

WATER POLLUTION AND ITS EFFECTS ON FISHERIES

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Abstract

Freshwater is a chief natural resource used for Various types of activities in our daily lives for drinking as well as different developmental purposes. An increase in pollution levels leads to instability in our natural environment and harms both the physical systems and living organisms dwelling in the ecosystem. Various harmful substances present in polluted water bodies in the form of insecticides, pesticides, heavy metals, mill waste, and crude oil are frequently released into the aquatic ecosystem. When a large amount of these pollutants is released into any water body, causes an acute effect by rapid high-scale mortalities of aquatic organisms. Minor levels of pollutant discharge result in an accumulation of contaminants in the body composition of fish species Water pollution effects are classified into acute and chronic effects, which suppress the immune response, reduction of metabolism, harm togills, and epithelial layer in the fish species. Some of the diseases caused by the pollutant include fin rot, tailrot, gill disease, damage to hepatic tissues, and also causes ulceration. This chapter aims to review the various types of impacts caused by water pollution on the health of fish species and their ecosystem.

Keywords: Aquatic environment, Fish species, Toxicity, Wastewater, Water pollution.

Introduction

Water pollution is any chemical, physical, or biological change in the quality of water that has harmful effects on any living thing that drinks uses, or lives (in) it. When humans drink polluted water, it often has serious effects on their health.

Water pollution comes from man-made substances or things produced by man activities that prevent the water from being used

naturally.

Water pollution causes devastating consequences to marine life, fish and marine animals at the top of the food chain are exposed to higher levels of toxins because they are exposed to toxins directly from the water. Water pollution affects the ecosystem. It will stand at the smallest part of the food chain and affect the chemical makeup of the river.

Water pollution is one of the most serious environmental problems, it occurs when substances such as human and other animal wastes, toxins, chemicals, metals, and oils contaminate water. This contamination can affect lakes, rivers, oceans, the water beneath, the surface of the earth, and groundwater.

Water polluted with human and animal wastes can spread typhoid fever, cholera, dysentery, and other diseases. Scientists are concerned that drinking even with small quantities of these substances over many years may have harmful effects.

Water pollution, means one or more substances have built up in water to such an extent that, they cause problems for animals or people. Water pollution is all about quantities, how much polluting substances are released, and how big a volume of water is. Small quantities of a toxic chemical may have little impact if it is spilled into the ocean from a ship.

In 1996, a study in Iowa in the United States found that over half of the state's groundwater wells were contaminated with weed killers. Chemicals released by smokestacks (chimneys) can enter the atmosphere and then fall back on earth as rain, entering seas, rivers, and lakes, causing water pollution, which is called atmosphere deposition. This is one of the reasons why, it is such a difficult problem to solve. Moreover, our life greatly depends on water, and life without water is impossible.

Factors Affecting Fish Production in Nigeria

The various factors are known to adversely affect fish production in this chapter. They include factors that affect fish in

water as are considered separately below.

1. **Pollution of the Aquatic Environments**

Fish live in water and will only flourish when the chemical and biological conditions of the water are suitable, such as when the water is fairly free from pollution. Water pollution is defined by Wisdom (1956) as the presence of anything in the water that changes its natural qualities. According to Hynes (1959), all such activities as clearing trees, burning and cultivating, and piling up of middens lead to alteration in streams. Pollution affects fish more than any other factors prevailing in the water. Vanden, Bossche, and Bernacsek (1990) said that Nigeria is one of the most advanced countries in Africa and is pursuing an active policy for agricultural and industrial development. Far-reaching environmental issues are therefore to be anticipated with consequent losses in industrial wastes that have already caused eutrophication and pollution in the coastal lagoons. Anything that causes pollution is referred to as a pollutant. Water pollutants include:

- (a) Organic matter pollutants
- (b) Chemical compounds
- (c) Oil, and
- (d) Detergents.

(a) ***Organic matter pollutants***

Organic pollutants that find their way to the water include sewage, dead bodies of animals, domestic wastes, leaf-fall, manure (from cattle yards), waste from breweries and beverage factories (mostly from soft-drink production), and wastes from the textiles industries as well as from slaughter-houses.

In many areas in Nigeria, people still use waterways as toilets or for dumping feces. This could be very intensive when the rivers flow through towns or villages, most especially through a marketplace. Good examples are the Odo-Ogbe River in Ile-Ife; Agbede River in Ondo; River Ezu which flows through Awka; River Oji which flows through Onitsha; River Kaduna which flows through Kaduna and River Niger which flows through many towns,

notably Yelwa where it is heavily polluted. In many of these instances, market women commonly throw feces,used leaves, and other organic materials into the rivers directly, in other instances, the rubbish is piled up to form big heaps ("aatan" in Yoruba, "Ikpoahihia" in Ibo and "juji" in Hausa) near these rivers. The contents of such heaps are later washed off, during heavy rain, into the river.

Roso, River Lisaluwa in Ondo has a big slaughterhouse. (PPC)in the town.withwastes from breweries and soft-drinkplants.The beer) in Ilesa washes into River Asoro(or Asorostream), and washes into the OgbeseRiver on the Akure-Owo Road in Oyo State respectively. Table 5.1 shows more brewery's soft drinks plants on rivers.

Pollution prevents water bodies from carrying out their two major functions support fisheries and serve time, pollution increases the rate of ageing of lakes (Pearsall, 1949). When organic matter gets into water bodies from whatever source, bacteria of decay act on it, using up the oxygen in the water. Bacteria of fecal origin are also usually present in sewage.

Table 5.1: *Some Nigerian Breweries, Bottling Plants, and the Waterbodies that receive their Effluents*

Town	State	Location of factories	Product/s	Water bodies
Abeokuta	Ogun	Ita Oshin	Top beer, Baron lager beer	River Ogun
Abeokuta	Ogun	Lafenwa	Spirit/Alcoholic beverage	River Ogun
Ijebu-Ode	Ogun	Epe road	33 Export lager beer	River Osun
Ibadan	Oyo	Oluyole Industrial Layout	Club lager beer	River Ona,Elere River
Ibadan		New Ife Road	Gulder/Star/Captain lager beers Maltina	River Osun
Ibadan	Oyo	Mokola Road	Coca-ola/Fanta/Tonic	Ogunpa River
Akure	Ondo	Ondo Road Akure Owo Road	Zit lemon Bluna, Orange, Vimto, Africola Time Cola,	Ohosu River Ogbese River

Ilesa	Osun	Omiasoro Road	Trophy/Mayor lager beers/Betamalt	River Asoro
Ilorin	Kwara	Asa-dam Road	Fruit squash	River Asa
Bacita	Kwara	Pati-tunku Estate	Alcohol/Spirit	River Osin
Kaduna	Kaduna	Isa Kaita Road	Kronneborg lager beer	River Kaduna
Zaria	Kaduna	Waff Road	-	River Tubo/ River Kaduna
Kano	Kano	Mangana Road	Double Crown Lager beer	River Kano
Onitsha	Anambra	Akwa Road Industrial layout	Pepsi Cola Premier lager beer	River Niger River Niger
Umuahia	Abia	Afara layout	Golden guinea lager beer, Berged off lager beer	River Imo
Aba	Abia	Osisioma Industrial Area	Dubic larger beer	River Imo
Port Harcourt	Rivers	Trans-Amadi Industrial layout	Graud lager beer, Bond lager beer, Grand/Wines and Spirits	Bonny River, Dockyard Creek
Uyo	Akwa Ibom	Eket-Oron Road	Dr. Pepper Champion Lager beer/Champ malt	River Cross

b) Chemical Pollutants

These could be agricultural or industrial pollutants that find their way to the waterbodies. Agricultural pollutants include:

- (i) the poisons used for killing or stupefying fishes, like rotenone, cyanides, and Gamalin²⁰;
- (ii) the herbicides and insecticides especially DDT, BHC; and
- (iii) fertilizers drained from farmlands.

Although fertilizers are frowned upon in many Western countries, if used with caution, they are found to make water productive in tropical ecosystems.

The industrial pollutants include inorganic reducing agents like sulphites, sulphides, and ferrous compounds; and heavy metals like

lead, copper, and silver. Most of the chemical pollutants find their way to the water through land erosion and inflows. Combustion products from gas flares in oil-producing areas, e.g., the Niger Delta, could be a pollutant when dissolved in the rain that falls into the water.

(c) Oil Pollutants

Oil is washed into water from spills on roads, from workshops and garages, or through ignorant motorists who drain the oil 210 GCW from their vehicles into waters or places where it can be washed into streams directly by the villagers who add oil to the dumping places) add to the sources of oil in water. Palm oil production plants near a river are other sources. An example is the palm oil production plant on the bank of River Ozi in Nigerian water bodies petroleum and petroleum products leak from pipes into such water-bodies. We frequently waterbodies. An example is the Texaco oil leakage which occurred in the Niger Delta in February 1980, killing aquatic organisms, (especially fishes), in larger numbers, rendering the water useless for drinking and domestic use, and destroying fishing equipment. If we bear in mind that a small quantity of oil can cover an enormous area of water-something of the order of four acres to the gallon (Hynes, 1959) - we could appreciate the amount of Nigerian waterbodies that might have been polluted with oils, at times through thoughtless, preventable actions.

When oil gets to the water, it forms a film over the surface of the water, preventing oxygen from entering the water and thereby reducing the rate of reoxygenation. It also blocks the respiratory surfaces of many of the animals in the water.

(d) Detergent pollutants

Detergents are important pollutants in Nigerian inland water bodies. Travelling through the country one sees people washing clothes and bathing in the rivers with all sorts of soap and detergents. Many prophets request members of their congregation to bathe in flowing waters. The Osun River at Ede in Osun State is a

good place to watch this type of action. The villagers are particularly guilty of washing and bathing in the rivers. The lack of pipe-borne water in these villages is partly responsible for this. Detergents affect the uptake of oxygen at the water surface and also form foams that are unsightly in the water. On the whole, detergent adds phosphates to the water, and when in excess it becomes dangerous.

Its primary effect is on living things. Most of the causes of uneducated on this important issue, the problem of pollution is likely to remain for long.

2. Drought

This is simply defined as the excessive loss of water from the evaporation rate. Drying up of rivers, exposure of the bottom including the man himself. The ultimate result is starvation, animals have no water to drink and man cannot get water for domestic use. As a result, animals, especially cows and other livestock die in large numbers.

The effect of drought is most pronounced on animals that live in water, especially the fishes. When serious drought occurs concerning larger waterbodies, besides the fact that a great amount of the water has been dried up due to the drought, what is left is still required for several purposes: irrigation is responsible for further reduction in the water; water is also taken from these waterbodies for domestic use; and the shepherds bring their livestock there to drink. All these actions further reduce the amount of water in, say, lakes. These reductions have three main effects on fish production. First, the shoreline and its vegetation, which hitherto had formed the breeding ground for fishes, are exposed and destroyed. This reduces the number of young fish that enter the population. Furthermore, the water becomes shallower, to the disadvantage of deepwater excessively high, deepwater dwellers, and the salinity of the water may become excessively high, resulting in the death of some fishes and probably forcing them to migrate.

3. Overfishing

Overfishing is the act of taking more fish than scientifically fishing more than fixed quotas when such exists. It occurs when the recruitment rate is lower than the fishing rate. Ita (1982) gave the following five reasons to show that Lake Kainji was overfished:

(i) the general decline in catch per unit effort and the observation that the increase in fishing effort does not result in a proportional increase in the catch; (ii) low productivity of the littoral zones; (iii) a high concentration of fishermen per unit length of shoreline or surface area of the lake; and

4. Aquatic Weeds

(ii) Under aquatic conditions, but growing out of control. Some of the aquatic weeds already identified in Nigeria, and their effects on both the fishes, the fishermen, and the aquatic environments as a whole. (ii) They prevent water from mixing, thereby preventing an even distribution of nutrients. (iii) They compete with other aquatic organisms, including fishes, for nutrients and gases.

(iv) They impede navigation and the actual process of fishing. Also, fishing nets cannot go down beyond the water surface when there is weed infestation and the nets are torn, the boats are destroyed by the weeds and fishermen are, as a result,

(v) They clog water inlets and outlets, especially in ponds.

(vi) They increase the rates and amounts of siltation, thereby making the water below the weedy surface too clear for appreciable productivity. (vii) They enhance water loss due to transpiration and in shallow water bodies this may lead to drought.

(viii) The snails and other disease vectors use the weeds as their breeding. There are other adverse effects of aquatic weeds (such as their effects on the generation of hydroelectricity) not directly affecting fishermen. Aquatic weeds, however, confer some advantages such as the reduction of erosion along the shorelines, provision of food, protection and breeding grounds for some fishes, and the release of oxygen to the environment during photosynthesis.

The disadvantages well outweigh the advantages in the environments.

Many water bodies in Nigeria have been completely taken Chad fishery is the invasion of swamp vegetation leaving little (Eichhornia crassipes. Solms), The Nigerian government had never given attention to the aquatic weed menace.

Table 5.2: *Some of the Aquatic Weeds in Nigerian Freshwater*

Botanical Names	Common Names	Habits
Eichhornia crassipes	Water hyacinth	Free-floating
Pistia stratiotes	Water lettuce	Free-floating
Pistia maximum	Water lettuce	Free-floating
Cyperus difformis	Sedge	Marginal
Cyperus digitus	Sedge	Marginal
Cyperus papyrus	Sedge/papyrus	Marginal
yperusarticulatus	Sedge	Marginal
Iternantherasessilis	Aligator weed	Marginal
Eratophyllumdemersum	Coontail/Homwort	Submerged
Omoea aquatica	Morningglory	Marginal
Emmnapaucicostata	Duckweed	Free-floating
Chinochloastagnina	Grass	Marginal
Hinochloa pyramidalis	Grass	Marginal
Mphaea lotus	White water lily	Emergent
Mphaeacolus	White water lily	Emergent
Icularia vulgaris	Great bladderwort	Free-floating
Icularia intermedia	Intermediate	Free-floating
Opodiuminundatum	Marsh clubmoss	Marginal
Vgonumsenegalense	Smartweed	Marginal
Ha domingensis	Cattails	Emergent
Chiaria mutica	Grass	Marginal

(ii)They prevent water from mixing, thereby preventing an even distribution of nutrients.

(iii) They compete with other aquatic organisms, including fishes, for nutrients and gases.

(iv) They impede navigation and the actual process of fishing.Also fishing nets cannot go down beyond the water surface when there is weed infestation and the nets are torn, the boats are destroyed by the weeds, and fishermen are, as a result, discouraged.

- (vi) They increase the rates and amounts of siltation, thereby making the water below the weedy surface too clear for appreciable productivity.
- (vii) They enhance water loss due to transpiration and in shallow water bodies this may lead to drought.
- (viii) The snails and other disease vectors use the weeds as their breeding grounds. This affects the health of the riverine people especially the fishermen, many of whom have gone blind in Nigeria today as a result of filaria infection.

Aquatic weeds, however, confer some advantages such as the reduction of erosion along the shorelines,provision of food, protection and breeding grounds for some fishes, and the release of oxygen to the environment during photosynthesis. The disadvantages well outweigh the advantages in the environment. Many water bodies in Nigeria have been completely taken from Chad's fishery in the invasion of swamp vegetation leaving little (Eichhornia crassipes. Solms), Nigerian government had never given attention to the aquatic weed menace.

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Conclusion:

Different types of impurities and toxins enter into the aquatic ecosystem impact the water quality and disturb the life cycle of aquatic organisms. Some pollutants are very active in the aquatic organisms both morphologically and metabolically. Nevertheless, there is only inadequate evidence that water impurities and pollutants are truly accountable for the expansion of disease in aquatic animals, The revelation of aquatic animals to pollutants for a long term the ceaseless risk to health. So, directly and indirectly, aquatic animals are at higher risk due to various anthropogenic activities. For these problems, it is very clear that everyone should have the essential preemptive Diverse effect of pollutants on the population of various fish species has been reported by severalresearchers' time to time and predicts a chronic which causes different effects on the aquatic life i.e. changes in histopathological, migration, embryonic and changes especially in fish Several pollutants in the atmosphere constituted of various toxicant compound i.e. organophosphate compounds bring lethal effects in fish species, Thus, to overcome problems it is important to develop some approaches using molecular biology techniques that will modernize toxicological bids that are low-priced arid do not demand the aquatic animals to ecological stressors. More research struggles must be done to establish the concentration level and time of all the pollutants and also it is very important to significant lethal and sublethal effects on the aquatic organism.

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