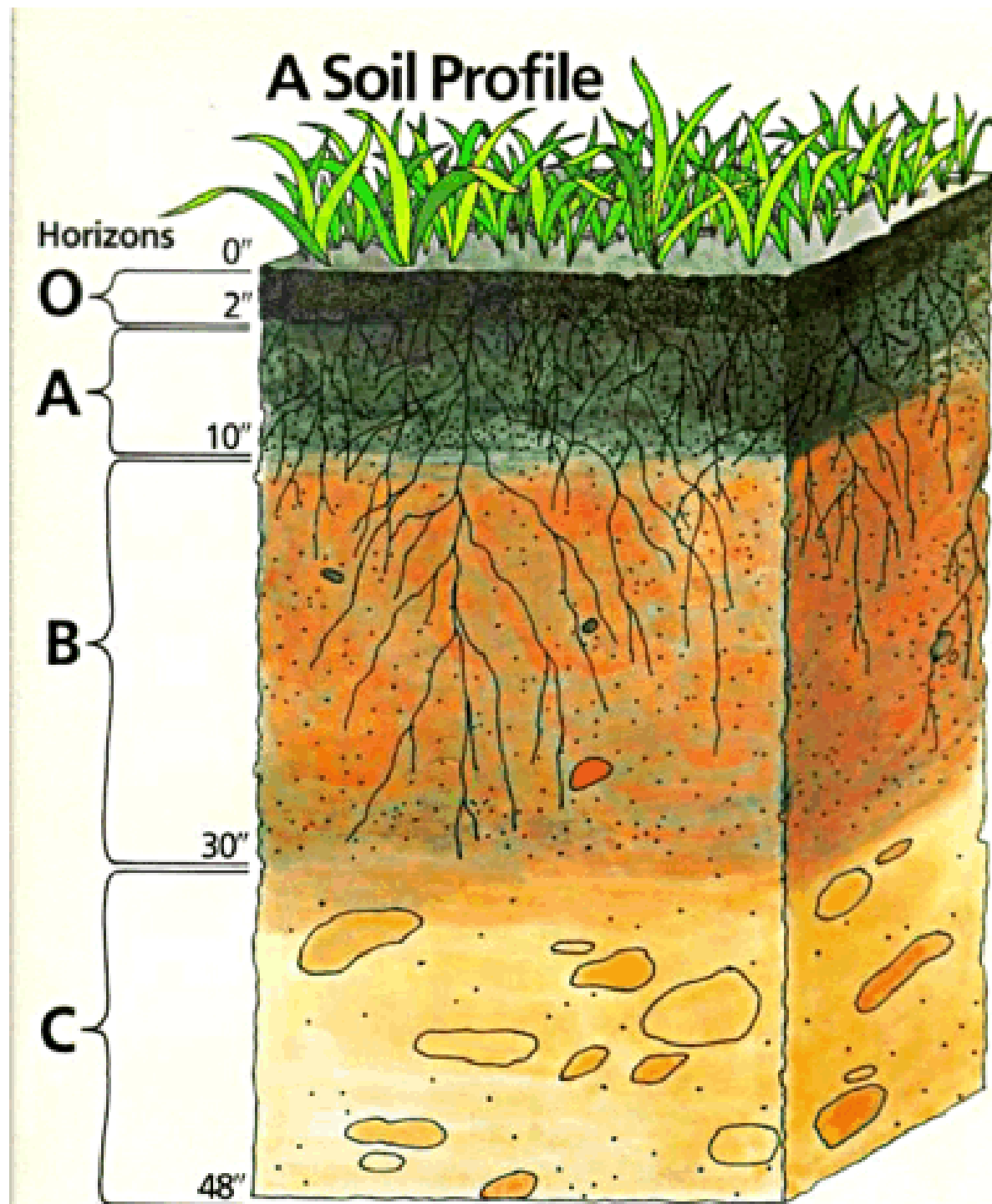


# Soil pollution

- q Soil is upper layer that covers the earth's surface
- q Soil is the home for millions of microorganisms
- q Soil serves as a primary nutrient base for plants.
- q Soil Consists of organic and inorganic materials,
- q The organic materials are present in the top most portion of the layer.
- q The inorganic materials would be the rocks which are formed by various physical and chemical changes in the bedrock.
- q Productive soils are necessary for agriculture to supply the world with sufficient food



- O Horizon – Organic matter
- A Horizon – Top soil. Organic matter **and some inorganic mineral particles**
- B Horizon – Subsoil **less organic material**
- C Horizon – Parent Material **does not contain any organic materials.**

# Soil Pollution

- ü **Soil pollution** is addition of any substance which affects its physical chemical and biological property and reduces soil productivity
- ü Resulting in a change of the soil quality
- ü likely to affect the normal use of the soil or endangering public health and the living environment.



**soil pollutant** : is any factor which deteriorates the quality, texture and mineral content of the soil or which disturbs the biological balance of the organisms in the soil. Pollution in soil has adverse effect on plant growth

## **Major Types of soil pollutants:**

- 1. Heavy metals and their salts**
- 2. Other inorganic pollutant**
- 3. Radionuclides**
- 4. Nuclear debris from major nuclear accidents**

## **Causes (sources) of Soil Pollution**

### **Causes (sources) of Soil Pollution**

This is caused mainly by two ways, those being:

- 1) Pollutants of Natural ways**
- 2) Pollutants of artificial or human intervention**

### **Pollutants of Natural ways**

- 1) The ash from volcanic eruptions contain toxic elements which once settled on the ground pollute it and made it unfit for agriculutral purposes.
- 2) Decaying living organisms also cause pollution as the fluids from the organism act as poisonous pollutants.
- 3) When a tornado descends it dumps the debris in that location causing soil pollution

• Pollutants due to Human Intervention **is associated with:**

- Pollutants of Agrochemical sources (fertilizers – pesticides).
- Soil pollutants of Urban sources
- Industrial sources
- Deforestation and soil erosion



## •Pollutants of Agrochemical sources

- q Pollutants from Agrochemical sources include fertilizers and pesticides in addition spill of hydrocarbon used as fuels for agricultural machine.
- q 1 - The main pollution effect, caused by fertilizer is the introduction of **heavy metals and their compound into the soil**.  
Ex., arsenic, cadmium, manganese, uranium and zinc by some phosphate fertilizers
- q The **heavy metals** are not degradable, it accumulate in the soil and became toxic due to excessive use of phosphate fertilizers becomes an indestructible poison for crops.

q 2- The over use of NPK (nitrogen, phosphorus and potassium) fertilizers **reduce quantity and quality**(protein content – carbohydrates- Vitamin) **of vegetables**. The vegetables and fruits grown on over fertilized soil are more attacking by insects and diseases.

Effect of over amount of NP ??????????

- 3- Pesticides** and herbicides which contains **harmful chemicals**.

The most important pesticides are like DDT, BHC, chlorinated hydrocarbons, organophosphates, aldrin, malathion, dieldrin, furodan, etc.

- The remnants of such pesticides adsorbed by the soil particles, which then contaminate root crops grown in that soil. The consumption of such crops causes the pesticides remnants to enter human biological systems, affecting them adversely.

- **Fuel spills in farms** : Fuels used in agriculture machines are mostly petroleum products like that may contain organic contaminates like benzene, heptane , hexane phenol , tetramethyl lead and zinc

## •Soil pollutants of Urban sources :

•Power generation emissions includes  $\text{CO}_x$ ,  $\text{NO}_x$ ,  $\text{SO}_x$ , and aromatic hydrocarbons, and radionuclides . These may be introduced into the soil either directly as dry deposition or in a wet form after being dissolved in precipitation.

**1- Soil pollution through transport activates:** the impact of transport activities (highways) on the hydrogeologic environment may cause considerable transformations on the terrain , leading to the physical and or chemical degradation of soil

## 2- Damping of solid Waste (disposal sewage sludge, landfill leachates, organic) pollutants:

q Since a significant amount of urban solid waste tends to be paper and food waste, the majority is recyclable or biodegradable in landfills.

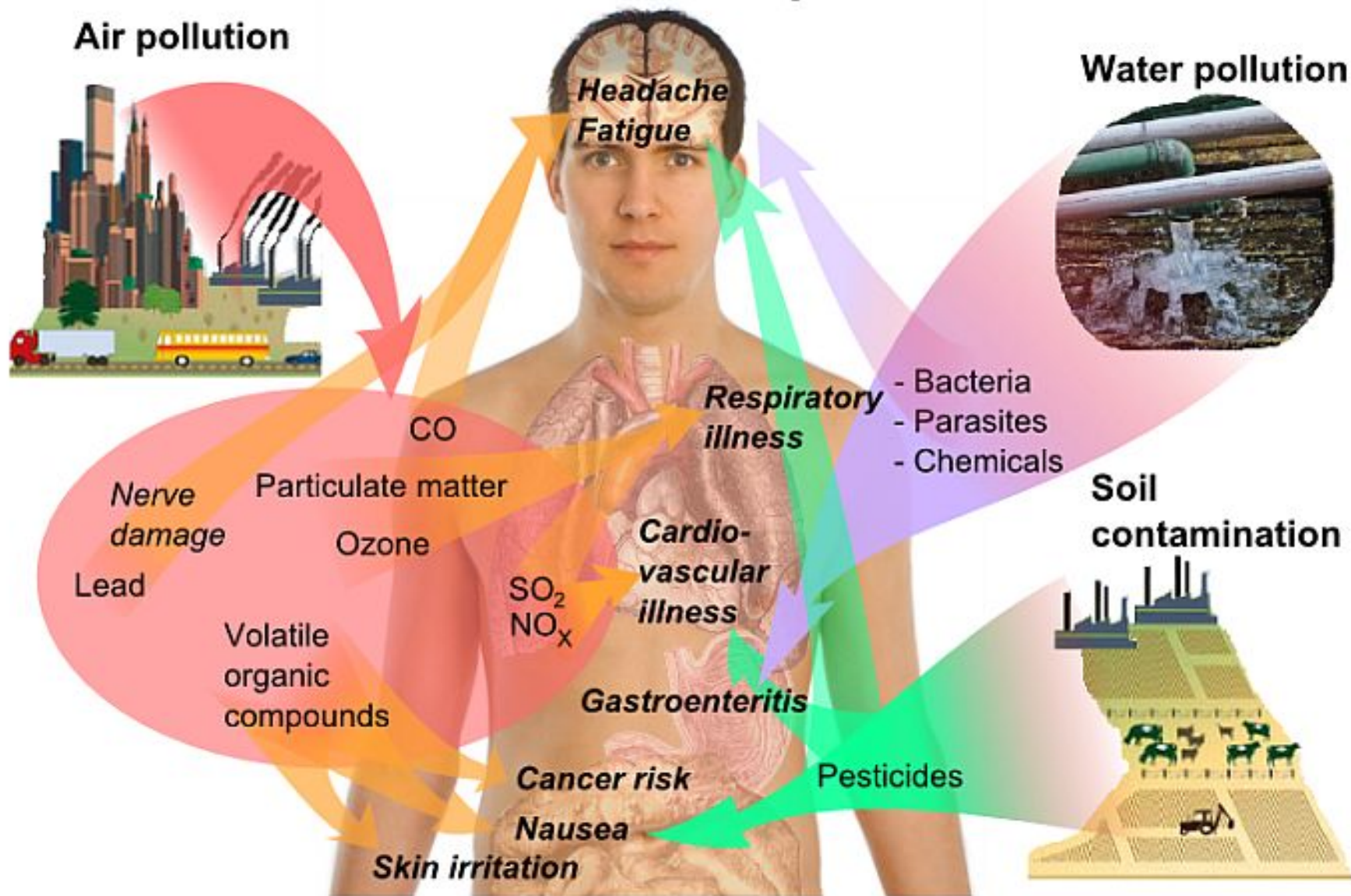
q The portion of solid waste that is hazardous such as oils, battery metals, heavy metals from smelting industries and organic solvents are the ones we have to pay particular attention to

q More than 90% of hazardous waste is produced by chemical, petroleum and metal-related industries and small businesses such as dry cleaners and gas stations contribute as well.

### •3- Soil Erosion

- q Soil Erosion occurs when the soil particles are dislodged and carried away by wind or water.
- q Deforestation, agricultural development, temperature extremes, precipitation including acid rain, and human activities contribute to this erosion.
- q Humans speed up this process by construction, mining, cutting of timber, over cropping and overgrazing. It results in floods and cause soil erosion

# Health effects of pollution





## **Control of soil pollution**

The following steps have been suggested to control soil pollution.

To help prevent soil erosion, we can limit construction in sensitive area.

In general we would need less fertilizer and fewer pesticides

if we could all adopt the three **R's: Reduce, Reuse, and Recycle**. This would give us less solid waste.