



WATER POLLUTION & ADVERSE HEALTH EFFECT

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ABSTRACT

Water is essential natural element for all kind of life. The quality of water is vital concern for mankind since it is directly linked with human welfare. Water is the universal solvent because of high dielectric constant has the property of dissolving most of the substance but the access of these substance leads to water pollution. Man's health may be affected by the ingestion of contaminated water either directly or through food. Water pollution is a growing hazard in many developing countries owing to human activity.

KEYWORDS: Water pollution, contaminated water, dielectric constant.

INTRODUCTION

The three-fourth of the earth's surface is covered with water, but only small portion of it accounts for freshwater that can be put to use. The freshwater is mainly obtained from surface run off and ground water that is continually being renewed and recharged through the *hydrological cycle*. All water moves within the *hydrological cycle* ensuring that water is renewable resource.^[1] Water is the universal solvent because of high dielectric constant has the property of dissolving most of the substances but the access of these substance leads to water pollution. The various environmental acts define the term pollution in a language which is used for legal interpretation. It is the entry of foreign matter in a water so as to make it unsuitable for use.

Water Pollution in Indian Context

In India so far as surface water is concerned, the entire country is criss-crossed by rivers. The rivers in India cover geographical area of 329 million hectares and carry a wide importance in cultural, economical, geographical and religious terms. There are 14 major river basins in country which occupy 85% of total surface flow. These are Ganga, Brahmaputra, Indus, Godavari, Krishna, Mahanadi, Narmada, Kaveri, Brahmini, Tapti, Mahi, Subarnarekha, Pennar and Sabarmati (CPCB, 2002). Despite having plenty of surface water, rural India lacks proper water supply infrastructure and people do not have access to safe drinking water. In India 12% of people get clean

drinking water, the rest 88% quench their thirst from populated lakes, rivers and wells due to which more than million people get affected or die of enteric diseases every year. On the other hand the urban areas are facing the problem of inadequate supply and low quality of these services. (Sharma1998a). The severity of this problem can be understood by monitoring of water quality of some major rivers of the country.

Effects of Water Pollution

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.^[2] 3.1% deaths occur due to the unhygienic and poor quality of water.^[3] Water pollution causes approximately 14,000 deaths per day, mostly due to contamination of drinking water by untreated sewage in developing countries.^[4] There are many harmful effect of polluted water on human health and whole environment are following.

A) Effect of Polluted Water on Human Health^[5]

1) Bacterial Diseases – Many diseases like cholera, typhoid, diarrhea, shigellosis etc. are bacterial diseases which can be caused by polluted water. They affect the digestive tract of humans and damage the intestinal epithelium. Sometimes they are fatal specially in childrens.

Table 1: Showing water borne bacterial disease, agent, source and their symptoms.

S. no.	Disease	Agent	Source	Symptoms
1.	Botulism	Clostridium botulinum	Bacteria can enter a wound from contaminated water sources. Can enter the gastrointestinal tract by consuming contaminated drinking or (more commonly) food.	Dry mouth, blurred and double vision, difficulty in swallowing, muscle weakness, blurred speech and diarrhea. Death is usually caused by respiratory failure.
2.	Cholera	<i>Vibrio cholerae</i>	Drinking water contaminated with the bacterium.	In severe forms it is known to be one of the most rapidly fatal illness known. Symptoms include very watery diarrhoea, nausea, cramps, vomiting.
3.	E. Coli infection	Certain strain of Escherichia coli	Water contaminated with the bacteria.	Mostly diarrhea. Can cause death in immunocompromised individuals.
4.	Dysentery	Shigella, Salmonella	Water contaminated with the bacteria.	Frequent passage of feces with blood and mucus.
5.	Leptospirosis	Caused by bacterium of genus Leptospira	Water contaminated by the animal urine carrying the bacteria.	Begins with flu-like symptoms then resolves. The second phase then occurs involving meningitis, liver damage and renal failure.
6.	Salmonellosis	Caused by many bacteria of genus Salmonella.	Drinking water contaminated with the bacteria. More common as a food borne illness.	Symptom including diarrhea, fever, vomiting, abdominal cramps.
7.	Typhoid fever	<i>Salmonella typhi</i>	Ingestion of water contaminated with feces of an infected person.	Characterised by sustain fever up to 40°C (104°F), diarrhea, spleen and liver enlarged.

2) Viral Diseases: Hepatitis, gastroenteritis, poliomyelitis etc. are viral diseases which can be caused by polluted water. Hepatitis and gastroenteritis mainly affect the liver and intestine and poliomyelitis causes paralysis in humans.

Table 2: Showing water borne Viral disease, agent, source and their symptoms.

S. no.	Disease	Agent	Source	Symptoms
1.	SARS(Severe Acute Respiratory Syndrome)	Corona virus	Manifests itself in improperly treated water.	Symptom include fever, myalgia, lethargy, gastrointestinal symptom, Cough and sore throat.
2.	Hepatitis A	Hepatitis A Virus (HAV)	Can manifest itself in water (and food)	Symptom are only acute (no chronic Stage to the virus) and include Fatigue, fever, abdominal pain, nausea, diarrhea, weight loss, jaundice and depression.
3.	Poliomyelitis	Polio virus	Enters water through the feces of infected individuals.	90-95% of patients show no symptom. 4-8% have minor symptoms with delirium, headache, fever and occasional seizures and spastic paralysis. 1% have symptoms of non-paralytic aseptic meningitis.

3) Protozoal Diseases –Amoebiasis, cryptosporidiosis and giardiasis is main protozoal diseases which occur due to infected water. In these diseases diarrhea is main symptom. Giardiasis is also known as traveler's disease.

Table 3: Showing water borne Protozoal disease, agent, source and their symptoms.

S. no.	Disease and Transmission	Microbial agent	Sources of agent in water supply	General symptoms
1.	Amoebiasis (hand-to-mouth)	<i>Entamoeba histolytica</i>	Sewage, non-treated drinking water, flies in water supply	Abdominal discomfort, fatigue, weight loss, diarrhea, bloating, fever.
2.	Cryptosporidiosis (oral)	<i>Cryptosporidium parvum</i>	Collects on water filters and membranes that cannot be disinfected, animal manure, seasonal runoff of water.	Flu-like symptoms, watery diarrhea, loss of appetite, substantial loss of weight, bloating, nausea.
3.	Cyclosporiasis	<i>Cyclospora cayetanensis</i>	Sewage, non-treated drinking water.	Cramps, Nausea, vomiting, muscle aches, fever and fatigue.
4.	Microsporidiosis	<i>Microsporidia</i> (Protozoan phylum but closely related to fungi).	<i>Encephalitozoon intestinalis</i> has been detected in ground water, the origin of drinking water.	Diarrhea and wasting in immunocompromised individuals.

4) Effect of Metals: Metals like lead, zinc, arsenic, copper, mercury and cadmium in industrial waste water have many adverse effect on humans and other animals like immune suppression, reproductive failure and acute as well as chronic poisoning. Beside these arsenic causes

skin cancer, mercury causes mental derangement and Minamata disease in humans and dropsy in fishes, lead causes anemia and cadmium cause lung cancer and Itai Itai disease.

Table 4: Showing Common effects, general resources of few heavy metals.

S.no	Elements	General Sources	Common effect
1.	Lead	Industry, Coal, Gasoline, mining plumbing	Anemia, colic pain, wrist drop, kidney disease, nerves disorder.
2.	Mercury	Industrial waste, disposed fluorescent light, paints, batteries, pesticides.	Gingivitis, diarrhea, anemia, tremor of hands and tongues (Minamata disease), paralysis.
3.	Arsenic	Pesticides, chemical waste and mining by-products.	Indigestion, nausea, neurological problems, Carcinogenic
4.	Fluorine	Industrial waste mining	Teeth deformity, skeletal fluorosis (Knock knee syndrome)
5.	Zinc	Industrial waste, metal plating	Abnormal cramps, vomiting, diarrhea.
6.	Chromium	Temporary discharge, metal plating	Malfunctioning of gastrointestinal, urogenital system, central nervous system.
7.	Copper	Metal plating, industrial and domestic waste mineral leaching	Sporadic fever, anemia, coma.
8.	Cadmium	Industrial discharge, mining waste, metal plating	Suppresses kidney activities, rainfall disease of bones and joints.

5) Effect of Other Chemicals: Human health is affected by the direct damage of plants and animal nutrition. Water pollutants are killing seaweeds, 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. They damage the nervous system and causes cancer, blue baby syndrome, reproductive and endocrinal damage.

B) Effect of Water Pollution On Environment

Biomass and diversity of communities are to be expected when large amount of toxic materials are released into the streams, lakes and coastal waters in the ocean. Much of aquatic pollution involves sewage in which organic waste predominate. This waste can increase secondary productivity while altering the character of the aquatic community. Most fishes especially the species desired as food by man are among the sensitive species that disappear with the least intense pollution.

- 1) Micro-organisms consume lot of oxygen in biodegradation of organic matter found in sewage water and make water oxygen deficient killing fish and other aquatic creatures.
- 2) Many chemicals like DDT can undergo biomagnifications in aquatic food chain. High concentration of DDT disturb calcium metabolism in birds, which causes thinning of eggshells and their premature breaking, finally it decline birds population.
- 3) Thermal waste water eliminates or reduces the number of plants and animals which are sensitive to high temperature, and these organisms are shifted to other areas, this phenomenon cause misbalance in ecosystem.
- 4) Aquatic organisms take up pesticides from water which enters into the food chain and transmit in upper trophic level. At higher trophic level they get concentrated and this phenomenon is called biomagnifications.
- 5) Polluted water reduces dissolved oxygen (DO) amount in water so they eliminate sensitive organisms like plankton, mollusks and fish etc.
- 6) Acid rain has been shown to have adverse impacts on forest, fresh water and soil, killing insects and aquatic life forms, causing paint to peel, corrosion of bridges and weathering of stone building as well as having impacts on human health.

Preventive Approach To Control Water Pollution^[6]

The government of India has formulated comprehensive legislation to enable the institution like pollution control boards for effective protection of the environment. Some important acts in this direction are:

- 1) The water (prevention and control of pollution) Act, 1974
- 2) The water (prevention and control of pollution) Rules, 1975
- 3) The water (prevention and control of pollution Cess Act, 1978
- 4) The Environment (protection) Act, 1986.

Some important measures for control of water pollution

- Sewage treatment plant
- Industries should pay more responsibilities
- Preventing soil erosion
- Adopting Organic farming
- Educating people and media involvement.

CONCLUSION

Water is not only a vital environmental factor to all forms of life, but it has also play a great role in socio-economic development of human pollution. Economically a country is pulled back when drinking water supply is not proper. The safety and accessibility of drinking water are major risk factor for ill health.

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