

Water pollution fact sheet!



Source:

<http://www.water-pollution.org.uk/>

This fact sheet covers all main objectives for lesson plan, and is a tool for the instructor when presenting the topic in class.

7 types of water pollution:

Surface water pollution: Surface waters are the [natural water](#) resources of the Earth. They are found on the exterior of the Earth's crust and include:

- Oceans
- Rivers
- Lakes

Oxygen depleting: Microorganisms that live in water feed on biodegradable substances. When too much biodegradable material is added to water, the number of microorganisms increase and use up the available oxygen. This is called oxygen depletion. When [oxygen levels](#) in the water are depleted, relatively harmless aerobic microorganisms die and anaerobic microorganisms begin to thrive. Some anaerobic microorganisms are harmful to people, animals and the environment, as they produce harmful toxins such as ammonia and sulfides

Groundwater: A lot of the Earth's water is found underground in soil or under rock structures called aquifers. Humans often use aquifers as a means to obtain drinking water, and build wells to access it. When this water becomes polluted it is called groundwater pollution. Groundwater pollution is often caused by [pesticide](#) contamination from the soil; this can infect our drinking water and cause huge problems.

Nutrients: Nutrients are essential for plant growth and development. Many nutrients are found in wastewater and fertilizers, and these can cause excess weed and algae growth if large concentrations end up in water.

- This can contaminate drinking water and clog filters.
- This can be damaging to other aquatic organisms as the algae use up the oxygen in the water, leaving none for the surrounding marine life.

Microbiological: Microbiological water pollution is usually a natural form of water pollution caused by microorganisms.

Many types of microorganisms live in water and cause fish, land animals and humans to become ill. Microorganisms such as:

- Bacteria
- Viruses
- Protozoa

Serious diseases such as cholera come from microorganisms that live in water. These diseases usually affect the [health of](#) people in poorer countries, as they do not have the facilities to treat polluted water.

Suspended matter: Some pollutants do not dissolve in water as their molecules are too big to mix between the water molecules. This material is called particulate matter and can often be a cause of water pollution.

- The suspended particles eventually settle and cause thick silt at the bottom. This is harmful to marine life that lives on the floor of rivers or lakes.
- Biodegradable substances are often suspended in water and can cause problems by increasing the amount of anaerobic microorganisms present.
- Toxic chemicals suspended in water can be harmful to the development and survival of aquatic life.

Chemical: Industrial and agricultural work involves the use of many different chemicals that can run-off into water and pollute it.

- Metals and solvents from industrial work can pollute rivers and lakes. These are poisonous to many forms of aquatic life and may slow their development, make them infertile or even result in death.

- [Pesticides](#) are used in farming to control weeds, insects and fungi. Run-offs of these pesticides can cause water pollution and poison aquatic life. Subsequently, birds, humans and other animals may be poisoned if they eat infected fish.
- Petroleum is another form of chemical pollutant that usually contaminates water through [oil spills](#) when a ship ruptures. Oil spills usually have only a localized effect on wildlife but can spread for miles. The oil can cause the death of many fish and stick to the feathers of seabirds causing them to lose the ability to fly.

Causes of Water Pollution:

Sewage and wastewater: Domestic households, industrial and agricultural practices produce wastewater that can cause pollution of many lakes and rivers.

- [Sewage](#) is the term used for wastewater that often contains feces, urine and laundry waste.
- There are billions of people on Earth, so treating sewage is a big priority.
- Sewage disposal is a major problem in developing countries as many people in these areas don't have access to sanitary conditions and clean water.
- Untreated sewage water in such areas can contaminate the environment and cause diseases such as diarrhea.
- Sewage in developed countries is carried away from the home quickly and hygienically through sewage pipes.
- Sewage is treated in water [treatment plants](#) and the waste is often disposed into the sea.
- Sewage is mainly biodegradable and most of it is broken down in the environment.
- In developed countries, sewage often causes problems when people flush chemical and pharmaceutical substances down the toilet. When people are ill, sewage often carries harmful [viruses and bacteria](#) into the environment causing health problems.

Marine dumping industrial waste: Dumping of litter in the sea can cause huge problems. Litter items such as 6-pack ring [packaging](#) can get caught in marine animals and may result in death. Different items take different lengths of time to degrade in water:

- Cardboard – Takes 2 weeks to degrade.
- Newspaper – Takes 6 weeks to degrade.
- Photodegradable packaging – Takes 6 weeks to degrade.
- Foam – Takes 50 years to degrade.
- Styrofoam – Takes 80 years to degrade.
- Aluminum – Takes 200 years to degrade.
- Plastic packaging – Takes 400 years to degrade.
- Glass – It takes so long to degrade that we don't know the exact time.

Radioactive wastes: Nuclear waste is produced from industrial, medical and scientific processes that use radioactive material. Nuclear waste can have detrimental effects on marine habitats. Nuclear waste comes from a number of sources:

- Operations conducted by nuclear power stations produce radioactive waste. Nuclear-fuel reprocessing plants in northern Europe are the biggest sources of man-made nuclear waste in the surrounding ocean. Radioactive traces from these plants have been found as far away as Greenland.
- Mining and refining of uranium and thorium are also causes of marine nuclear waste.
- Waste is also produced in the nuclear fuel cycle which is used in many industrial, medical and scientific processes.

Oil pollution: Oceans are polluted by oil on a daily basis from oil spills, routine shipping, run-offs and dumping. 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 cause 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.

Underground storage leaks: A tank or piping network that has at least 10 percent of its volume underground is known as an [underground storage tank](#) (UST). They often store substances such as petroleum, that are harmful to the surrounding environment should it become contaminated. Many UST's constructed before 1980 are made from steel pipes that are directly exposed to the environment. Over time the steel corrodes and causes leakages, affecting surrounding soil and groundwater.

Atmospheric deposition: Atmospheric deposition is the pollution of water caused by air pollution.

- In the atmosphere, water particles mix with [carbon](#) dioxide sulfur dioxide and nitrogen oxides, this forms a weak acid.
- Air pollution [means](#) that water vapor absorbs more of these gases and becomes even more acidic.
- When it rains the water is polluted with these gases, this is called acid rain.
- When acid rain pollutes marine habitats such as rivers and lakes, aquatic life is harmed

Global warming: An increase in [water](#) temperature can result in the death of many aquatic organisms and disrupt many marine habitats. For example, a rise in water temperatures causes coral bleaching of reefs around the world. This is when the coral expels the microorganisms of which it is dependent on. This can result in great damage to coral reefs and subsequently, all the marine life that depends on it. The [rise](#) in the Earth's water temperature is caused by global warming.

- Global warming is a process where the average global temperature increases due to the greenhouse effect.
- The burning of fossil [fuel](#) releases greenhouse gasses, such as carbon dioxide, into the atmosphere.

- This causes heat from the sun to get 'trapped' in the Earth's atmosphere and consequently the global temperature rises.

Eutrophication: Eutrophication is when the environment becomes enriched with nutrients. This can be a problem in marine habitats such as lakes as it can cause algal blooms.

- Fertilizers are often used in farming, sometimes these fertilizers run-off into nearby water causing an increase in nutrient levels.
- This causes phytoplankton to grow and reproduce more rapidly, resulting in algal blooms.
- This bloom of algae disrupts normal ecosystem functioning and causes many problems.
- The algae may use up all the oxygen in the water, leaving none for other marine life. This results in the death of many aquatic organisms such as fish, which need the oxygen in the water to live.
- The bloom of algae may also block sunlight from photosynthetic marine plants under the water surface.
- Some algae even produce toxins that are harmful to higher forms of life. This can cause problems along the food chain and affect any animal that feeds on them.

Dangers of Water Pollution

Health: Virtually all types of water pollution are harmful to the health of humans and animals. Water pollution may not damage our health immediately but can be harmful after long term exposure. Different forms of pollutants affect the health of animals in different ways:

- Heavy metals from industrial processes can accumulate in nearby lakes and rivers. These are toxic to marine life such as fish and shellfish, and subsequently to the humans who eat them. Heavy metals can slow development; result in [birth defects](#) and some are carcinogenic.
- Industrial waste often contains many toxic compounds that damage the health of aquatic animals and those who eat them. Some of the toxins in industrial waste may only have a mild effect whereas other can be fatal. They can cause immune suppression, reproductive failure or acute poisoning.
- Microbial pollutants from sewage often result in infectious diseases that infect aquatic life and terrestrial life through drinking water. Microbial water pollution is a major problem in the developing world, with diseases such as cholera and typhoid fever being the primary cause of infant mortality.
- [Organic matter](#) and nutrients causes an increase in aerobic algae and depletes oxygen from the water column. This causes the suffocation of fish and other aquatic organisms.
- Sulfate particles from acid rain can cause harm the health of marine life in the rivers and lakes it contaminates, and can result in mortality.
- Suspended particles in freshwater reduces the quality of drinking water for humans and the aquatic environment for marine life. Suspended particles can often reduce the amount of sunlight penetrating the water, disrupting the growth of photosynthetic plants and micro-organisms.

Economy: Water pollution can be damaging to the economy as it can be expensive to treat and prevent contamination. Waste that does not break down quickly accumulates in the Earth's waters and eventually makes its way to the oceans.

Water pollution can be prevented by stopping pollutants from contaminating nearby waters. There are a [number](#) of water treatments to prevent pollution such as:

- Biological filters
- Chemical additives
- [Sand filters](#)

These simple techniques cost money to maintain, but [prevention](#) is much cheaper than cleaning up water pollution that has already occurred. The cost of a pollution clean-up depends on many factors:

- The location of the pollution is important in determining how much the clean-up will cost. If the contamination is in an area that is easy to get to, then the clean-up cost will be cheaper.
- The contamination size also needs to be considered, the larger the area of contamination, the more expensive the cost of the clean-up.
- The type of pollutant may also have an effect on the clean-up cost, some pollutants are more difficult to clean up than others, and therefore more expensive.

Environment: There are many different types of water pollution and all have a different adverse effect on the environment.

- Heavy metals from industrial processes can accumulate in nearby lakes and rivers. These are toxic to marine life such as fish and shellfish, and can affect the rest of the food chain. This means that entire animal communities can be badly affected by this type of pollutant.
- Industrial waste often contains many toxic compounds that [damage](#) the health of aquatic animals and those who eat them. Some toxins affect the reproductive success of marine life and can therefore disrupt the community structure of an aquatic environment.
- Microbial pollutants from sewage often result in infectious diseases that infect aquatic life and terrestrial life through drinking water. This often increases the [number](#) of mortalities seen within an environment.
- Organic matter and nutrients causes an increase in aerobic algae and depletes oxygen from the water column. This is called eutrophication and causes the suffocation of fish and other aquatic organisms.
- Sulfate particles from acid rain change the pH of water making it more acidic, this damages the health of marine life in the rivers and lakes it contaminates, and often increases the number of mortalities within an environment.
- Suspended particles can often reduce the amount of sunlight penetrating the water, disrupting the growth of photosynthetic plants and micro-organisms. This has subsequent effects on the rest of the aquatic community that depend on these organisms to survive.

How to Prevent Water Pollution

If you want to help keep our waters clean, there are many things you can do to help. You can prevent water pollution of nearby rivers and lakes as well as groundwater and drinking water by following some simple guidelines in your everyday life.

- Conserve water by turning off the tap when running water is not necessary. This helps prevent water shortages and reduces the amount of contaminated water that needs treatment.
- Be careful about what you throw down your sink or toilet. Don't throw paints, oils or other forms of litter down the drain.
- Use environmentally household products, such as washing powder, household cleaning agents and toiletries.
- Take great care not to overuse pesticides and fertilizers. This will prevent runoffs of the material into nearby water sources.
- By having more plants in your garden you are preventing fertilizer, pesticides and contaminated water from running off into nearby water sources.
- Don't throw litter into rivers, lakes or oceans. Help clean up any litter you see on beaches or in rivers and lakes, make sure it is safe to collect the litter and put it in a nearby dustbin.

Fun Facts about Water:

Source: <http://water.epa.gov/learn/kids/drinkingwater/waterfactsoflife.cfm>

- There is the same amount of water on Earth as there was when the Earth was formed. The water from your faucet could contain molecules that dinosaurs drank.
- Water is composed of two elements, Hydrogen and Oxygen. $2 \text{ Hydrogen} + 1 \text{ Oxygen} = \text{H}_2\text{O}$.
- Nearly 97% of the world's water is salty or otherwise undrinkable. Another 2% is locked in ice caps and glaciers. That leaves just 1% for all of humanity's needs — all its agricultural, residential, manufacturing, community, and personal needs.
- Water regulates the Earth's temperature. It also regulates the temperature of the human body, carries nutrients and oxygen to cells, cushions joints, protects organs and tissues, and removes wastes.
- 75% of the human brain is water and 75% of a living tree is water.
- A person can live about a month without food, but only about a week without water.
- Water is part of a deeply interconnected system. What we pour on the ground ends up in our water, and what we spew into the sky ends up in our water.
- The average total home water use for each person in the U.S. is about 50 gallons a day.
- The average cost for water supplied to a home in the U.S. is about \$2.00 for 1,000 gallons, which equals about 5 gallons for a penny.
- Water expands by 9% when it freezes. Frozen water (ice) is lighter than water, which is why ice floats in water.