

### Definition of Ecological pollution :

Environmental scientists and other interested people such as climate scientists, health, chemistry, and other specialties differ in the definition of pollution, and in the eyes of some interested people, pollution is concerned with all the ways in which human activity causes damage to the natural environment, and *ecological or environmental pollution is* defined as the unwanted change of our environment through the effects of Direct and indirect changes in energy patterns, radiation levels, physical and chemical states, and abundance of living things.

While, *pollutants*, they are defined as the substances, microbes, or energy that cause environmental harm to humans, animals, or plants, or that cause an imbalance in the ecosystem.

*Degrees of Ecological pollution:* Environmental scientists have identified three degrees of environmental pollution, namely: -

- 1- The acceptable pollution:* It is a degree of pollution that does not affect the environmental balance and does not include any major environmental problems (this degree is found in all regions of the globe due to the ease of transporting pollution of various types from one place to another)
- 2- The dangerous (risk) pollution:* It is an advanced stage of environmental pollution, and this degree of pollution is found in many industrialized countries due to industrial activity, as the quantity and quality of pollutants exceed the permissible limits, and the negative impact on natural environmental elements begins.
- 3- The devastating pollution:* This is the stage in which the ecosystem collapses and becomes unable to rebalance. The nuclear bombs used against the cities of Hiroshima and Nagasaki in Japan during World War II are a perfect example of this type of pollution, as the ecosystem

collapsed completely . It took many years to restore its balance, at great economic cost.

*The nature of the pollutants:* - They can be divided according to:

*1- Chemical composition:* It can be divided into two types:

*a- Organic materials:* These include pesticides such as DDT, aldrin, chlorine rich in chlorine and malathion rich in phosphorous, etc.

*b- Inorganic materials:* They may be in the form of **ions** such as phosphates, nitrates, etc., or in a **non-ionic** form such as heavy elements ( lead, cadmium, mercury, etc.).

*2- The degree of degradation:* It is divided into two types :

*a- Biodegradable materials:* These are substances that can be analyzed in the environment by analyzers such as bacteria and fungi.

*b- Non-Biodegradable Materials:* These include chemical and industrial materials that have a cumulative effect on the environment and that cannot be degraded, such as pesticides, fungicides, plastics, nylon, some detergents ... etc.

*3- The degree of toxicity:* These are the substances that cause obstruction and stopping of metabolic activities through direct and effective influence on the physiological activities of the organism and may lead to the death of the organism.

*Toxic substances differ in their effect on:*

*a- Its chemical composition*

*b- Concentration of matter*

## How to express the concentrations of pollutants: -

The concentrations of pollutants are often expressed in very small parts ( ppt , ppm , ppb... etc ) , so the concentration of a part in a million (1ppm) corresponds to one part of the pollutant in a million parts of gas, liquid, or solid.

Small concentrations of pollutants have a serious effect on living things, for example :

- 1- One part per million of phenol in the water is fatal to some aquatic organisms, including fish.
- 2- 0.2 parts per million peroxybenzoyl nitrate in Smog can lead to severe irritation in human eyes.
- 3- 0.001 parts per million of HF gas. It damages sensitive plants, such as peaches.

## Some terms of environmental pollution :-

**Persistence (stability) of pesticide :** is defined as the time required for the pesticide level to be reduced to 25% of the original level of the pesticide, **for example ;**

persistence for Chlordene 5 years = meaning that chlordine reduces to 25% of its original level within 5 years.

persistence for DDT (dichlorodiphenyltrichloroethane) = 4 years,

persistence for Bechloran = one year and half .

**Time lag of pollutants :** Sometimes there is a time lag between the release of pollutants and the beginning of their effect ,

**for example ;** inorganic mercury compounds, especially in the sediments of rivers and lakes where they need from 10 - 100 years to turn into an organic mercury methyl which is considered very dangerous to different organisms.

Biological  
concentration

- The levels of pollutants in an organism are higher than in their food ((an organism > their food ))

for example

- One of the studies showed higher concentrations of DDT as we progressed in the food chain, and the results were as follows: -
- 0.014ppm in a lake sediment
- 0.14 ppm crustaceans feed on the bottom
- 3 - 6 ppm in lake fish
- More than 2,400 ppm in seagull

Biological  
discrimination

- the pollutants in the environment are at higher concentrations than it is in the body of the organism ((an environment > an organism)) , due to the presence of a mechanism to regulate these substances within the bodies of living organisms that prevent it from increasing concentration more than normal levels

for example

- We may find pesticide residues in plant tissues lower than the soil on which they grow as follows:
- The soil on which the potato grows contains 0.48 ppm - 8.36 ppm of residual aldrin.
- potato plants contain 0.009 ppm – 0.32 ppm aldrin metabolites.