

Review Article

WATER POLLUTION AND ITS HAZARDOUS EFFECTS TO HUMAN HEALTH: A REVIEW ON SAFETY MEASURES FOR ADOPTION

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Abstract: Water pollution is the contamination of natural water bodies by chemical, physical, radioactive or pathogenic microbial substances. Widespread consequences of water pollution upon ecosystems include species mortality, biodiversity reduction and loss of ecosystem services. Chemical water pollutants are generally atoms or molecules, which have been discharged into natural water bodies, usually by activities of humans.

Keywords: Contamination, Human health, Microbe, Water pollution.

INTRODUCTION

Water is essential for maintenance of life by drinking pure water. Ill health due to consumption of contaminated water affects humanity especially in the developing country. Water is not only a vital environmental factor to all forms of life, but it has also a great role to play in socioeconomic development of human population. Water is said to be polluted when it contains micro-organisms of human or animal origin, poisonous chemical substances, industrial or domestic sewage, organic and inorganic substances. Water is said to be pure when it is colorless, free from turbidity and abnormal taste and smell. Water pollution is the contamination of natural water bodies by chemical, physical, radioactive or pathogenic microbial substances. Adverse alteration of water quality presently produces large scale illness and deaths, accounting for approximately 50 million deaths per year worldwide, most of these deaths occurring in Africa and Asia. In China, for example, about 75 percent of the population (or 1.1 billion people) are without access to unpolluted drinking water, according to China's own standards [1]. Widespread consequences of water pollution upon ecosystems include species mortality, biodiversity reduction and loss of ecosystem services. Chemical

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water pollutants are generally atoms or molecules, which have been discharged into natural water bodies, usually by activities of humans. Common examples of such chemical water pollutants are mercury emanating from mining activity, certain nitrogen compounds used in agriculture, chlorinated organic molecules arising from sewage or water treatment plants [2] or various acids which are the externalities of various manufacturing activities. The WHO states that one sixth of the world's population, approximately 1.1 billion people do not have access to safe water and 2.4 billion lack basic sanitation [3]. Polluted water consists of Industrial discharged effluents, sewage water, rain water pollution [4]. More than fifty countries of the world with an area of twenty million hectares area are treated with polluted or partially treated polluted water [5] including parts of all continents [6-11] and this poor quality water causes health hazard and death of human being and aquatic life. Common pathogenic microbes, in addition to *G. lamblia* are: species of the genus *Salmonella* (which variously cause typhoid fever and food-borne illnesses); species in the genus *Cryptosporidium*, which are fecal-oral route parasites often transmitted as water pollutants and are associated with inadequate sanitation; parasitic worms that live inside faunal digestive systems for part of their life cycle (This widespread syndrome is spread partially as water pollutants, with an estimated three billion people currently affected). Hepatitis A is a viral disease, one of whose pathways of transmission is water-borne.

Characteristics of water:

Physical characteristics of water: Colour, odour, taste, organic matter, temperature, pH and turbidity.

Chemical characteristics of water:

Chemical characteristics may be metallic or non-metallic. Some important metallic and non-metallic impurities found in water may be summarized in the **table 1**.

Sl. No.	Name of Substance	Permissible limit (mg/l)
1.	Iron	0.3
2.	Copper	0.05
3.	Lead	0.05
4.	Fluoride	1
5.	Arsenic	0.05
6.	Mercury	0.001
7.	Manganese	0.1
8.	Aluminum	0.03
9.	Zinc	5
10.	Nitrite	3

Microbiological aspects of water pollution:

The presence of bacteria in drinking water very hazardous. These bacteria are:

1. Iron bacteria

Crenothrix and Gallionella are iron bacteria, which has power to abstract iron from water in which they lives.

2. Soil bacteria

Soil bacteria in water convert the organic matter into its simpler forms like Carbon, Hydrogen and Nitrogen. Nitrosomas convert Ammonia into nitrite, whereas Nitrobacter converts nitrite into nitrate.

Coliform bacteria

It includes all aerobic and facultative anaerobic, gram-negative, non-sporulated, motile and non-motile rod shaped bacteria. These bacteria are found in intestinal tract of humans and animals and excreted through feces. They contaminate soil, vegetation and water sources. All waters contaminated with sewage contain *E. coli*.

Faecal streptococci, Streptococcus are Spherical, gram positive, non-sporulated and found in the form of chains. The presence of these organisms in water is confirmatory evidence of recent faecal water pollution.

Clostridium welchii: *C. welchii* is a normal intestinal inhabitant. It is spore forming, which survives for longer time than coliforms [12].

Viruses

Certain Viral diseases like FMD, Rinderpest, Newcastle disease may be present in water and spread among animals [13-15].

Radiological aspects of water pollution

Radioactive substances enter into water from waste emerging out of an atomic reactor or industry dealing with radioactive products. Presence of these radioactive substances in water may assume a serious health problem in future [14, 15].

Prevention of Water Pollution

- a. Mass education people regarding sources and hazards of water pollution should be organized.
- b. Proper disposal of domestic and industrial sewage.
- c. Animals should not be allowed to enter into water sources.
- d. Use of clean buckets, ropes etc for pulling out water from any water reservoirs.
- e. Washing of clothes in ponds should be banned.

f. In sewage, there should not any leakage.

g. Carcass should never be thrown into or dumped near a river, canals or other water sources.

h. After flood, river, pond or well waters should be used after proper treatment like boiling, chlorination [16].

CONCLUSION

Water is not only a vital environmental factor to all forms of life, but it has also a great role to play in socioeconomic development of human population. Water is said to be polluted when it contains micro-organisms of human or animal origin, poisonous chemical substances, industrial or domestic sewage, organic and inorganic substances. Water is said to be pure when it is colourless, free from turbidity and abnormal taste and smell.

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