

# Different Sources of Water Pollution

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## Abstract

Water is considered polluted when it is contaminated by anthropogenic contaminants and either does not support a human use, such as drinking water, or undergoes a significant shift in its ability to support its constituent biotic communities, such as fish. Volcanoes, algae blooms, storms, and earthquakes all cause significant changes in water quality and the ecological status of water. Although surface water and groundwater are interconnected, they are frequently studied and managed separately. Surface water percolates into the soil and becomes groundwater. Groundwater, on the other hand, can feed surface water sources. Surface water pollution sources are generally classified into two types based on their origin. Water pollution is a significant worldwide issue which requires continuous assessment and update of water asset strategy at all levels. It has been recommended that it is the main overall reason for deaths and illnesses, and that it represents the deaths of in excess of 14,000 individuals day to day.

## Sewage

In today's world, sewage water pollution is one of the most serious issues that most cities face. This type of pollution causes health and environmental problems (P.P. Hujoel, L.G. Zina, S.A.S. Moimaz, J. Cunha-Cruz, 2009). Water pollution can be reduced with proper water treatment. Sewage water pollution is one of the world's major problems in cities. Sewage water is discharged into rivers untreated. Careless sewage water disposal causes a cascade of problems such as disease spread, eutrophication, an increase in Biological Oxygen Demand (BOD), and more.

Waste water is created when water is used for domestic, industrial, or other purposes. It is known as sewage water. In ideal circumstances, sewage water is channelled or piped out of cities to be recycled. Sewage contains both organic waste and chemicals. Water pollution caused by sewage is mostly seen in developing countries. Sewage water is not properly disposed of in these countries.

The main cause of water pollution is improper waste water disposal. Sewage is drained into rivers in large quantities (Ho K., Neidell M., 2009). It slows the process of dilution of water constituents, causing the river to stagnate. It may also result in the spread of diseases such as diarrhoea, typhoid, and others. One of the major causes of pollution is the discharge of untreated water. In sewage water, there are numerous pathogens and hazardous chemicals. Phosphates in detergents released into water allow algae and water hyacinths to grow.

## **Nutrients**

Nutrient pollution, a type of water pollution, refers to contamination caused by excessive nutrient inputs. It is a primary cause of surface water eutrophication in which excess nutrients, usually nitrogen or phosphorus, promote algal growth (C.K. Jain, Sudhir Kumar, and K.K.S. Bhatia). Nutrient pollution is caused by runoff from farm fields and pastures, septic tank and feedlot discharges, and combustion emissions.

As fertiliser use grows around the world, the resulting air and water pollution is becoming a more acute and widespread issue. Lawns and gardens contribute significantly, but they are not the only culprits.

Fertilizers and plant nutrients have the potential to contaminate both groundwater and surface water. In most cases, nitrogen is the main problem in ground water. Fertilizers, whether organic (manure) or synthetic, are almost always its source (Jain, C.K., Bhatia, K.K.S., and Vijay, T., 1997). The three primary nutrients for plants — nitrogen, phosphorus, and potassium — are the most mobile and most likely to permeate the soil and reach underground aquifers.

It primarily takes the form of nitrates in aquifers, which can prevent infants and young livestock from having enough oxygen in their blood. (Imran Ali, C.K. Jain, and M.K. Sharma, 1999) Methemoglobinemia, also known as blue baby syndrome, rarely affects people older than six months. However, older children and adults may also experience a variety of other health issues as a result of nitrate exposure. Large amounts of nitrogen and phosphorus, primarily from agricultural runoff, enter surface water. Both nutrients help to eutrophicate, or over-fertilize, water, which can result in hypoxia, or oxygen depletion. Most people are familiar with this phenomenon because of algal blooms, which are episodes of rapid growth of microscopic algae that exhaust the area's oxygen supply. Fish are frequently able to swim away, but shellfish are usually trapped and will suffocate along with many other bottom-dwelling creatures. The Dead Zone is almost certainly primarily caused by agricultural runoff with high levels of nitrogen and phosphorus.

## **Industrial Waste**

Industry is a huge source of water pollution, it produces pollutants that are extremely harmful to people and the environment. Many industrial facilities use freshwater to carry away waste from the plant and into rivers, lakes and oceans. Pollutants from industrial sources include:

### **Asbestos**

This pollutant is a serious health hazard and carcinogenic. Asbestos fibers can be inhaled and cause illnesses such as asbestosis, mesothelioma, lung cancer, intestinal cancer and liver cancer.

### **Lead**

This is a metallic element and can cause health and environmental problems. It is a non-biodegradable substance so is hard to clean up once the environment is contaminated. Lead is harmful to the health of many animals, including humans, as it can inhibit the action of bodily enzymes.

**Mercury**

This is a metallic element and can cause health and environmental problems. It is a non-biodegradable substance so is hard to clean up once the environment is contaminated. Mercury is also harmful to animal health as it can cause illness through mercury poisoning.

**Nitrates**

The increased use of fertilizers means that nitrates are more often being washed from the soil and into rivers and lakes. This can cause eutrophication, which can be very problematic to marine environments.

**Phosphates**

The increased use of fertilizers means that phosphates are more often being washed from the soil and into rivers and lakes. This can cause eutrophication, which can be very problematic to marine environments.

**Sulphur**

This is a non-metallic substance that is harmful for marine life.

**Oils**

Oil does not dissolve in water, instead it forms a thick layer on the water surface.

This can stop marine plants receiving enough light for photosynthesis. It is also harmful for fish and marine birds.

**Petrochemicals**

This is formed from gas or petrol and can be toxic to marine life.

**Chemical Waste**

Chemical waste, such as mercury, bioaccumulates in the food chains. It is taken up through the gills of fish and concentrated in the flesh (Khopkar, S.M.). It can be dangerous to eat large quantities of big ocean fish, contaminated by mercury. In humans, mercury causes neurological symptoms, birth defects and death. In one international incident, a village of Minimata Bay, Japan suffered mercury poisoning and 52 people died eating fish contaminated by a chemical plant.

**Oil Pollution**

An oil spill is the release of a liquid petroleum hydrocarbon into the environment, especially marine areas, due to human activity, and is a form of pollution (Lindberg, R.D. and Runnells, D.D.). The term is usually applied to marine oil spills, where oil is released into the ocean or coastal waters, but spills may also occur on land. Oil spills may be due to releases of crude oil from tankers, offshore platforms, drilling rigs and wells, as well as spills of refined petroleum products (such as gasoline, diesel) and their by-products, heavier fuels used by large ships such as bunker fuel, or the spill of any oily refuse or waste oil.

Oceans are polluted by oil on a daily basis from oil spills, routine shipping, run-offs and dumping (Lal, P.C. and Bhattacharya, K.G.).

- Oil spills make up about 12% of the oil that enters the ocean. The rest come from shipping travel, drains and dumping.

- An oil spill from a tanker is a severe problem because there is such a huge quantity of oil being spilt into one place.
- Oil spills because a much localized problem but can be catastrophic to local marine wildlife such as fish, birds and sea otters.
- Oil cannot dissolve in water and forms a thick sludge in the water. This suffocates fish, gets caught in the feathers of marine birds stopping them from flying and blocks light from photosynthetic aquatic plants.

### **Plastics**

Water pollution is increasingly caused by plastic particles, including nurdles pre-production micro plastic resin pellets typically under 5 mm (0.20 in) in diameter found outside of the typical plastic manufacturing stream and an intermediate good used to produce plastic final products; micro beads from cosmetics; and the breakdown products of plastic litter. Plastic particle water pollution is also referred to as mermaids' tears.

Plastic is one of the major toxic pollutants of our time. Being composed of toxic chemicals and most importantly a non biodegradable substance, plastic pollutes earth and leads to air pollution and water pollution (Lamberg M., Hausen H., Vartiainen T.). There is no safe way to dispose plastic waste. Plastic causes serious damage to environment during its production process and during its disposal process. So the only way to reduce the hazards of plastic pollution is to reduce the use of plastic and thereby force a reduction in its production. The major chemicals that go into the making of plastic are highly toxic and pose serious threat to living beings of all species on earth. Some of the constituents of plastic such as benzene and vinyl chloride are proved to cause cancer, and other gases and liquid hydrocarbons spoil earth and air. (Marquis RE, Clock SA, Mota) The noxious substances emitted during the production of plastic are synthetic chemicals like ethylene oxide, benzene and xylenes.

### **Thermal Pollution**

Thermal pollution is the degradation of water quality by any process that changes ambient water temperature. A common cause of thermal pollution is the use of water as a coolant by power plants and industrial manufacturers (Macek M.D., Matte T.D., Sinks T., Malvitz D.M.). When water used as a coolant is returned to the natural environment at a higher temperature, the change in temperature decreases oxygen supply, and affects ecosystem composition. Urban runoff—storm water discharged to surface waters from roads and parking lots—can also be a source of elevated water temperatures. Elevated temperature typically decreases the level of dissolved oxygen of water. This can harm aquatic animals such as fish, amphibians and other aquatic organisms. High temperature limits oxygen dispersion into deeper waters, contributing to anaerobic conditions. Thermal pollution may also increase the metabolic rate of aquatic animals.

### **Pathogens**

To protect drinking water from disease-causing organisms, or pathogens, water suppliers often add a disinfectant, such as chlorine, to drinking water (Milgrom P., Reisine S.). However, disinfection practices can be complicated because certain microbial pathogens, such as *Cryptosporidium*, are highly resistant to traditional disinfection practices. Also, disinfectants themselves can react with naturally-occurring materials in the water to form byproducts, such as trihalomethanes and haloacetic acids, which may pose health risks. Inadequately treated water may contain disease-causing organisms, or

pathogens. Pathogens include various types of bacteria, viruses, protozoan parasites, and other organisms.

### **Radioactive Pollutants**

Radioactive wastes are wastes that contain radioactive material. Radioactive wastes are usually by-products of nuclear power generation and other applications of nuclear fission or nuclear technology, such as research and medicine. Radioactive waste is hazardous to human health and the environment, and is regulated by government agencies in order to protect human health and the environment.

Radioactive particles form ions when it reacts with biological molecules (Marthaler T.M., Petersen P.E.). These ions then form free radicals which slowly and steadily start destroying proteins, membranes, and nucleic acids. A longer exposure to radioactive radiations can damage the DNA cells that results in cancer, genetic defects for the generations to come and even death.

Following are the major sources where most of the radioactive waste is generated and is responsible for causing radioactive pollution:

- Production of nuclear fuel
- Nuclear power reactors
- Use of radionuclide's in industries for various applications
- Nuclear tests carried out by defence personnel
- Disposal of nuclear waste
- Uranium mining

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