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WATER POLLUTION AND WATER QUALITY STANDARDS FOR LIVESTOCK

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Abstract: Water is also essential to man for maintaining personal hygiene and freedom from disease. Of the total volume of water 1,385 million km^3 on the planet earth, 96.5% is salt water (Oceans and seas), the fresh water is mostly ice (24 million Km^3). The fresh water available as annual stream flow is 46,768 Km^3, that is 0.00034% of the total global water. The world water consumption is estimated at 4,000 km^3, consisting of 2680 Km^3 for Agriculture, 973 Km^3 for industry, 300 Km^3 for Municipal supplies 170 Km^3 in reservoirs.

Water pollution occurs when unwanted materials enter in to water, changes the quality of water and harmful to environment and human health. Water is an important natural resource used for drinking and other developmental purposes in our lives. Safe drinking water is necessary for human health all over the world. Being a universal solvent, water is a major source of infection. According to world health organization (WHO) 80% diseases are water borne. Drinking water in various countries does not meet WHO standards. 3.1% deaths occur due to the unhygienic and poor quality of water.

Keywords: Pollution, source, control.

Introduction

Discharge of domestic and industrial effluent wastes, leakage from water tanks, marine dumping, radioactive waste and atmospheric deposition are major causes of water pollution. Heavy metals that disposed off and industrial waste can accumulate in lakes and river, proving harmful to humans and animals. Toxins in industrial waste are the major cause of immune suppression, reproductive failure and acute poisoning. Infectious diseases, like cholera, typhoid fever and other diseases gastroenteritis, diarrhea, vomiting, skin and kidney problem are spreading through polluted water. Human health is affected by the direct damage of plants and animal nutrition. Water pollutants are killing sea weeds, mollusks, marine birds, fishes, crustaceans and other sea organisms that serve as food for human. Insecticides like DDT concentration is increasing along the food chain. These insecticides are harmful for humans.

Fresh water pollution may be classified into two types: surface water pollution and ground water pollution.

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Surface Water Pollution

The surface water pollution has a number of sources. These can categorised as:

1. Point and Non-point Sources 2. Natural and Anthropogenic Sources

(i) Point and Non-point Sources

The well-defined sources that emit pollutants or effluents directly into different water bodies of fresh water are called **point sources**. Domestic and industrial wastes are examples of this type. The point sources of pollution can be effectively checked. On the other hand, the **non-point sources** of water pollution are scattered or spread over large areas. This type of sources delivers pollutants indirectly through environmental changes and account for majority of the contaminants in streams and lakes.

(ii) Natural and Anthropogenic Sources

An increase in the concentration of naturally occurring substances is also termed pollution. The sources of such an increase are called **natural sources**. S**iltation** (which includes soil, sand and mineral particles) is one such natural source. It is a common natural phenomenon, which occurs in most water bodies. Indiscriminate deforestation makes soil loose and flood waters bring silt from mountains into streams, rivers and lakes.

On the other hand, the human activities that result into the pollution of water are called **anthropogenic** or manmade sources of water pollution**.** For example, domestic (sewage and waste water), industrial and agricultural wastes that goes into the rivers, lakes, streams and seas are anthropogenic sources. Certain materials that are leached from the land by run-off water and enter the various water bodies also belong to this category. The anthropogenic sources of water pollution

Ground Water Pollution

When the polluted water seeps into the ground and enters an aquifer it results into **ground water pollution**. The most of our villages and many townships, ground water is the only source of drinking water. Therefore, pollution of groundwater is a matter of serious concern. Groundwater gets polluted in a number of ways. The dumping of raw sewage on soil, seepage pits and septic tanks cause pollution of groundwater. The porous layers of soil hold back solid particles while the liquid is allowed to pass through. The soluble pollutants are able to mix with the groundwater. In addition to these, the excessive use of nitrogenous fertilizers and unchecked release of toxic wastes and even carcionogenic substances by industrial units many result in slow trickling down through the earth's surface and mixing with the groundwater. This problem is very serious especially in areas where water table is high

(i.e., where water is available near surface of earth).

The ground water can move over large distances by virtue of the large empty space available below the earth's surface. This way if some impurities seep into the ground water at one point, they may be observed at a different point far removed from the point of source. In such a case it is difficult to estimate the source of water pollution. However, suspended impurities and bacterial contaminants are removed in the process of seepage by the soil acting as an absorbent and filter, and water acting as a solvent.

Sources of water pollution

It is reported that 75 to 80% water pollution is caused by the domestic sewage. Waste from the industries like, sugar, textile, electroplating, pesticides, pulp and paper are polluting the water. Polluted river have intolerable smell and contains less flora and fauna. 80% of the world's population is facing threats to water security. Large amount of domestic sewage is drained in to river and most of the sewage is untreated. Domestic sewage contains toxicants, solid waste, plastic litters and bacterial contaminants and these toxic materials causes water pollution. Different industrial effluent that is drained in to river without treatment is the major cause of water pollution. Hazardous material discharged from the industries is responsible for surface water and ground water contamination. Contaminant depends upon the nature of industries. Toxic metals enter in to water and reduced the quality of water. 25% pollution is caused by the industries and is more harmful. Increasing population is creating many issues but it also plays negative role in polluting the water. Increasing population leads to increase in solid waste generation. Solid and liquid waste is discharged in to rivers. Water is also contaminated by human excreta. In contaminated water, a large number of bacteria are also found which is harmful for human health. Government is incapable to supply essential needs to citizens because of increasing number of population. Sanitation facilities are more in urban areas than rural areas. Polythene bag and plastic waste is a major source of pollution. Waste is thrown away by putting it in to plastic bags. It is estimated that three core people of urban areas defecate in open. 77% people are using flush latrines and 8% are using pit latrines. Urbanization can cause many infectious diseases. Overcrowding, unhygienic conditions, unsafe drinking water are major health issues in urban areas.

W.H.O. DRINKING WATER STANDARDS

Parameter	**Unit**	**Limit**
Aluminium	mg Al/l	0.2
Arsenic	mg As/l	0.05
Barium	mg Ba/l	0.05
Berylium	ug Be/l	0.2
Cadmium	ug Cd/l	5.0
Calcium	mg Ca/l	200.0
Chromium	mg Cr/l	0.05
Copper	mg Cu/l	1.0
Iron Total	mg Fe/l	0.3
Lead	mg Pb/l	0.01
Magnesium	mg Mg/l	150.0
Manganese	mg Mn/l	0.1
Mercury	ug Hg/l	1.0
Selenium	mg Se/l	0.01
Sodium	mg Na/l	200.0
Zinc	mg Zn/l	5.0
Chlorides	mg Cl/l	250.0
Cyanide	mg Cn/l	0.1
Fluorides	mg F/l	1.5
Nitrates	mg NO_3/l	10.0
Nitrites	mg NO_2/l	-
Sulphates	mg SO_4/l	400.0
Suphides	mg H_2S/l	0
TOTAL "drins"	ug/l	0.03
TOTAL "ddt"	ug/l	1.0

Hydrocarbons	mg/l	0.1
Anionic Detergents	mg/l	0
pH		9.2
Total dissolved solids	mg/l	1500
Total hardness	mg/l	500
Alkalinity	mg/l	500
Microbiological parameters		
Total Bacteria	Count/ml	100
Coliform	Count/100ml	0
E. Coli	Count/100ml	0
Salmonella	Count/100ml	0

ug = microgram or ppb

mg = milligram or ppm

Water pollution and biological effects

The natural source of water in the form of precipitation or rain is the purest form available in nature. However after reaching the surface and then underground it gets contaminated by a number of pollutants. There are some biological factors also mentioned earlier responsible for spoiling the quality of water. These include the lower plants like algae and bacteria which are the causes of nutrient accumulation in aquatic systems.

Eutrophication

Eutrophication is a process by which a water body slowly becomes rich in plant nutrients such as nitrates and phosphates due to soil erosion and run off from the surrounding land. Let us try to understand this phenomenon. A water system like a lake or any reservoir may get a large inflow of organic matter from domestic wastes and run off from the surrounding land. Increasing human population, intensive agriculture and rapid industrial growth have led to an increasing release of domestic waste, agricultural residues, industrial wastes and land run-off into various water bodies. Nutrients are released from organic waste by aerobic (oxygen requiring) bacteria which start decomposing it. Dissolved oxygen is consumed in this process. As more and more organic matter enters a water body, more is the deoxygenation of the water body and larger is the production of nutrients. These nutrients fertilize an abnormal growth of algae and other large water plants such as duckweed. As more plants grow, some of them die

also due to larger oxygen demand and therefore oxygen deficiency in the water body. Such a water body is said to be eutrophied and the process is called eutrophication. The word eutrophication is derived from the Greek word which means well nourished as (eu- true, trophos - feeding)

Biological Oxygen Demand (BOD)

The quality of oxygen used up by microorganisms at 27ºC and in darkness during 3 days in breaking down organic wastes in a water body is called its biological oxygen demand. The BOD value of an aquatic system depends upon

- ✓ The type and amount of organic waste
- ✓ The organisms acting on it
- ✓ Temperature and pH

The greater the amount of organic waste in the water body, the greater is the amount of oxygen required to break it down biologically and therefore higher is the BOD value of water. This value is a good measure in evaluating the degree of pollution in a water body. The less polluted water shows comparatively low value of BOD. Its value is used as a criterion for managing water pollution of a water body. An evaluation is made by determining oxygen concentration in water before and after incubation at 20ºC in dark for 5 days.

Biomagnification

A variety of toxic chemicals move through food chains. Toxic pesticides may be sprayed for controlling insect pests, fungi, herbs, but they concentrate in the food chain and harm to other (non target) organisms. For example, DDT accumulated in the marshes and planktons. Planktons were eaten by fish and the fish had a higher concentration of DDT in its body. Further, when birds ate the fish, they accumulated still higher concentration. This increase in concentration of accumulated toxic chemicals as one goes higher in the food chain is termed biomagnification. Biomagnification has at times threatened the reproduction and survival of carnivores (secondary consumers) who occupy the highest level of the food.

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.

(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 waster 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 minimize 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

Legislative measures for preventing water pollution

It is important to utilise a good quality and unpolluted water. The quality criteria may vary depending on the use. Individual efforts do pay in this regard, however, a common policy in the form of legislation is always more effective. The enactment of 'Prevention and Control of Water Pollution Act' in 1974 has helped in the prevention of water pollution. The standards have been prescribed for water pollution under Environment (Protection) Act 1986. These are given as follows.

- General standards for water pollutants for discharge of effluents in water bodies on land (inland surface water, public sewers, irrigated land and coastal areas)
- Standards specific for each type of industry
- Standards defined for the amount of waste water to be discharged for different

industries

- Standards limiting the amount of a particular pollutant on the basis of production capacity of an industrial unit

The state pollution control boards have also been empowered to grant/renew consent to new/existing water polluting industries under water 'Prevention and Control of Pollution Act-1974.' They have been empowered to shut down any industrial unit which fails to meet the prescribed standards under this Act. The state governments have also been authorized to take punitive measures against defaulting industries.

It becomes imperative to act upon the above mentioned rules and regulations and also follow measures at individual end to improve the quality of water used for various purposes.

Conclusion and recommendations

Water pollution is a global issue and world community is facing worst results of polluted water. Major sources of water pollution are discharge of domestic and agriculture wastes, population growth, excessive use of pesticides and fertilizers and urbanization. Bacterial, viral and parasitic diseases are spreading through polluted water and affecting human health. It is recommended that there should be proper waste disposal system and waste should be treated before entering in to river. Educational and awareness programs should be organized to control the pollution.

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