**Chapiter 04: Different types of pollution.**

**Introduction:**

 The most general definition of the term pollution was given by the first report of the White House Council on Environmental Quality (1965) "pollution" says this report "is an adverse modification of the natural environment which appears in whole or in part as a by-product of human action, through direct or indirect effects altering the criteria of distribution of energy flows, radiation levels, the physicochemical constitution of the natural environment and the abundance of living species. These modifications can affect man directly or through agricultural resources, water and biological products. They can also affect him by altering the physical objects he owns or the recreational possibilities of the environment."

1. **Sources of air pollution:**

 To better understand and control air pollution, it is necessary to know the sources of pollution, identify them and quantify them.

* 1. **Pollution of natural origin :**

There are many natural sources of pollution, often much larger than their man-made counterparts, including:

- Natural sources of sulfur dioxide include releases from volcanoes, biological decomposition, and forest fires. In 1983, the United Nations Environment Programme estimated that sulfur oxides were released between 80 million and 288 million tons per year (compared to about 79 million tons worldwide from human sources).

- Natural sources of nitrogen oxides include volcanoes, biological decomposition, and lightning. Estimates range from 20 million to 90 million tons per year of nitrogen oxides released from natural sources (compared to about 22 million tons worldwide from human sources).

**1.2 Pollution of anthropogenic origin:**

* **Thermal energy production:** At the individual or tertiary level (heating homes and offices) as well as at the industrial level (production of steam or electricity), the combustion of fossil fuels (coal, heavy fuel oil, etc.) produces significant polluting emissions. Carbon dioxide (CO2), an unavoidable product of the combustion of organic matter whose increasing concentration in the atmosphere contributes to the greenhouse effect, carbon monoxide (CO), sulfur dioxide (SO2), nitrogen oxides (NOx), dust, heavy metals, etc. are concerned.
* **Industry:** Industry is the source of specific emissions due to the treatment or manufacturing processes used. In varying quantities, depending on the industrial sector, it emits carbon monoxide and dioxide, sulfur dioxide, nitrogen oxide, dust, volatile organic compounds (VOCs), heavy metals, etc.
* **Transport and automobiles:** Pollution from transport has long been considered a local problem, mainly perceived in cities due to the density of traffic. Today, we know that transport, mainly road transport and particularly automobiles, is a significant source of pollution. Internal combustion engines are by far the leading cause of emissions of nitrogen oxides and various hydrocarbons. Diesel engines, less polluting in terms of the latter type of emissions, are, however, the source of particles and sulfur dioxide. The contribution of transport to pollution continues to increase due to the increase in traffic directly linked to economic developments, despite the many technological advances made in recent years.
* **Waste:** Waste is considered one of the biggest sources of pollution. Whether dumped in a landfill or incinerated, as it decomposes, it produces several pollutants, such as methane, hydrochloric acid, heavy metals, dioxins and furans.
* **Agricultural activities:** Agriculture also contributes to air pollution. Its emissions (mainly ammonia, methane, nitrous oxide, carbon monoxide and phytosanitary products) are linked to the decomposition of organic matter and the use of fertilizers and phytosanitary products.
1. **Water pollution:**

 There are two major sources of water pollution: direct and indirect. Direct sources include factories, sewage treatment facilities, septic systems, and other sources that clearly discharge pollutants into water sources. Indirect sources are more difficult to identify because they cannot be traced to a specific location. Indirect sources include runoff, which includes sediment, fertilizers, chemicals, and animal waste from farms, fields, construction sites, and mines. The U.S. Environmental Protection Agency divides water pollution into the following six categories:

* Biodegradable waste consists primarily of human and animal waste. When biodegradable waste enters a water supply, the waste provides an energy source (organic carbon) for bacteria. Organic carbon is converted to carbon dioxide and water, which can cause air pollution and acid rain.
* Plant nutrients, such as phosphates and nitrates, enter water through sewage, livestock, and fertilizer runoff. Phosphates and nitrates are also found in industrial waste.
* Heat can be a source of water pollution. As water temperatures rise, the amount of dissolved oxygen decreases. Thermal pollution can be natural, in the case of hot springs or shallow ponds during the summer, or man-made, through the discharge of water that has been used to cool power plants or other industrial equipment. Fish and plants require certain temperatures and oxygen levels to survive, so thermal pollution often reduces the diversity of aquatic life in the water.
* Sediment is one of the most common sources of water pollution. Sediment consists of solid organic or mineral material that is washed or blown from the earth into water sources. Sediment pollution is difficult to identify because it comes from indirect sources, such as construction, agricultural and livestock operations, forestry, flooding, and urban runoff.
* Hazardous and toxic chemicals are usually man-made materials that are not used and disposed of properly. Direct sources of chemical pollution include industrial waste and oil spills.
* Radioactive pollutants include sewage discharges from factories, hospitals, and uranium mines. These pollutants can also come from naturally occurring isotopes, such as radon. Radioactive pollutants can be dangerous, and it takes several years before radioactive substances are no longer considered dangerous.
1. **Soil pollution :**

 Human activities are most often the cause of soil pollution:

- Industrial facilities can, in the event of a leak, an accident, or even the abandonment of a factory, cause site pollution.

- The spreading of plant protection products and discharges from livestock buildings and farms are also the cause of numerous soil pollution events (particularly nitrogen and phosphates), which in turn lead to the contamination of runoff water and, subsequently, waterways.

- The actions of local authorities can also be the cause of soil pollution: management of landfills and wastewater treatment plants, use of plant protection products by green space departments, management of shared gardens, etc.

Geographically distant events can also produce soil pollution, whether natural events (e.g., ash fallout from a volcano following a major eruption) or technological events (radioactive fallout following a nuclear test or a disaster, such as the Chernobyl accident).