
Soil Pollution

What is soil?

- Soil is defined as the top layer of the earth's crust.
- It contains inorganic matter, organic matter, water, air and many living organisms.
- Soil provides support and nutrients for plant growth.
- The healthy soil has a valuable asset.
- It has been receiving more and more toxic substance.

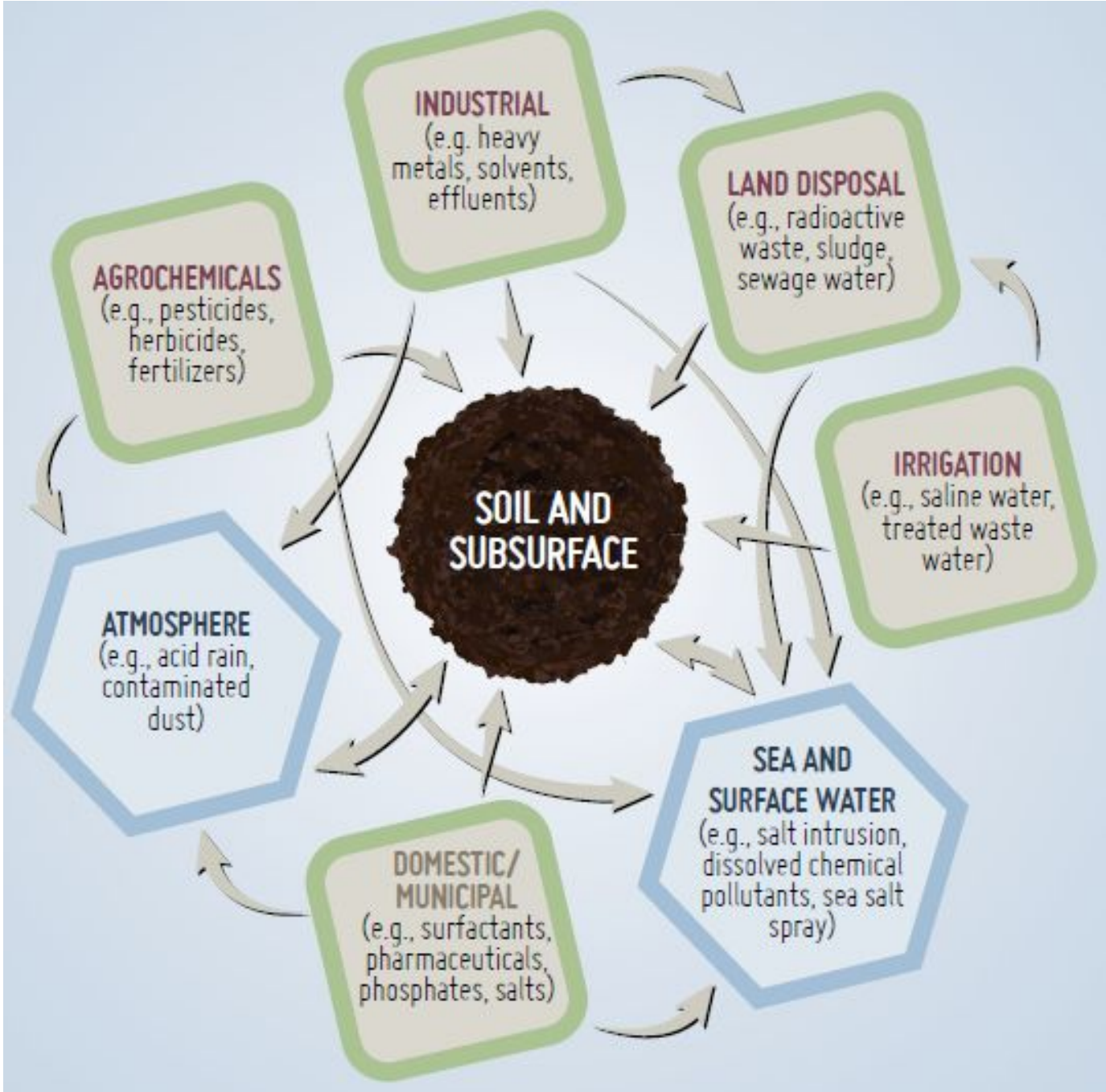
DEFINITION OF SOIL POLLUTION

Soil pollution is the contamination of soil with harmful substances that can adversely affect the quality of the soil and the health of those living on it.


Causes of Soil Pollution
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Types of Soil Pollution

- Agricultural Soil Pollution.
- Industrial Soil Pollution.
- Urbanization Soil Pollution.

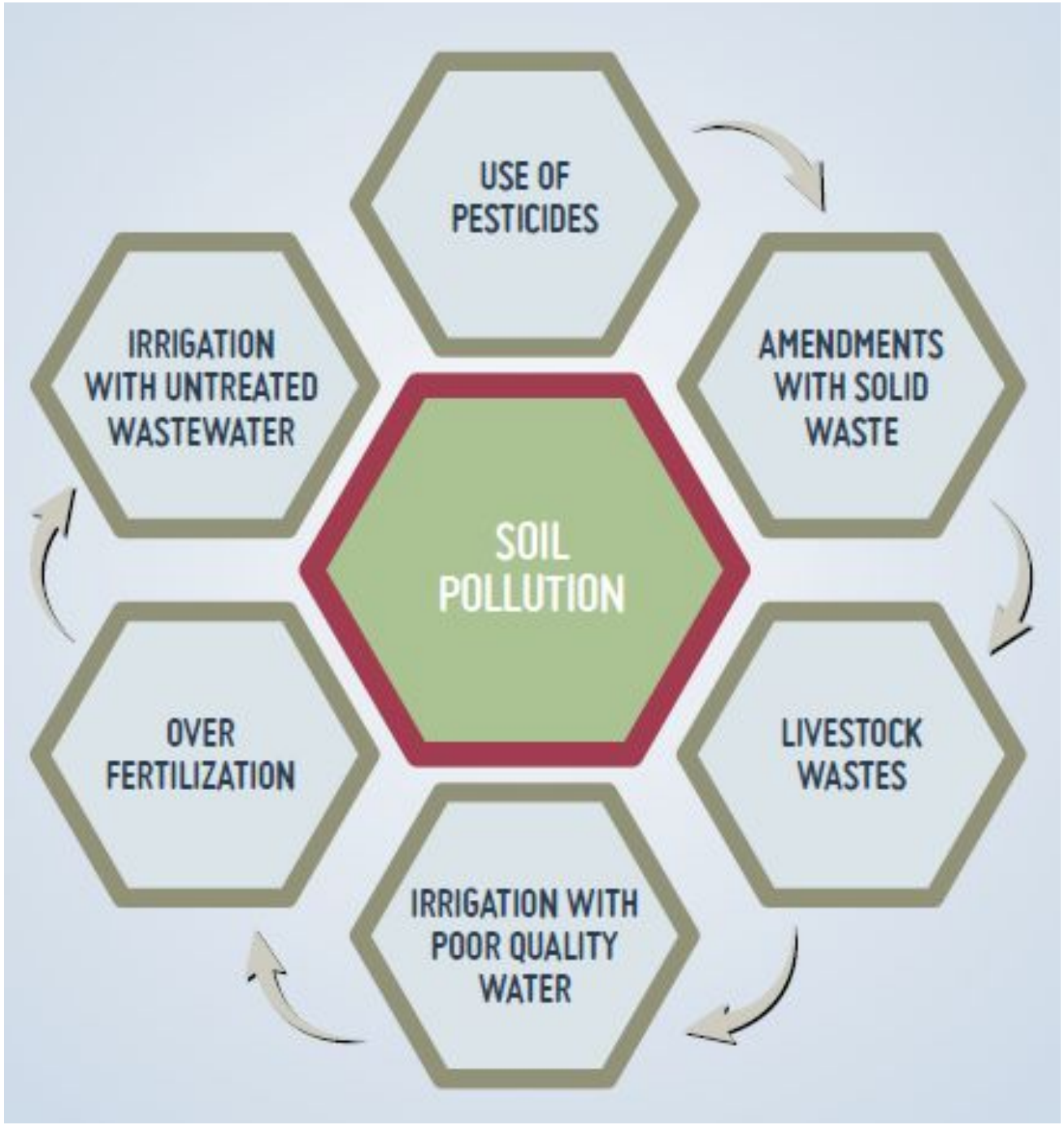

INDUSTRIAL
(e.g. heavy metals, solvents, effluents)
LAND DISPOSAL
(e.g., radioactive waste, sludge, sewage water)
AGROCHEMICALS
(e.g., pesticides, herbicides, fertilizers)
IRRIGATION
(e.g., saline water, treated waste water)
SOIL AND SUBSURFACE
ATMOSPHERE
(e.g., acid rain, contaminated dust)
SEA AND SURFACE WATER
(e.g., salt intrusion, dissolved chemical pollutants, sea salt spray)
DOMESTIC/ MUNICIPAL
(e.g., surfactants, pharmaceuticals, phosphates, salts)

USE OF CHEMICALS

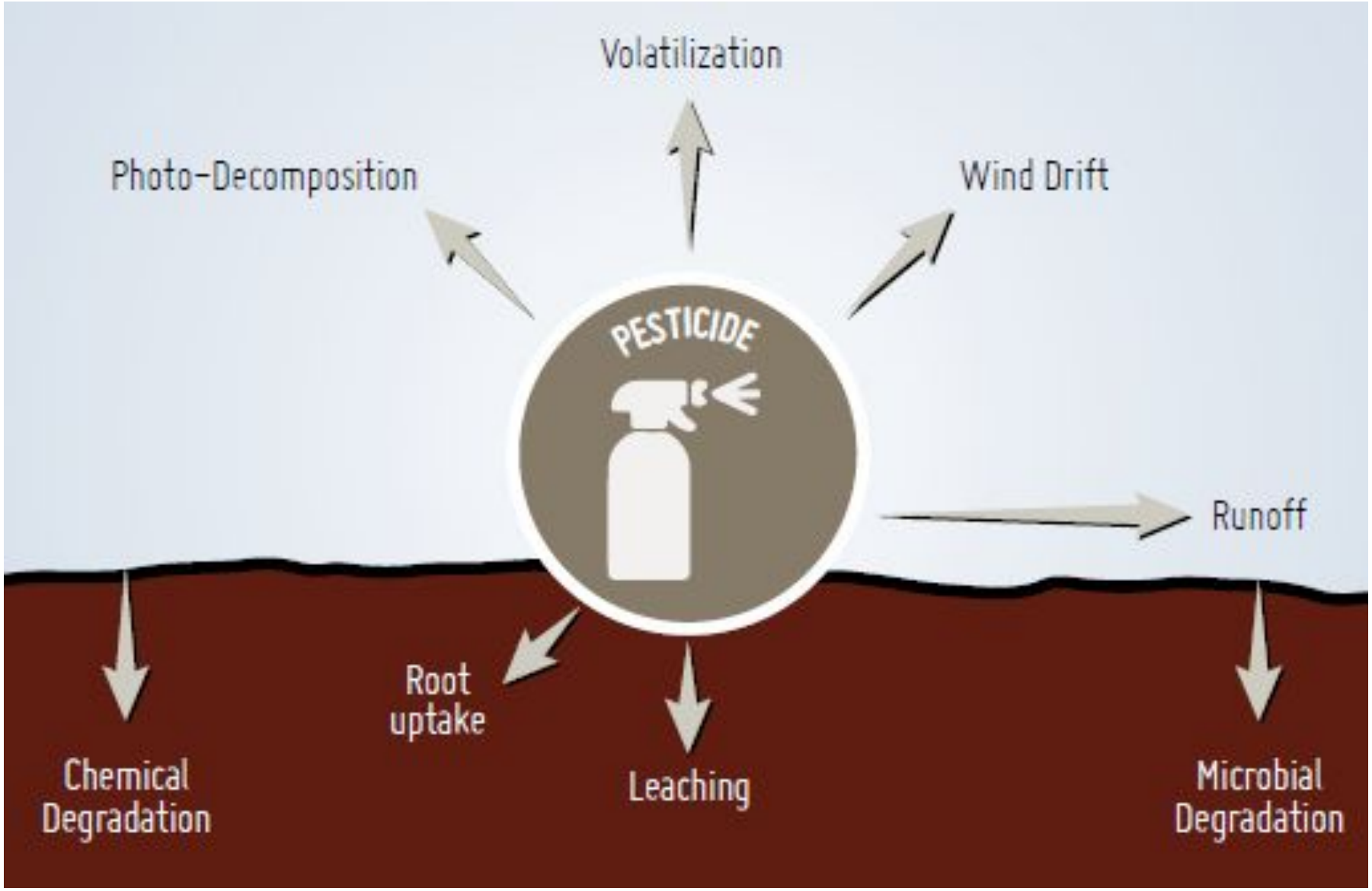
- Use of chemicals include –

  Pesticides, insecticides, fertilizers.
- Excessive use of these chemicals increases salinity of the soil.
- It adversely affects the micro-organisms present in it causing soil to lose its fertility.
- Results in loss of minerals present in the soil.

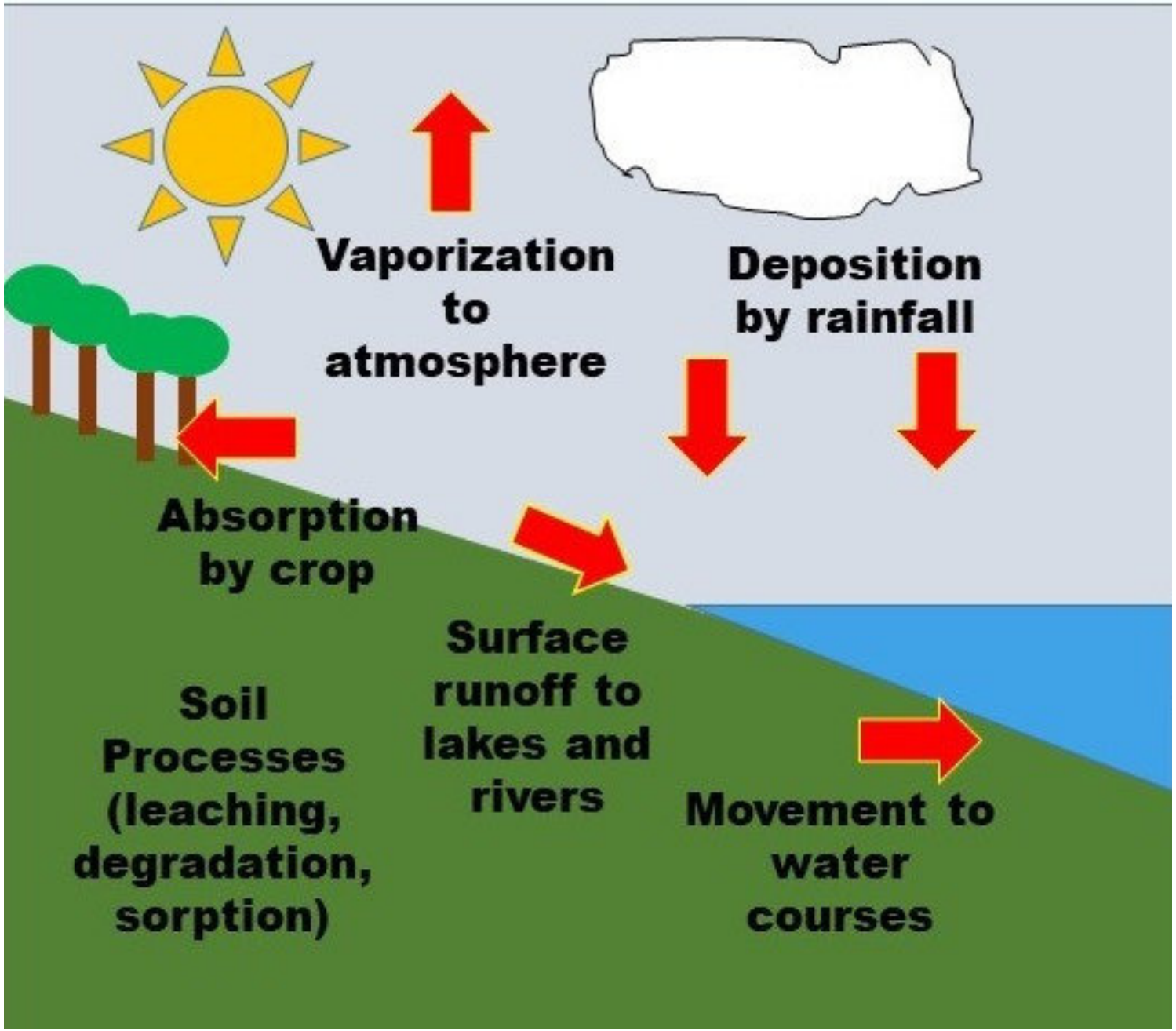




Agricultural Soil Pollution



Behavior of pesticides in the environment


Vaporization to atmosphere
Deposition by rainfall
Absorption by crop
Surface runoff to lakes and rivers
Soil Processes (leaching, degradation, sorption)
Movement to water courses

SOIL EROSION

- It occurs when top soil moves from one place to another as a result of various natural and man-made factors.
- Leads to decrease in the soil's capacity to retain water.
- When the soil is eroded, the crops grown are affected resulting in an indirect effect on the environment



SALTY WATER

- Use of water with high salinity causes soil pollution.
- Salts present in the water accumulates at the top layer of the soil.
- This salty water present in the soil becomes a cause for studded growth of the crops.



URBAN WASTE

- Both domestic and commercial waste are known as urban waste
- It contains garbage and rubbish material like papers , fibers ,plastics ,glasses , bottles and dried sludge of sewage
- As this rain water runs from top of the this uncovered garbage this causes soil pollution



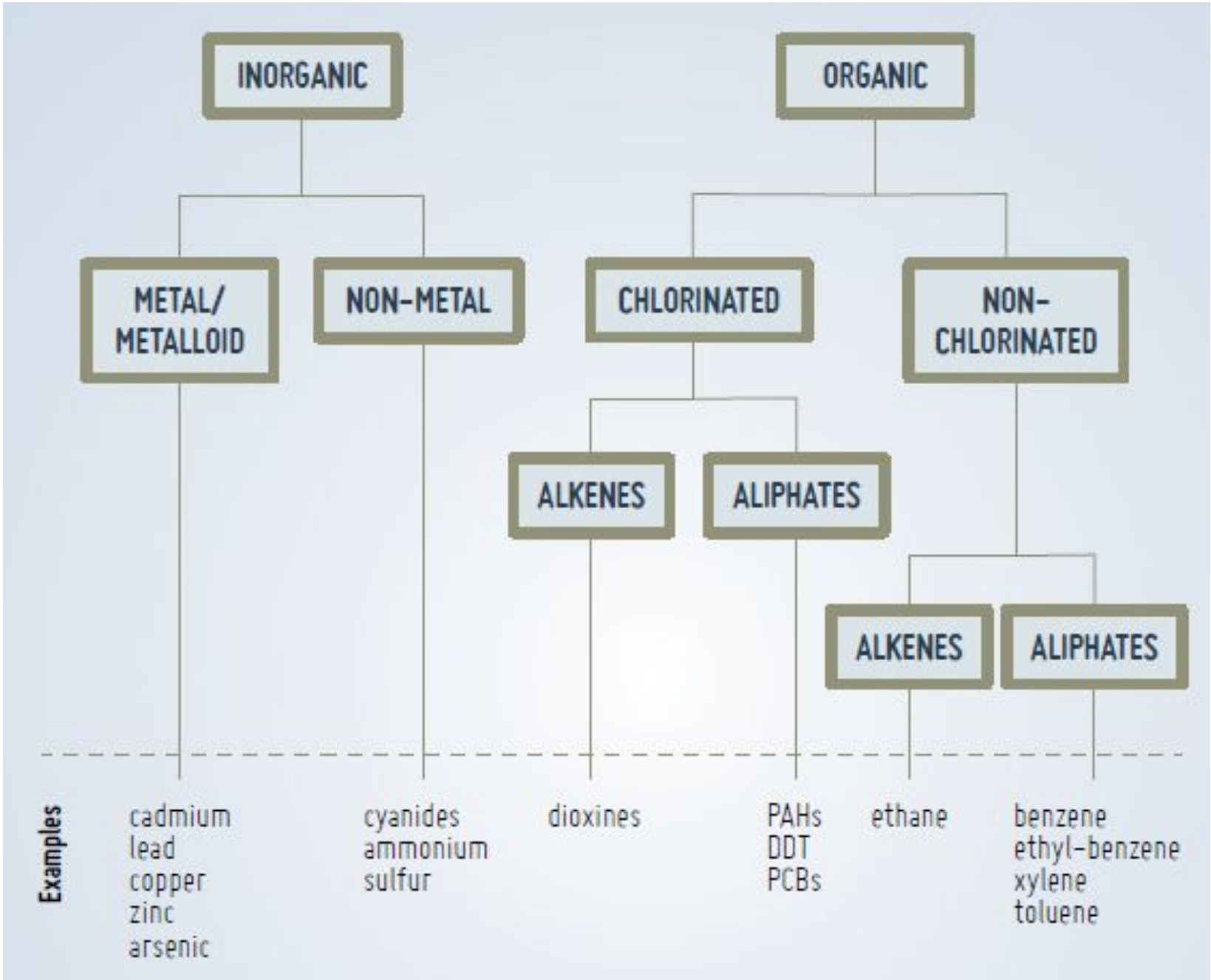


INDUSTRIAL WASTE

- Most of the industrial waste rejected materials like calcium carbonate , magnesium , sulphate.
- This industrial waste are all dumped over the soil surface by almost all industries
- This causes toxicity of soil






INORGANIC
ORGANIC
METAL/ METALLOID
NON-METAL
CHLORINATED
NON-CHLORINATED
ALKENES
ALIPHATES
ALKENES
ALIPHATES
Examples
cadmium
lead
copper
zinc
arsenic
cyanides
ammonium
sulfur
dioxines
PAHs
DDT
PCBs
ethane
benzene
ethyl-benzene
xylene
toluene

POLLUTION OF UNDERGROUND WASTE

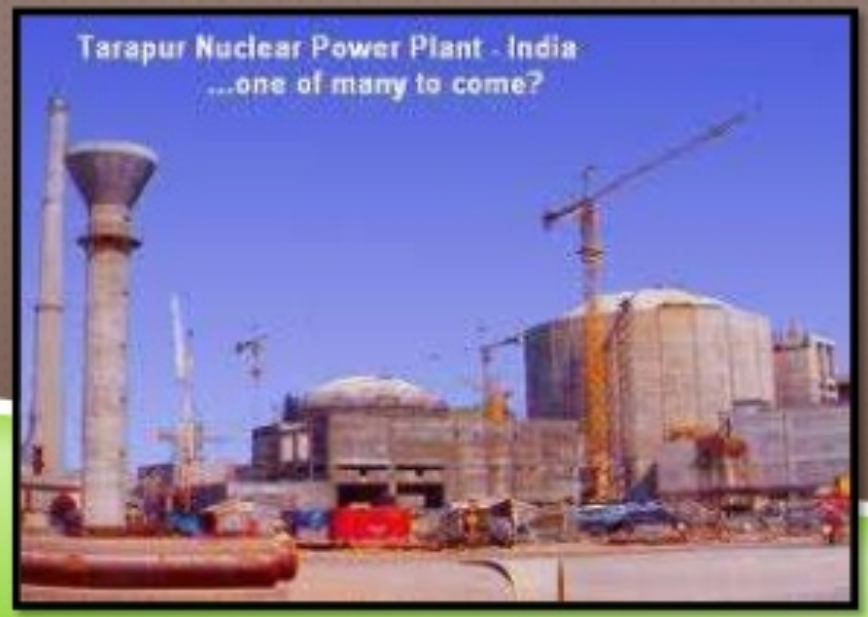
- Deposition of many agricultural chemicals in the underground layers has disturbed the normal activities.

- Living of earthworms ,centipede ,millipede ,frogs and rats underground has greatly disturbed the ecological equilibrium is badly affected



RADIOACTIVE WASTE

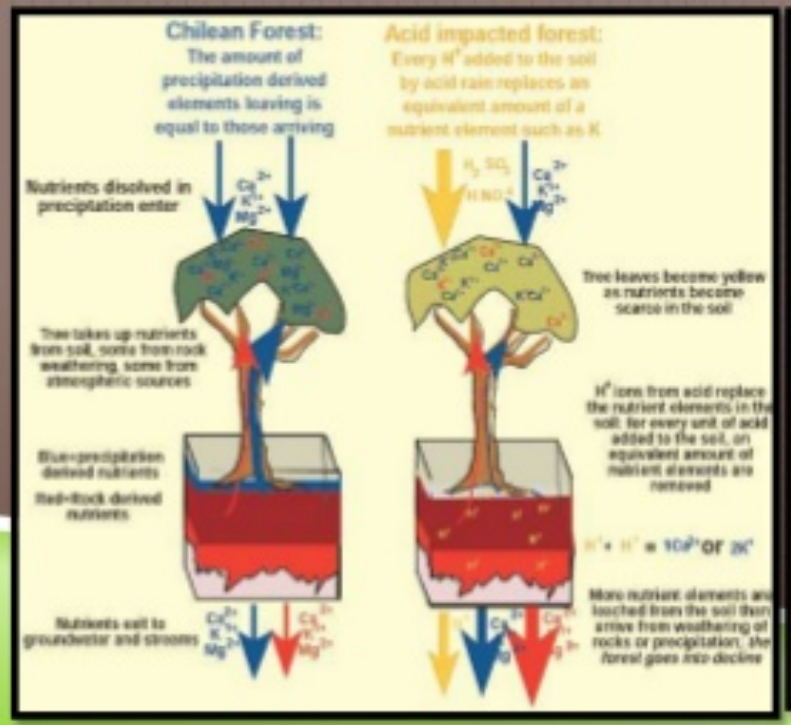
- Storage and disposal of radioactive waste from nuclear power plants causes soil pollution
- They gets deposited on the top soil and emits continuously gamma radiations.
- Examples : strontium 90, iodine 131, barium 140

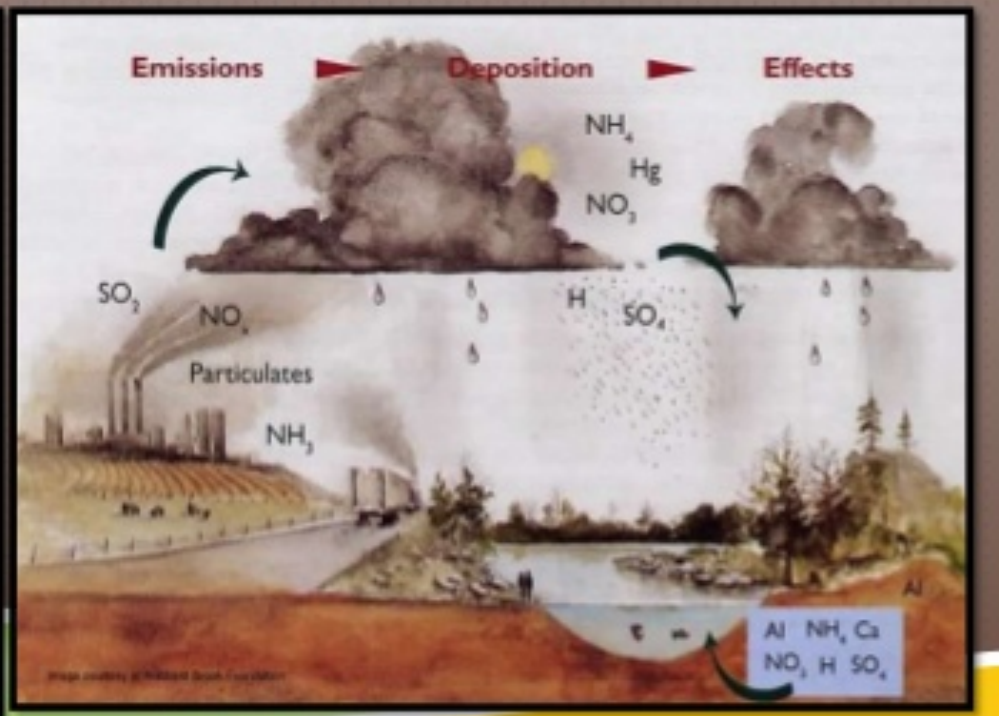




ACID RAIN

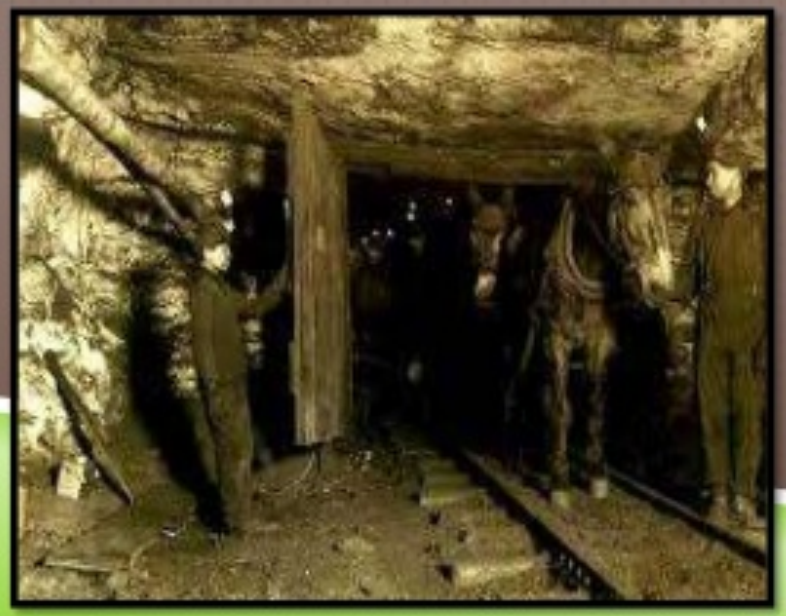
- It is caused by air pollution.
- The acidic water falls on the soil and pollutes it by making the soil acidic.
- Soil looses its nutrient due to high solubility in acidic water





WASTE FROM MINING

- Huge holes are dug in the ground.
- Waste obtained from mining left on site in the form of spoil heaps.
- This waste contain toxic and poisonous substances which then leach into the soil due to rainfall.





Waste obtained from coal mining

LEAKAGE OF TOXINS

- Faulty landfills.
- Bursting of underground bins.
- Seepage from faulty sewage systems



DUMPING OF SOLID WASTE

- Solid waste includes garbage, domestic refuse.
- Discarded solid material from commercial, industry & agricultural operation.
- These degrades the appearance of an area and pollute the soil.



OIL & PETROLEUM SPILLS

- Petroleum spills from gas stations, fuel tanks or other activities can result in elevated levels of contaminants in the soil.
- Such as Benzene, Toluene, and Xylene.
- Oil spills cause poor grow of plants.

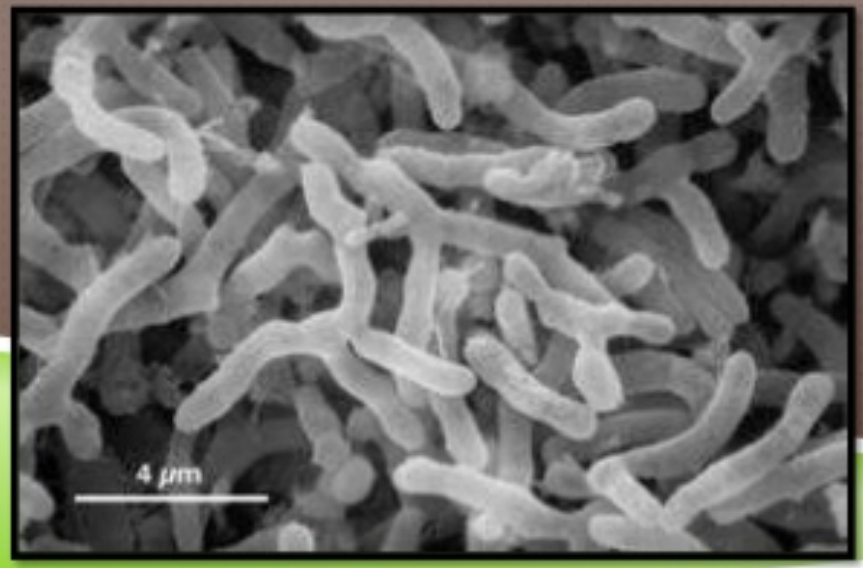



Soil Pollution Effects

EFFECT ON MICRO-ORGANISMS

Loss of variety of micro-organisms due to :

- Change in genetic make-up of the soil.
- Certain animals die.
- Loss of supply of food chain.
- Imbalance in food chain.





EFFECT ON SOIL:-

- It leads to soil fertility.
- Decrease in soil yield.
- It results in loss of nutrients present in the soil

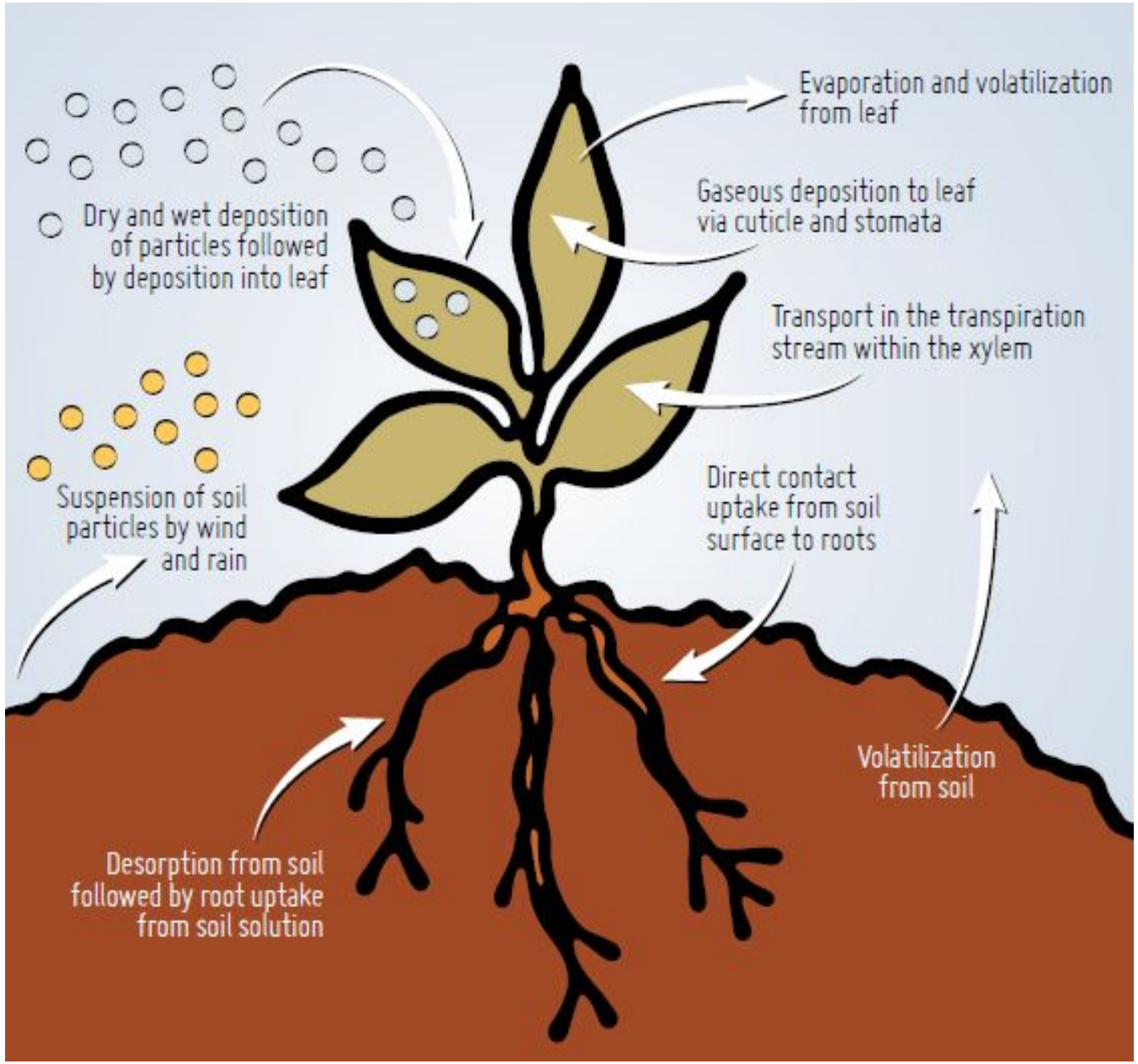




EFFECT ON BIO-ACCUMULATION

- **PLANTS :**
- Grown in polluted soil absorbs molecules of the pollutants.
- Pollutants accumulate in the plants.
- **ANIMALS :**
- By eating these polluted plants, animals take on all the pollution.
- **HUMANS :**
- By eating such plants or animals large amount of pollutants may cause poison in human body.

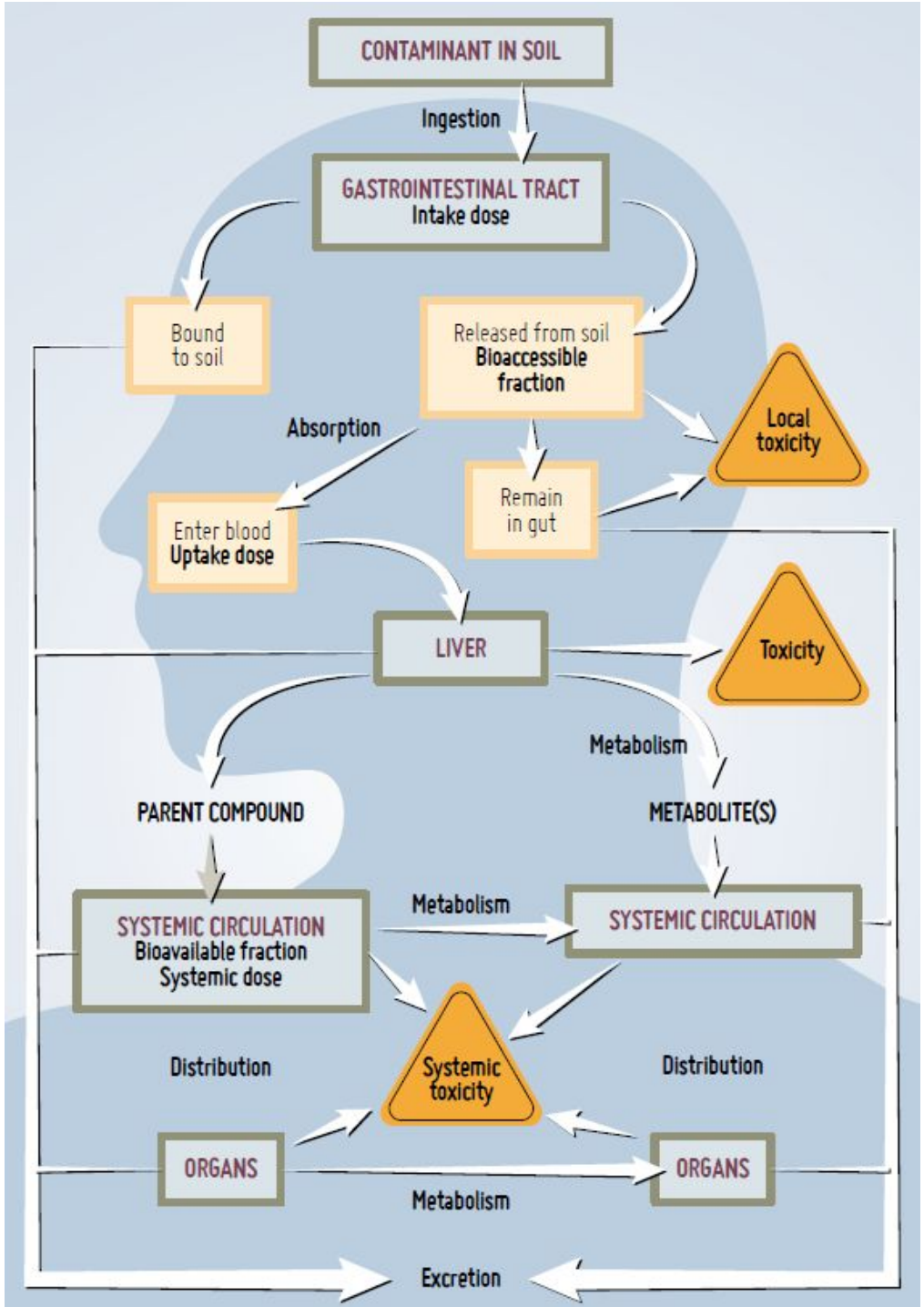




Principal uptake pathways for the uptake of soil contaminants by plants

ORGAN DAMAGE

- Presence of heavy metals in the soil.
- High concentrations of lead and mercury.
- Leads to irreversible developmental damage in children.
- Causes damage to the developing brains of young children.
- Leads to neurological problems.
- May also suffer kidney or liver damage.



ECONOMIC LOSS

- Soil pollution can cause economic damage.
- Polluted soil with heavy metals is not used to grow grains.
- Grains are often polluted which grow in this soil which cannot be consumed.
- Farmers are hence in a great loss.





EFFECT ON PHOTOSYNTHESIS

- Soil polluted by acid rain have an impact on plants.
- Disrupts the soil chemistry.
- Reduces plant's ability to take up nutrients and undergoes photosynthesis.



EFFECT ON AGRICULTURE WASTE

- High dose of Pesticide increases zinc, copper, such metals in soil.
- Produces hazards pollutants to water & soil.
- Pollutants added by burning of any fuel reduces soil fertility.





EFFECT ON INDUSTRIAL WASTE

- Destroy bacteria & beneficial microorganisms present in the soil.
- Compound accumulated in the soil for long time destroy the living organism.
- Product such as synthetic fiber, plastic produce toxic vapour



EFFECT ON CROP

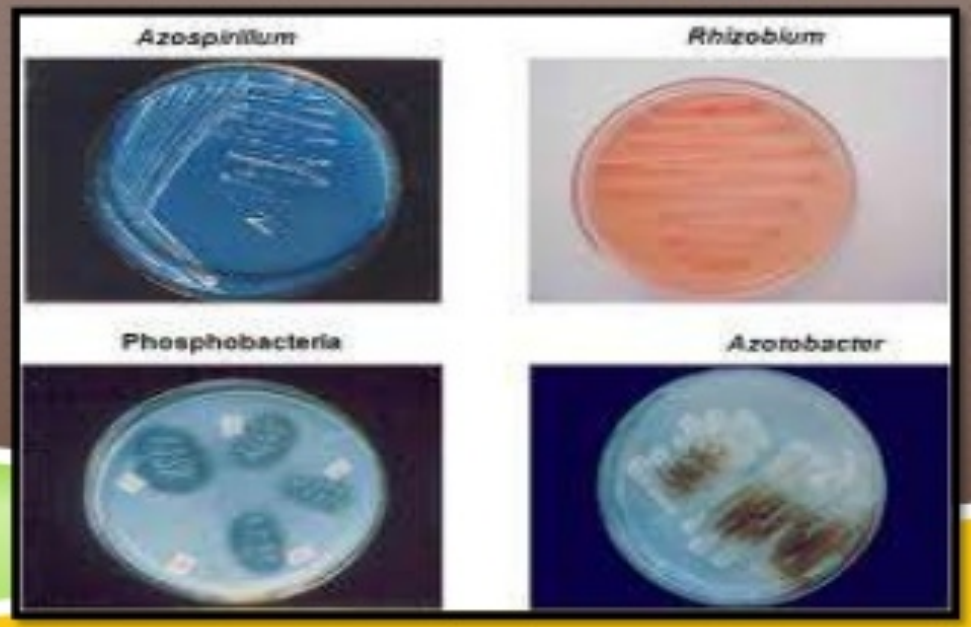
- Soil pollution reduces crop yields.
- 30% of irrigated land of world is affected by salinity of the soil.
- It decreases nutritive values of soil as well as crops.



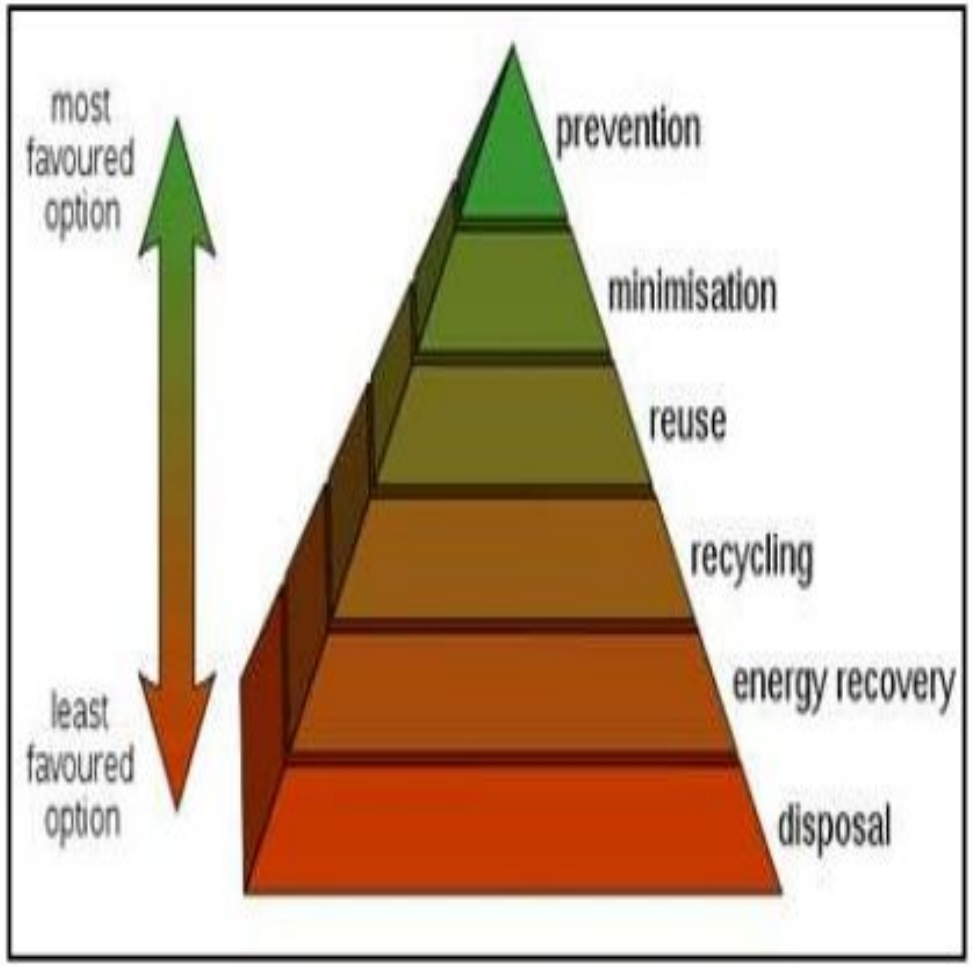

Prevention and Control
of Soil Pollution
Bottles & Jars

- Reduce use of pesticides, insecticides & fungicides.
- Overuse of these chemicals leads to soil pollution.
- Manures & biofertilizers like rhizobium can be used to increase fertility of soil.





- Waste should be disposed off properly to avoid pollution.
- Acidic & alkaline waste should be neutralized before they are disposed of so they don't contaminate the soil.
- Biodegradable waste should be broken down before disposing it off.



- Proper disposal of industrial waste.
- Waste reduction techniques.
- Recycling.



- Proper drainage system.
- Large holes.
- Renovation of drains.
- Keep clear.





- Reforestation, i.e. planting more trees.



- Animal waste to be used as manure.



Swine manure compost for use as fertilizer

PREVENTION OF SOIL POLLUTION…



- 3R's should be implemented i.e.
- 'Recycling of paper : waste paper can be recycled instead of throwing it.
- 'Reuse plastic wastes.
- 'Reduce toxic wastes.





- Proper waste disposal at home.
- E.g. Segregate wet and dry waste.

