# Pollutant Handout

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| **Microbiological Pollutants**<br>Waterborne pathogens, including bacteria, protozoa, and viruses, can contaminate water systems. Human and animal wastes are the main source of pathogen pollutants in water. These pollutants enter drinking water through runoff from farms, sewage treatment facilities, and urban areas. Diseases such as cholera, giardia, polio, and typhoid are spread through unsafe drinking water. Harmful algae blooms (HABs) are caused by cyanobacteria (blue-green algae) that produce toxins. These toxins can be dangerous and lethal to humans and animals. Types of HABs include *Microcystis, Ceratium, and Karenia.* | **Sediments**<br>Sediments are fine-grained particles of sand, silt, soil, and clay that are washed into bodies of water where they degrade its quality. The most common sources of sediment pollution are construction and logging. Turbidity, or the cloudiness of water, can affect the visibility of aquatic animals and make it difficult for plants to receive sunlight. Sediments can also settle in rivers and creeks which can affect water flow and cause blockages that have to be maintained through dredging. | **Thermal pollution**<br>Changes in water temperature can have tremendous effects on the health of water systems. On a local scale, bodies of water are used to cool down industrial equipment which increases water temperature. Thermal pollution can also decrease water temperature, such as when human-made dams release large amounts of colder water into other bodies of water. When water temperature is altered quickly, this will shock both the plants and animals who may not be able to adapt to such a drastic change. Temperature changes can also alter dissolved oxygen levels, nutrient cycles, and metabolic rates of species. Just a few degrees can be enough to affect an aquatic ecosystem. |
| **pH imbalance**<br>Each species of plants and animals survive within a specific range of conditions. They require a certain level of pH, or acidity, within their bodies. Additionally, aquatic organisms require a certain pH from their water sources. Air pollutants from burning fossil fuels can make their way into water and change pH. Sulfur dioxide and nitrogen oxides are condensed with water in clouds and precipitate together to form acid rain. When pH is altered, many organisms will no longer survive and populations will decrease. | **Human and Animal Wastes**<br>Untreated human waste and animal waste can cause a range of health and ecological impacts. Human waste can enter water systems through sewage leaks. Animal waste is usually from domestic pets or livestock. Concentrated animal feeding operations (CAFOs) contaminate surface water as manure will runoff during rain or flooding events. This waste can carry pathogens like E.coli, hormones, heavy metals, and chemicals like phosphorus, nitrate, and ammonia. In drinking water, waste contamination can cause gastrointestinal and respiratory illness and skin irritation. | **Litter**<br>Litter debris, like plastic bags, bottles, cigarette butts, food containers, and styrofoam are often thrown on the ground and make their way into nearby flowing water. Aquatic animals and birds can mistake this trash for food. This causes animals to choke or it can disrupt their digestive systems. Additionally, litter can decrease dissolved oxygen in the water as it decays. Aquatic species need dissolved oxygen to survive, so a disruption can cause large effects on the ecosystem. |

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| **Petroleum products**<br>Petroleum products, such as crude oils and fuels, through spills and runoff from soils. In soil, petroleum products are highly mobile and will be washed away into nearby water sources. Once in water, it causes harm to both aquatic plants and animals. There are regulations for safe drinking water regarding petroleum products since they contain toxic substances. | **Inorganic chemicals**<br>Inorganic chemicals are those that do not contain carbon. They can be natural or human-made chemicals. Some inorganic materials are less likely to cause health issues to humans through drinking water, like chloride and iron. However, other inorganic chemicals (like arsenic and lead) can be very toxic, even in trace amounts. | **Fertilizer and detergents**<br>Fertilizer used for farms and detergents used for cleaning can make their way into water sources. Flooding during rain and flooding events causes fertilizer to runoff into water. Detergents are washed down drains where they can enter water sources. Both fertilizer and detergents have high levels of phosphorus, which is an element that is needed in ecosystems. However, too much phosphorus in water causes eutrophication. Too many plants and algae will block sunlight and oxygen from reaching other aquatic species and cause them to die. |
| **Organic waste products**<br>Organic waste is biodegradable and breaks down over time. Food waste and byproducts, paper products, and landscaping debris are all organic waste. As these substances break down, they release methane, a potent greenhouse gas, into the air. Bacteria that consume these wastes exponentially increase in the water and therefore depletes the necessary oxygen for fish. | **-Cides**<br>Pesticides, herbicides, and fungicides are all types of chemicals that are used to manage unwanted insects, plants, and fungi in agricultural fields. In most cases, these chemicals are sprayed directly onto fields using special equipment or airplanes. Factors that affect pesticide pollution in water are its mobility in soil, solubility in water, and irrigation management. If pesticides are sprayed on wet, rainy days, it is more likely that they will leach into nearby water sources. These chemicals can cause a range of health effects to humans, including causing cancers, irritations, or affecting the nervous system or endocrine system. | **Microplastics**<br>It can take plastic up to 450 years to decompose. However, due to the sun's radiation and ocean waves, plastic will break into pieces over time. Fragments of plastic smaller than 5 millimeters are considered microplastics. Microplastics are found throughout water sources and are scattered along beaches. They have been found in many aquatic organisms, from plankton to whales. It is still unknown whether microplastics are harmful to humans. Nevertheless, they pollute water since they are a foreign substance. |