**Soil pollution**

 Stripping soil of its natural fertility by using artificial chemicals like pesticides, insecticides, ripening agents etc. is known as "Soil Pollution".

Soil contamination or **soil pollution is caused by**

1. the presence of (human-made) chemicals or other alteration in the natural soil environment.
2. It is typically caused by industrial activity, agricultural chemicals, or improper disposal of waste. The most common chemicals involved are petroleum hydrocarbons, polynuclear aromatic hydrocarbons (such as naphthalene and benzo(a)pyrene), solvents, pesticides, lead, and other heavy metals.
3. Industrial wastes such as harmful gases and chemicals, agricultural pesticides, fertilizers and insecticides are the most common causes of soil pollution.

Soil pollution results from the build up of contaminants, toxic compounds, radioactive materials, salts, chemicals and cancer-causing agents. The most common soil pollutants are hydrocarbons, heavy metals (cadmium, lead, chromium, copper, zinc, mercury and arsenic), herbicides, pesticides, oils, tars, PCBs and dioxins.

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**Health effects of pesticides and Pesticide poisoning**

Pesticides may cause acute and delayed health effects in people who are exposed. Pesticide exposure can cause

1. a variety of adverse health effects, ranging from simple irritation of the skin and eyes
2. to more severe effects such as affecting the nervous system
3. mimicking hormones causing reproductive problems, and also causing cancer

 4-In addition, pesticide use reduces biodiversity

1. contributes to pollinator decline
2. destroys habitat (especially for birds), and threatens endangered species.
3. 6-Since chlorinated hydrocarbon pesticides dissolve in fats and are not excreted, organisms tend to retain them almost indefinitely. Biological magnification is the process whereby these chlorinated hydrocarbons

 (pesticides) are more concentrated at each level of the food chain

**TYPES OF PESTICIDES**

 Pesticides are often referred to according to the type of pest they control. Pesticides can also be considered as either biodegradable pesticides, which will be broken down by microbes and other living beings into harmless compounds, or persistent pesticides, which may take months or years before they are broken down: it was the persistence of DDT, for example, which led to its accumulation in the food chain and its killing of birds of prey at the top of the food chain. Another way to think about pesticides is to consider those that are chemical pesticides or are derived from a common source or production method.

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**1- Organophosphate pesticides**

Organophosphates affect the nervous system by disrupting the enzyme that regulates acetylcholine, a neurotransmitter. Most organophosphates are insecticides. They were developed during the early 19th century, but their effects on insects, which are similar to their effects on humans, were discovered in 1932 Some are very poisonous. However, they

usually are not persistent in the environment.

**2- Pesticides**

Carbamate pesticides affect the nervous system by disrupting an enzyme that regulates acetylcholine, a neurotransmitter. The enzyme effects are usually reversible. There are several subgroups within the carbamates.

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**3- Organochlorine insecticides**

They were commonly used in the past, but many have been removed from the market due to their health and environmental effects and their persistence (e.g., DDT and chlordane).

 Organochlorines include DDT, Aldrin, Dieldrin and BHC. They are cheap to produce, potent and persistent. DDT was used on a massive scale from the 1930s, with a peak of 72,000 tonnes used 1970. Then usage fell as the harmful environmental effects were realized. It was found worldwide in fish and birds and was even discovered in the snow in the Antarctic. It is only slightly soluble in water but is very soluble in the bloodstream. It affects the nervous and endocrine systems and causes the eggshells of birds to lack calcium causing them to be easily breakable. It is thought to be responsible for the decline of the numbers of birds of prey like ospreys and peregrine falcons in the U150s

**4-Pyrethroid pesticides**

They were developed as a synthetic version of the naturally occurring pesticide pyrethrin, They have been modified to increase their stability in the environment. Some synthetic pyrethroids are toxic to the nervous system.

**Biopesticides**

**Biopesticides** are certain types of pesticides derived from such natural materials as animals, plants, bacteria, and certain minerals. For example, canola oil and baking soda have pesticidal applications and are considered biopesticides. At the end of 2001, there were approximately 195 registered biopesticide active ingredients and 780 products.

In toxicology, the median lethal dose, LD50 (abbreviation for "lethal dose, 50%"), LC50 (lethal concentration, 50%) or LCt50 (lethal concentration and time) of a toxin, radiation, or pathogen is the dose required to kill half the members of a tested population after a specified test duration. LD5o is usually determined by tests on animals such as laboratory mice.

Biodegradation is the chemical dissolution of materials by bacteria or other biological means. While biodegradable simply means to be consumed by microorganisms and return to compounds found in nature, "compostable". The term is often used in relation to ecology, waste management, biomedicine, and the natural environment (bioremediation) and is now commonly associated with environmentally friendly products that are capable of decomposing back into natural elements. Organic material can be degraded aerobically with oxygen, or anaerobically, without oxygen. Biosurfactant, an extracellular surfactant secreted by microorganisms. enhances the biodegradation process..

**Biomagnification**, also known as **bioamplification** or **biological magnification**, is the increasing concentration of a substance, such as a toxic [chemical](https://en.wikipedia.org/wiki/Chemical_substance), in the [tissues](https://en.wikipedia.org/wiki/Tissue_%28biology%29) of tolerant organisms at successively higher levels in a [food chain](https://en.wikipedia.org/wiki/Food_chain). This increase can occur as a result of:

* Persistence – where the substance cannot be broken down by environmental processes
* [Food chain](https://en.wikipedia.org/wiki/Food_chain) [energetics](https://en.wikipedia.org/wiki/Bioenergetics) – where the substance's concentration increases progressively as it moves up a food chain
* Low or non-existent rate of internal degradation or excretion of the substance – often due to water-insolubility



 Biological magnification often refers to the process whereby certain substances such as pesticides or heavy metals work their way into lakes, rivers and the ocean, and then move up the [food chain](https://en.wikipedia.org/wiki/Food_chain) in progressively greater concentrations as they are incorporated into the diet of aquatic organisms such as [zooplankton](https://en.wikipedia.org/wiki/Zooplankton), which in turn are eaten perhaps by fish, which then may be eaten by bigger fish, large birds, animals, or humans. The substances become increasingly concentrated in tissues or internal organs as they move up the chain. Bioaccumulants are substances that increase in concentration in living organisms as they take in **contaminated air, water, or food** because the substances are very slowly metabolized or excreted.

Although sometimes used interchangeably with "[bioaccumulation](https://en.wikipedia.org/wiki/Bioaccumulation)", an important distinction is drawn between the two, and with bioconcentration.

* **Bioaccumulation** occurs *within* a [trophic level](https://en.wikipedia.org/wiki/Trophic_level), and is the increase in the concentration of a substance in certain tissues of organisms' bodies due to absorption from food and the environment.
* [**Bioconcentration**](https://en.wikipedia.org/wiki/Bioconcentration) is defined as occurring when uptake from the water is greater than excretion.[[1]](https://en.wikipedia.org/wiki/Biomagnification#cite_note-1)

Thus, bioconcentration and bioaccumulation occur within an organism, and biomagnification occurs across trophic (food chain) levels.

[Biodilution](https://en.wikipedia.org/wiki/Biodilution) is also a process that occurs to all trophic levels in an aquatic environment; it is the opposite of biomagnification, thus when a pollutant gets smaller in concentration as it progresses up a food web.

[Lipid](https://en.wikipedia.org/wiki/Lipid), ([lipophilic](https://en.wikipedia.org/wiki/Lipophilic)) or fat soluble substances cannot be diluted, broken down, or excreted in [urine](https://en.wikipedia.org/wiki/Urine), a water-based medium, and so accumulate in [fatty tissues](https://en.wikipedia.org/wiki/Adipose_tissue) of an organism, if the organism lacks [enzymes](https://en.wikipedia.org/wiki/Enzyme) to degrade them. When eaten by another organism, fats are absorbed in the gut, carrying the substance, which then accumulates in the fats of the predator. Since at each level of the food chain there is a lot of energy loss, a predator must consume many prey, including all of their lipophilic substances.

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**Substances that biomagnify**

There are two main groups of substances that biomagnify. Both are lipophilic and not easily degraded. Novel organic substances are not easily degraded because organisms lack previous exposure and have thus not [evolved](https://en.wikipedia.org/wiki/Evolved) specific detoxification and excretion mechanisms, as there has been no selection pressure from them. These substances are consequently known as "[persistent organic pollutants](https://en.wikipedia.org/wiki/Persistent_organic_pollutant)" or POPs.

Metals are not degradable because they are elements. Organisms, particularly those subject to naturally high levels of exposure to metals, have mechanisms to sequester and excrete metals. Problems arise when organisms are exposed to higher concentrations than usual, which they cannot excrete rapidly enough to prevent damage. Some persistent [heavy metals](https://en.wikipedia.org/wiki/Heavy_metal_%28chemistry%29) are especially dangerous and harmful to the organism's reproductive system

**What is Solid Waste**

 Solid waste means any garbage, refuse, sludge from a wastewater treatment plant, water supply treatment plant, or air pollution control facility and other discarded materials including solid, liquid, semi-solid, or contained gaseous material, resulting from industrial, commercial, mining and agricultural operations, and from community activities**.**

**In Simple Words** - Solid wastes are any discarded or abandoned

materials. Solid wastes can be solid, liquid, semi-solid or containerized gaseous material.

**Municipal solid waste (MSW)**, commonly known is a waste type consisting of everyday items that are discarded by the public. "Garbage" can also refer specifically to food waste.

**Waste can be classified in several ways but the following list represents a typical classification**:

* Biodegradable waste: food and kitchen waste, green waste, paper (can also be recycled).

Recyclable material: paper, glass, bottles, cans, metals, certain plastics, fabrics, clothes, batteries etc.

* Inert waste: construction and demolition waste, dirt, rocks, debris.
* Electrical and electronic waste (WEEE) - electrical appliances, TVs, computers, screens, etc.
* Composite wastes: waste clothing, Tetra Packs, waste plastics such as toys.
* Hazardous waste including most paints, chemicals, light

bulbs, fluorescent tubes, spray cans, fertilizer and containers

* Toxic waste including pesticide, herbicides, fungicides and

medical waste.

**Methods of Solid Waste Management**

There are different methods of solid waste management. The following are some of the recognized methods:

**1-Sanitary Landfill**

 This is the most popular solid waste disposal method used today. Garbage is basically spread out in thin layers, compressed and covered with soil or plastic foam. Modern landfills are designed in such a way that the bottom of the landfill is covered with an impervious liner which is usually made of several layers of thick plastic and sand. This liner protects the ground water from being contaminated because of leaching or percolation. When the landfill is full, it is covered with layers of sand, clay, top soil and gravel to prevent seepage of water.

 2-**Incineration**

 This method involves burning of solid wastes at high temperatures until the wastes are turned into ashes. Incinerators are made in such a way that they do not give off extreme amounts of heat when burning solid wastes. This method of solid waste management can be done by individuals, municipalities and even institutions. The good thing about this method is the fact that it reduces the volume of waste up to 20 or 30% of the original volume. It is used to dispose of solid, liquid and gaseous waste. It is recognized as a practical method of disposing of curtain hazardous waste materials (such as biological medical waste). Incineration is a controversial method of waste disposal, due to issues such as emission of gaseous pollutants.

Incineration is common in countries such as Japan where land is more scarce, as these facilities generally do not require as much area as landfills. Waste-to-energy (WtE) or energy-from-waste (EfW) are broad terms for facilities that burn waste in a furnace or boiler to generate heat, steam or electricity. Combustion in an incinerator is not always perfect and there have been concerns about pollutants in gaseous emissions from incinerator stacks. Particular concern has focused on some very persistent organic compounds such as dioxins, furans, and PAHs, which may be created and which may have serious environmental consequences.

**3-Pyrolysis**

 This is method of solid waste management whereby solid wastes are chemically decomposed by heat without presence of oxygen. This usually occurs under pressure and at temperatures of up to 430 degrees Celsius. The solid wastes are changed into gasses, solid residue and small quantities of liquid. In summary, proper solid waste management is an integral part of environmental conservation that should be observed by individuals and companies globally. This will keep the [environment clean](https://www.conserve-energy-future.com/environmental-ethics.php) and reduce health and settlement problems.

**4-Energy recovery**

 Energy recovery from waste is the conversion of non-recyclable waste materials into usable heat, electricity, or fuel through a variety of processes, including combustion, gasification, pyrolyzation, anaerobic digestion, and landfill gas recovery. This process is often called waste-to-energy. Energy recovery from waste is part of the non-hazardous waste management hierarchy. Using energy recovery to convert non-recyclable waste materials into electricity and heat, generates a renewable energy source and can reduce carbon emissions by offsetting the need for energy from fossil sources as well as reduce methane generation from landfills. Globally, waste-to-energy accounts for 16% of waste management.

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 5- **Biological reprocessing**

 Recoverable materials that are organic in nature, such as plant material, food scraps, and paper products, can be recovered through composting and digestion processes to decompose the organic matter. The resulting organic material is then recycled as mulch or compost for agricultural or landscaping purposes. In addition, waste gas from the process (such as methane) can be captured and used for generating electricity and heat. The intention of biological processing in waste management is to control and accelerate the natural process of decomposition of organic matter.

**6- Recycling**

 Recycling is a resource recovery practice that refers to the collection and reuse of waste materials such as empty beverage containers. The materials from which the items are made can be reprocessed into new products. Material for recycling may be collected separately from general waste using dedicated bins and collection vehicles, a procedure called kerbside collection. In some communities, the owner of the waste is required to separate the materials into various different bins (e.g. for paper, plastics, metals) prior to its collection. In other communities, all recyclable materials are placed in a single bin for collection, and the sorting is handled later at a central facility. The latter method is known as "single-stream recycling. "

The most common consumer products recycled include aluminium such as beverage cans, copper such as wire, steel from food and aerosol cans, old steel furnishings or equipment, polyethylene, glass bottles and jars, paperboard cartons, newspapers, magazines and light paper, and corrugated fiberboard boxes.