ENVIRONMENTAL CHALLENGES TODAY: GLOBAL PERSPECTIVE

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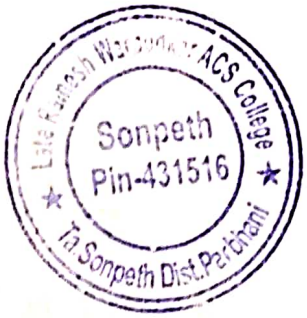

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Water Pollution – An Adverse Effect on Ecosystem

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INTRODUCTION

Life in the ecosystem is dependent of the environment. The environment provides energy in the form of sunlight, a suitable temperature and the nutrients for the living compound of the ecosystem. Disturbance in any component of environment results into harmful effect on ecosystem. Therefore the conservation of the ecosystem as well as environment is essential. Any changes in the environmental components which results into its deterioration called as pollution and those which causes it called as pollutant. Pollution is defined as the addition of extraneous materials to water, air or soil which adversely affect the natural quality of the environmental constituents. [1]

According to a report of EPA, > 50% of the water pollution of streams and rivers occur due to leaching and mixing of chemicals from the agriculture practices. The next highest source was municipal sources (about 12%). Groundwater contamination is from several sources (USGS Circular 1998), including agricultural activities, storage tank leakage, industrial waste, sewer and septic leakage, leaching from landfills, mining, and many other sources. Water pollution occurs when a body of water is adversely affected due to the addition of large amounts of materials to the water. [2]

As per one estimate in 1993 only 78% of rural and 85% of urban inhabitants had access to drinking water. However even today over 143,000 villages still have acute water problems,

and many more have unreliable water supply. As per ministry of water Resources, Govt. of India (1999) demand for water is increasing rapidly due to agricultural, industrial and population growth.[3]

Water is life as it begins with water and ends without it, this intimate link with life made water the most vulnerable element in human environment to be polluted first and most severely.

Water is essential for all forms of life. About 70% of earth surface is covered by water. The total volume of water on the earth is 1011 millions cubic kilometers. Of the total volume of water 97% water is in ocean and it is salty. Remaining 3% water accounts for the total fresh water, frozen water and polar ice caps. In india there are 113 rivers of which 14 are major, 44 are medium and 55 are minor. The Ganga, Brahmputra and the Indus are the major rivers with major basins larger than 20,000 square km. there are many snow fed Rivers origination from the Himalayas.

The water which is clean, colorless, odourless, well aerated, Oxygenated, cool, soft, potable, free from dissolved toxic substance and suspended particles is said to be pure water. But water is rarely found in pure state.

TYPES OF WATER POLLUTION

1. Ground Water Pollution: The ground water is most prime water which has multipurpose uses ranging from drinking to industrial and agricultural uses. The quality requirement varies distinctly with respect to the specific uses. For instance drinking water must have specified quality which is not at all essential for industrial purpose or other domestic uses. Though ground water appears to be less prone to pollutant mixing yet there are a number of potential sources of ground water pollution. Ground water contamination with arsenic. Fluoride, and nitrate recently possess serious health hazards to large sector of communities all over the world.

2. **Surface Water Pollution:** Major lakes, rivers, reservoirs of the world now getting polluted by various ways and thereby posing threat to the survivability of the life system on these diverse water bodies. There are a number of routs of entry of pollutants to the surface water.

3. **Nature of Water Pollutants:** There are diverse categories of water pollutants often encountered in nature. They are primarily high nutrients like PO_4, NO_3, CO_3, SO_4, acidity or alkalinity of water, contamination of toxic metals, high particulates load, contamination with pathogenic microbes & pesticides, presence of oils, grease and other hydrocarbon etc. these contaminants causing detrimental effect on aquatic biota or its consumption in any form cause serious health hazards. In addition higher water temperature may also cause serious health hazards and detrimental effect on aquatic biotic life too.

CAUSES OF WATER POLLUTION

The causes of water pollution are many but urbanization, industrialization and increasing population are the prominent among them. Water is said to be polluted when its quality or composition is changed naturally or as a result of human activities and when it becomes unsuitable for drinking and less suitable for domestic, agricultural, and industrial, recreational and other uses.

The dissolved or suspended substances which deteriorate the quality of water and make it unfit for human consumption are called water pollutants. In other words, water pollutants are those physical, chemical and biological factors which are harmful to aquatic life and those who consume water. Some of the important pollutants which cause water pollution are discussed as below.

1. **Sewage and Other Oxygen Demanding Wastes:** Medium and strong sewage and other oxygen demanding wastes from industry and agriculture lead to depletion of dissolved

oxygen in water and causes pollution. The sewage contains human excreta, dung, and urine of animals, some dissolved proteins, fats, carbohydrates and variety of inorganic wastes like nitrates, phosphate, chlorides, carbonates, sulphate and mineral elements.

2. Bio-Pollutants: The micro-organism which produces several undesirable and harmful effects in water are called bio-pollutants. The bio-pollutants like algae, fungi, bacteria, viruses, protozoa etc. reach to water bodies through surface, runoff, domestic wastes and sewage and causes water pollution.

3. Plant Nutrients: Nitrogen and phosphate are the important plant nutrients. The nitrogenous and phosphate plant nutrients are carried to the water bodies through surface runoff from agricultural fields. They increase growth of aquatic plants. Excess of aquatic plant lead to depletion of oxygen in water and make water unfit for recreational.

4. Exotic Organic Chemicals: Detergents, pesticides, industrial products, oils and decomposition products of other organic compounds are called the exotic organic chemicals. These chemicals and oils reach to the water bodies along with the waste products of industry and causes pollution.

5. Inorganic Minerals and Chemical Compounds: Inorganic minerals like sodium, calcium, magnesium, aluminum, nickel, chromium, mercury, lead, cadmium, copper etc. find their way into water bodies through municipal and industrial wastes and the urban runoff. These pollutants can kill and injure fishes and other aquatic life and they can interfere with the suitability of water for drinking and industrial purpose.

6. Global Warming: Due to global warming, there is an increase in water temperature. This increase in temperature results in death of aquatic plants and animals. This also results in bleaching of coral reefs in water.

EFFECT OF WATER POLLUTION

1. **Physico-Chemical Compound:** Many water pollutants produce undesirable colors, taste and odour in water and make it unpleasant and unfit for drinking and domestic uses. The changes in oxygen content, temperature and pH of water affect the physicochemical nature of water.

Organic substances results in depletion of oxygen and increase in CO_2 due to their decomposition of organic substance in absence of oxygen produces unpleasant odour and and unaesthetic condition due to release of gases, like ammonia, methane, hydrogen sulphide etc. The addition of plant nutrients to the water bodies results into algae and other biological growths. The algal photosynthesis produces increase PH of water by consuming CO_2. The CO_2 dissolved in water produces carbonates.

2. **Biological Effects:** Excess of pollutants affect aqutic flora and fauna. Excess of nutrients in water promotes algal growth and formation of water blooms by blue-green and green algae. Some of the algae produce toxic secretions which disturb the aquatic ecosystem.

3. **Toxic Effects:** Some pollutants like heavy metals, biocides, cyanides and other organic and inorganic compounds are harmful to aquatic organisms. The presence of these pollutants beyond the limits makes water unfit for aquatic life; the human beings and other uses. Many of these pollutants are non-biodegradable and ones they accumulate in the body of organism, causes long term effects.

4. **Pathogenic Effects:** Few wastes like sewage contain several pathogenic fungi, bacteria and viruses. These pathogens causes various types of food poisoning. Several water borne disease like cholera, typhoid, paratyphoid, dysentery, colitis, jaundice etc. are caused by these pathogen in water.

CONTROL MEASURES OF WATER POLLUTION

1. Adequate Sewage Treatment: Raw sewage should not be dumped in rivers, oceans and other water bodies. Before disposal into them, the sewage should be properly treated in sewage treatment plants. The soaking pits and septic tank are other methods for the disposal of sewage.

2. Treatment of Industrial Effluents: The industrial effluents should be cleaned, giving chemical treatment before they are discharged into rivers.

3. Recycling: The best method of prevention and control of water pollution is cycling of various kinds of wastes. Dung of cow and buffaloes can be used for the production of gobar gas a cheap source of fuel and also of manure.

4. Water Purification: The main source of drinking water in cities are rivers, lakes and streams. Water from such source is purified or made pollutant free and germ-free before that is supplied for drinking and other domestic purpose. The water is made pollutant free by three steps such as sedimentation, filtration, and chlorination.

CONCLUSION

Water pollution is a major an environmental problem that in the world. Human contribution in water pollution is enormous by way of defecating; dumping of refuse, sewage, industrial waste etc. Our industries should adopt modern technology to recycle these wastes instead of dumping them for rain water to sweep these refuse into our rivers and streams making them undrinkable. Also included adequacy of planning to control water pollution, existence of accurate water quality data as well as impact of pollution control measures on quality of water in rivers, lakes and ground water all over India. In this way they will be less inclined to pollute our waters.

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