints brushes in the sink.

Another way is to join or get involved with pollution prevention is to practice efforts on your own or join projects or programme. Some of these are available with the Environmental Protection Agency website (EPA).

Regulation and monitoring is an effective way of pollution management. Many nations worldwide have enacted legislation to regulate various types of pollution as well as to mitigate the adverse effects of pollution.

Pollution control means to control the emissions and effluents into the air, water and land or soil. Without pollution control, the waste products from consumptions, heating, agriculture, mining, manufacturing, transportation and other human activities, whether they accumulate or disperse, will degrade the environment. Pollution prevention and waste minimization are more desirable than pollution control. However, pollution could be minimized by adopting these practices (i) by recycling (ii) by reusing (iii) waste minimization (iv) by mitigating (v) by preventing (vi) by compost.

Apart from all these mentioned above, you can also use pollution control devices which include Dust collection system e.g. bag houses, cyclones, electrostatic precipitators, scrubbers e.g. baffle spray scrubber, ejector venturi scrubber, mechanically aided scrubbers, spray tower, wet scrubber, sewage treatment e.g. sedimentation (primary treatment), activated sludge bio filters (secondary treatment, also used for industrial waste water), aerated lagoons, constructed wetlands (also used in urban runoff); industrial wastewater treatment e.g. ultra filtration, API oil-water separators, bio filters, dissolved air flotation (DAF), powdered activated carbon treatment; the last but not the least are vapour recovery system and phytoremediation.

6. Conclusion

Water pollution is an environmental problem that is of major concern to us in Nigeria and the world at large. Human contribution to water pollution is enormous by way of defecating; dumping of refuse, industrial wastes and washing of clothes etc. (Egilor, 1998) apparently, environmental education is of immense importance to use particularly in schools and should have a place in the school curriculum. In this way they will be less inclined to pollute our waters.

7. Recommendation

It is pertinent that environmental education is introduced in schools and be made compulsory. Federal, State and Local Government should establish agencies to monitor our environment and equally to be sure that our environment is kept clean and free from refuse dumps.

Industrial homes or family should equally inculcate a hygienic environment particularly in their vicinity, according to the adage that says charity begins at home.

Our industries should go ahead in trying to recycle these wastes instead of dumping them for rain water to sweep these refuse into our rivers and streams making them undrinkable.

References

- Eguabor, V (1998). Strategies for Teaching water pollution in secondary schools. *STAN Journal Environmental Education series* (2), 49
- Gbamanja S.P.T. (1998). The Pedagogy of water pollution. *STAN Journal "Environmental Education Series"* (2), 43
- Musa H. (2013). Water Pollution. "Water Pollution in Focus" Contribution from the former Suleja LGA Chairman 21/6, 9.39am.
- Nzewi, U (1998). Strategies for Teaching water pollution. *STAN Journal Environmental Education Series* (2), 31, 33, 34
- Ogwuazor, K.E. (1998). Teaching water pollution by guided discovery. *STAN Journal Environmental Education Series* (2) 52.
- Olaniran N.S. (1995). "Environment and Health: An Introduction", in Olaniran, N.S. et al (Ed) Environment and Health. Lagos. Micmillan Nig. Pub. Co for NCF, 34-151.
- Webster.com. (2010). Definition from Webster Dictionary 08-13 Retrieved 2010-08-26
- Wikipedia, the free encyclopedia. <http://en.wikipedia.org/wiki/pollution>. Retrieved 20-06-2013