



**Al-Mustaqbal University**

**College of Science**

**Department of Medical physics**

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**Environmental Pollution**

**3<sup>th</sup> Lecture**

**Soil Pollution**

Soil is the thin layer of organic and inorganic materials that covers the Earth's rocky surface. The organic portion, which is derived from the decayed remains of plants and animals, is concentrated in the dark uppermost topsoil. Soil pollution definition is the presence of toxic chemicals (pollutants or contaminants) in soil in high enough concentrations to be of risk to human health and/or ecosystem. Additionally, even when the levels of contaminants in soil are not of risk, soil pollution may occur simply due to the fact that the levels of the contaminants in soil exceed the levels that are naturally present in soil (in the case of contaminants which occur naturally in soil).

2. The sources of soil pollution Mining, agriculture, and deforestation are important energy intensive activities that impact economies and at the same time directly and indirectly cause soil and land pollution. Soil pollutants include a large variety of contaminants or chemicals (organic and inorganic), which could be both naturally-occurring in soil and man-made. In both cases, the main soil pollution causes are the human activities (i.e., the accumulation of those chemicals in soil at levels of health risk is due to human activities such as accidental leaks and spills, dumping, manufacturing processes, etc.). Accumulation due to natural processes is also possible. Natural processes, however, may have an influence of the human released toxic chemicals (pollutants) in the soil, overall decreasing or increasing the pollutant toxicity and/or the level of contaminated soil.

3. Soil erosion and deforestation The amount of soil erosion occurring in the world today may be two or three times it was before human intervention in nature. Eroded materials can also be contributed by urban, industrial, and highway construction sites . These materials when they reach rivers and lakes lead to settle on fish spawning beds and suffocate the eggs. It can clog gills of adult fish, and can interfere with domestic and industrial uses of water and adds to the expenses of water.

. Soil pollutants Soil is a very sensitive and vulnerable pollution receptor. Contaminants can damage not only terrestrial ecosystems but can also be transferred from the soil to air, water or food. According to estimates by the European Environment Agency (EEA), in 1999 there were between 300,000 and 1,500,000 contaminated sites in Western Europe. In general, soil may be polluted by the following

- (1) Industrial wastes: Industries are the major causes for soil pollution. Textiles, steel, paper, Cement, oil, dyeing and other industries are responsible for soil pollution. Toxic organic compounds and phenol destroy the fertility of the soil.
- (2) Biological agents – Fungi, protozoa, bacteria are important Biological agents for soil pollution. The human and animal wastes, garbage, waste water generates heavy soil pollution.
- (3) Radio-active pollutants: Atomic reactor, nuclear radio active devices releases radio active pollutants. These pollutants enter the land and accumulate there by causing soil pollution

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- (4) Agricultural pollution : It is important to know that the modern agriculture practices pollute the soil to a large extent. Since agricultural practices are the most important factor in the pollution of the soil so it will take a special interest in this lecture. Today huge quantities of fertilizers, pesticides, weedicides are added to increase the crop field. Apart from these farm wastes, manure debris, soil erosion containing inorganic chemicals are causing soil pollution. The excessive use of these products can affect soils and water quality. The chemicals can also be absorbed by plants which are then consumed by animals and humans, terribly harmful to animal and human health. Below are some pollutants that are mainly agricultural pollutants

1. Animal wastes Over the centuries, farm animal waste have been regarded by all peoples as an important soil fertilizer. Fields fertilized with manure generally show higher yields than these without manure. Animal wastes contain several types of land pollutants that are of increasing concern both to the public and regulators. Besides traditional pollutants, increasing evidence suggests that excessive use of

animals waste on land releases measurable amounts of antibiotics, growth hormones, and pesticides containing toxic metals like arsenic. Animal waste have two principal measurable effects on surface water quality: (1) increased turbidity through the movement of soil particles into streams, rivers, and lakes; and (2) farm animal waste problems, including serious water pollution and unpleasant smell and the transfer of bacterial and viral diseases, parasitic and others. Current interest in animal waste control centers on the use of aerobic and anaerobic biologically active systems and the spreading of waste on the land. Anaerobic digestion system have proved successful in the laboratory and in field under some conditions. Aaerobic lagoons are used to remove and destroy much of the organic matter, and aerobic units are generally shallow oxidation ponds or lagoons with actually anaerobic conditions.