Sources, Effects And Management Of Water Pollution

Abstract:

Water is inevitable for the existence of life. But various anthropogenic activities degrade the quality of water. The substandard and low quality water is a poison. Whereas the pure water is a nectar and is essential for life the unsafe and substandard water can damage the functionaries of life. In this article a brief on water pollution is presented.

Introduction:

One of the most crucial renewable natural resources essential for the very existence of life on earth is water. The utility of water for the human being is not only limited to domestic use of day to day life in the form of drinking water to quest thrust of cooking the food or washing purpose but is also essential in a more fanatic way in food productions units like in agricultural crop productions, fisheries, etc. and also in industries. In deed water is used by human being in an enormous way and is quite impossible to substitute it by any other material. Despite the fact that almost 70% of the earth's surface is covered by water, the actual water useful for mankind is enormously small. It is around 1% or less than that is actually useful for the human beings as most of the water available on the earth exist as saline water in the ocean or stored on glacier in the form of ice. The consumption of water had increased recently due to rapid growth in human populations which triggered urbanization, industrializations and enormous agricultural growth. Due to developmental activities taking place everywhere, the contamination level of water throughout the world has also raised to the great ascend threatening the lives of people and other living beings.

In this article we address the origin of the problem i.e the source of water pollutions in the following section. In the subsequent section, the effect of the water pollution to the mankind as well as to the environment in general is presented. At the end we present the possible way to manage the water pollutions in a coherent and scientific way.

Sources of water pollution

The sources of water pollutions can be categorised as Point source and Non-point source. Point sources of pollution are those in which the source of the pollutants can be identified and is confined to a place. A simple example can be disposing of plastics in water bodies, dumping of waste from industries and oil spillage. On the other side non-point source of water pollution are those which pollutes the water in an unidentified manner like the fertilizers used for the agricultural purposes slowly gets into water. Water pollutants may be of both organic and inorganic pollutants. Organic pollutants comprises of organic matters like insecticides, waste from the livestock, herbicides, and organohalides, whereas inorganic pollutants are those inorganic substances that are responsible for pollution of water like heavy metals and other agricultural fertilizers which contain nitrogen and phosphorous.

The sources of water pollutions are

1. Urbnanization: the drainage system of most of the towns and cities are connected to the river systems thereby infecting the water mainly with higher concentration of phosphorus.
2. Sewage and other Oxygen Demanding Wastes: since very huge quantity of biodegradable and non- biodegradable waste is being produced every day, it is very difficult to manage the waste so they are disposed in water system like rivers and oceans. Sewage can be a fertilizer as it releases important nutrients to the environment such as phosphorus and nitrogen which is necessary for the growth of flora and fauna. These chemical fertilizers add nutrient and lead to increase in the growth of algae and plankton in oceans and lakes creating algal bloom and reducing the oxygen content of the water that is necessary for other aquatic lives.
3. Industrial Wastes: most of the industries and factories are located near the water bodies like river, lake, ocean etc. A large part of the waste material from the industries like acids, bases and other chemicals are disposed in the water bodies thereby polluting it which ultimately affects the human health and the lives of millions of aquatic organism.
4. Agro-chemical Wastes: in order to enhance the productivity of field various agro-chemical wastes like fertilizers, insecticides, and herbicides are used. So improper disposal of thus waste and during runoff season these waste ultimately reaches the water bodies contributing a large volume of pollution in the water bodies.
5. Thermal pollution: A large amount of heat is being released into water bodies in the form of hot water from nuclear power plant, electric power plant, petroleum refineries, steel melting factories, coal fire power plant, boiler from industries and others sources. This elevated temperature affects the aquatic lives adversely and disrupts the aquatic ecosystem. High temperature leads to reduction in the dissolved oxygen level of water which will cause several physiological, respiratory and digestive problems to the aquatic creatures.
6. Nutrient enrichment: The percentage of pollution by natural sources is relatively less. Anthropogenic sources of contaminants are because of releases from sewage water, runoff from agricultural land and animal farms contribute harmful pathogens to water system.

There are many other sources of water pollution like the disruption of sediments, acid rain pollution and introduction of alien species.

Effect of water pollution

Pure water is worthy for the existence and development of human society but the existence of pollutants in water affects human health in an unprecedented way. Presence of petrochemicals, chlorinated solvents, pesticides nitrates and heavy metals such as Cadmium, Mercury, Arsenic, Lead etc. makes the water a poison. Presence of excessive Fluoride in water is also a matter of worry as it affects the bones. Waterborne pathogens, in the form of disease-causing micro organs from human and animal waste, are the major cause of illness from the contaminated water. Consumption of polluted water spreads diseases like cholera, giardia, typhoid etc.

The acid rain also affects the quality of the soils, as it pollutes the soils and damages plants by dissolving and washing away necessary nutrients and minerals from the soil on which the plants rely.

Effect of organic matter decomposition: deposition of dead remain of plant and animals directly into the water bodies cause increment in the microbes like aerobic and anaerobic bacteria. Increase in decomposition of organic matter enhances growth of planktonic and green-blue algal bloom. This growth of algal bloom reduces penetration of light at deeper layer of water causing decline in the flora. This condition results in reducing the level of dissolved Oxygen and increase in biological oxygen demand (B.O.D).

Effect of detergent decomposition: Detergents from household and industrial purposes are washed into the water bodies. These detergents contain higher amount of phosphates that enters the plant through roots causing retarded growth, elongation of roots, destruction of chlorophylls and cell membranes and denaturation of proteins causing enzyme inhibition in various metabolic processes.

Effects of agricultural chemicals: chemicals present in fertilizer used for agriculture results in eutrophication by enrichment of nutrients. Pesticides, herbicides and insecticides also cause change in pH of the water bodies. Most common effect of these substances is the reduction in photosynthetic rate.

Effect of thermal pollution: it reduces the activity of aerobic decomposers due to the decrease in dissolved oxygen and also hampers the nutrient balance in water. Aquatic plants show reduced photosynthesis rate.

Phytotoxicity effect: The toxic elements in water also causes phytotoxicity when the polluted water is taken by the plants and combines with the food produced during photosynthesis. As animals feed on polluted food the increasing levels of poisons is built up through food chain.

Effects of oil spillage: Oil pollution due to spillage of oil tankers and storage containers prevents oxygenation of water and depletes the oxygen content of the water body by reducing light transmission, inhibiting the growth of planktons and photosynthesis in macrophytes.

Controlling water pollution

1. No oily substances in the sink: refrain from dumping oily substances like fat and oil in the kitchen sink. Rather collect all type of oily waste in a container and dump it in solid waste.
2. Refrain from throwing leftover medicines, pills and other contaminated substances in the drain: These substances through drain will get into the water bodies and can diminish the quality of water. It is recommended to always dispose in a proper place.
3. Do not use toilet as dustbin: Many people have the habit of discarding clothes piece, papers , chocolate wrappers and other synthetic material in the toilet pot: The harmful elements this materials will slowly get into the water bodies and add on to water pollution.
4. Less usage of bleach or detergents: it always advisable to use phosphate free detergent or soap in laundries, cutleries and while washing dishes.
5. Minimize the use of chemical fertilizer: Excessive usage of chemical fertilizers, herbicides, pesticides is the major cause of water pollution as the chemicals from those products will ultimately get into the water bodies by surface runoff or through infiltration into the soil. So by practicing the organic way of reducing weed, pest and diseases,

water pollution can be greatly minimised.

6. Proper sewage treatment: waste management is very crucial because the toxic and other injurious substances from the sewage usually lend in water bodies like river, lakes and oceans. And also the septic tank and drain from the house should not be connected to the water bodies.
7. There should be ban on washing of clothes and laundry alongside the river bank.
8. Industries should install Effluent Treatment Plant (ETP) to prevent the pollution at source.
9. All towns and cities must have Sewage Treatment Plants (STPs) to clean up the sewage effluents.
10. Improper use of fertilizers, herbicides and pesticides in farming should be stopped and organic methods of farming should be adopted. Cropping practices in riparian zone should be banned to protect the riparian vegetation growing there.
11. Religious practices that pollute river water by dumping colourful paints of idols containing harmful synthetic chemicals should be stopped.
12. Rain water harvesting should be practiced to prevent the depletion of water table.
13. Making people aware of the problem is the first step to prevent water pollution. Hence, importance of water and pollution prevention measures should be a part of awareness and education programme.
14. Polluter pays principle should be adopted so that the polluters will be the first people to suffer by way of paying the cost for the pollution. Ultimately, the polluter pays principle should be designed to prevent people from polluting and making them behave in an environmentally responsible manner.
15. As riparian vegetation helps in making the river water clean because of the multiple functions, to prevent people from felling and clearing down of riparian forest zones for road construction, agricultural practices, recreational and tourism, sand mining, quarrying and clay mining etc. community should play a regulatory role.
16. Proper disposal of solid waste non-biodegradable waste is very crucial. When the solid waste like sanitary towel and diapers are not disposed properly and flushed in toilets they will destroy the sewage treatment process.
17. Always try to use environment friendly products in household purposes or agricultural field like insect repellent.
18. Tree planting is another important way to control water pollution. Trees will help to reduce soil erosion and also lessen the flow of surface water runoff which indirectly prevents the flow of toxic substances into the water bodies.
19. Do not use plastic as it is non-bio-degradable and most of time it end up in water bodies. It not only pollutes the water but also litters the surroundings and affects the aquatic lives.
20. Practising organic farming will also help in reducing water pollution as it cut down the use of pesticides, herbicides and other chemical fertilizers.

References:

1. Eguabor V., STAN Journal Environmental Education series (2) (1998) 49.
2. Gbamanja S. P. T., STAN Journal Environmental Education Series (2) (1998) 43.
3. Musa H. (2013). Water Pollution. “Water Pollution in Focus” Contribution from the former Suleja LGA Chairman 21/6, 9.39 am.
4. Nzewi U., STAN Journal Environmental Education Series (2) (1998) 31-34.

5. Ogwuazor K. E., STAN Journal Environmental Education Series (2) (1998) 52.
6. 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.
7. Webster.com. (2010). Definition from Webster Dictionary 08-13 Retrieved 2010-08-26
8. P. O. Simeon, B. Ambah, International Letters of Natural Sciences 2 (2013) 1-10.
9. P. D. Kaze, K. P. Gam, International Letters of Natural Sciences 2 (2013) 11-18.
10. Y. A. Aliyu, I. J. Musa, T. T. Youngu, International Letters of Natural Sciences 2 (2013) 19-30.
11. Ebad Bashiri, Jahanbakhsh Bashiri, Farhad Karimi, International Letters of Natural Sciences 3 (2013) 7-20.
12. Goran Rajovi?, Jelisavka Bulatovi?, International Letters of Natural Sciences 3 (2013) 1-6.
13. Ebad Bashiri, Jahanbakhsh Bashiri, Farhad Karimi, International Letters of Natural Sciences 3 (2013) 7-20.
14. L. U. Grema, A. B. Abubakar, O. O. Obiukwu, International Letters of Natural Sciences 3 (2013) 21-27.