

Sources of soil pollution, major soil pollutants, soil pollution and human health

1. Soil pollution

Soil pollution refers to anything that causes contamination of soil and degrades the soil quality. Soil pollution is defined as the buildup in soils of persistent toxic compounds, chemicals, salts, radioactive materials, or disease-causing agents, which have adverse effects on plant growth and animal health. **Soil** is the thin layer of organic and inorganic materials that covers the Earth's rocky surface.

2. Sources of soil pollution

Soil pollution can be caused by the following

2.1. Industrial activity

Industrial activity has been the biggest contributor to the problem in the last century, especially since the amount of mining and manufacturing has increased. Most industries are dependent on extracting minerals from the Earth. After extraction, the by-products are not disposed of in a manner that can be considered safe. As a result, the industrial waste lingers in the soil surface for a long time and makes it unsuitable for use.

2.2. Agricultural activities

Chemical utilization has increased tremendously with production of modern pesticides and fertilizers. These chemicals cannot be broken down. As a result, they seep into the ground after they mix with water and slowly reduce the fertility of the soil. Plants absorb many of these pesticides and when they decompose, they cause soil pollution since they become a part of the land.

2.3. Waste disposal

Every human produces a certain amount of waste and much of it moves into the sewer system. There is also a large amount that is dumped directly into landfills. Even the sewer system ends at the landfill, where the biological waste pollutes the soil and water. This is because our bodies are full of toxins and chemicals which are now seeping into the land and causing pollution of soil.

2.4. Accidental oil spills

Oil leaks can happen during storage and transport of chemicals. The chemicals present in the fuel deteriorates the quality of soil and make them unsuitable for cultivation.

2.5. Acid rain

Acid rain is caused when pollutants present in the air mix up with the rain and fall back on the ground. The polluted water could dissolve away some of the important nutrients found in soil and change the structure of the soil.

3. Major soil pollutants

Some of the most hazardous soil pollutants are xenobiotics – substances that are not naturally found in nature and are synthesized by human beings. The different types of pollutants that are found in contaminated soil include

3.1. Heavy metals

The presence of heavy metals in soils can cause it to become highly toxic to human beings. These metals can originate from several sources such as mining activities, agricultural activities, electronic waste (e-waste), and medical waste.

3.2. Polycyclic aromatic hydrocarbons

Polycyclic aromatic hydrocarbons (often abbreviated to PAHs) are organic compounds that:

- Contain only carbon and hydrogen atoms.
- Contain more than one aromatic ring in their chemical structures.

Soil pollution due to PAHs can be sourced to coal processing, vehicle emissions, cigarette smoke, and the extraction of shale oil.

3.3. Industrial waste

Some common soil pollutants that can be sourced to industrial waste are listed below.

- Chlorinated industrial solvents
- Dioxins produced from the manufacture of pesticides and the incineration of waste.
- Plasticizers/dispersants
- Polychlorinated biphenyls (PCBs)

3.4. Pesticides

Pesticides are substances (or mixtures of substances) that are used to kill or inhibit the growth of pests. Common types of pesticides used in agriculture include:

- Herbicides – used to kill/control weeds and other unwanted plants.
- Insecticides – used to kill insects.
- Fungicides – used to kill parasitic fungi or inhibit their growth.

4. Soil pollution and human health

Soil pollution can cause the increase exposure to toxic and harmful chemicals thus increasing health threats to people living nearby and on the degraded land. Living, working or playing in the contaminated soil can lead to respiratory diseases, skin diseases, and other diseases. Moreover, it can cause other health problems. Urban soils are increasingly becoming polluted mainly due to rapid industrialization and urbanization. The industrialization and urbanization result in enormous discharge of pollutants into soil, which inevitably affect the health of urban soils and subsequently human health through the food chain because plants take up pollutants from soil through roots and transport to the above ground plant parts.

Soil contaminants can exist in all three phases (solid, liquid, and gaseous). Therefore, these contaminants can find their way into the human body.

The short-term effects of human exposure to polluted soil include:

- Headaches, nausea, and vomiting.
- Coughing, pain in the chest, and wheezing.
- Irritation of the skin and the eyes.
- Fatigue and weakness.

A variety of long-term ailments have been linked to soil pollution. Some such diseases are listed below.

- Exposure to high levels of lead can result in permanent damage to the nervous system. Children are particularly vulnerable to lead.
- Depression of the CNS (Central Nervous System).
- Damage to vital organs such as the kidney and the liver.
- Higher risk of developing cancer.

It can be noted that many soil pollutants such as petroleum hydrocarbons and industrial solvents have been linked to congenital disorders in humans. Thus, soil pollution can have several negative effects on human health.