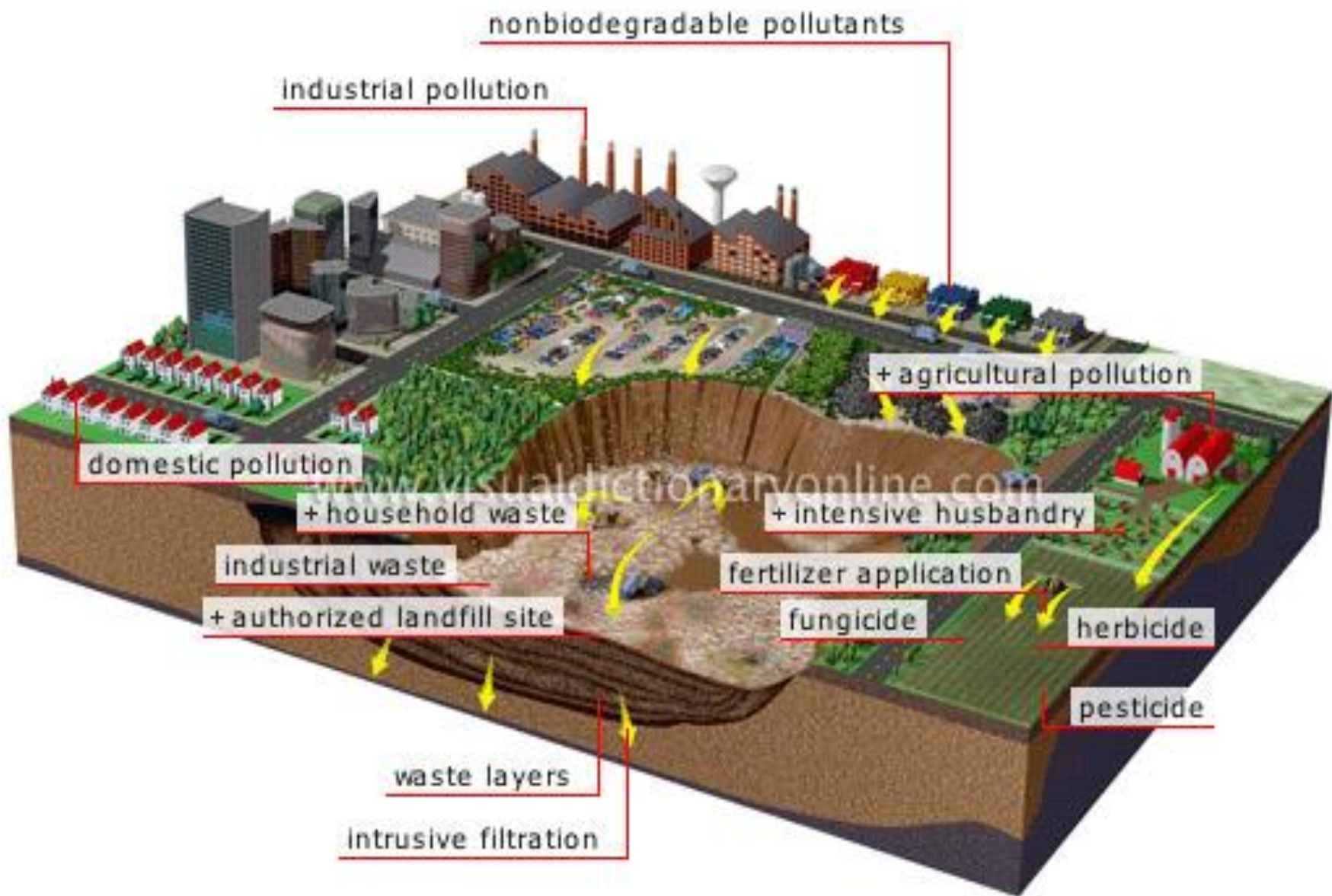


Soil pollution

Dr.Manal



SOIL POLLUTANTS

- Plastics
- Agro chemicals
- Fertilizers
- Heavy metals

Plastics

- Major part of global domestic and industrial waste
- Not easily biodegraded
- Waste plastic **accumulates** much thus adds to severe pollution problem
- Takes several years to disintegrate – 400 years to degrade mineral water bottles
- Use of biodegradable plastic solves the problem of pollution

Agrochemical pollution

- Include pesticides, herbicides, fungicides
- **Pesticides** applied reach the soil **ultimately**
- Accumulation of **pesticide residues in biosphere creates** ecological stress causing soil, water and food contamination
- Persisting chemicals are hazardous to human health
- Total remediation is impossible
- **Reduction of residue levels through redeeming technology**
(desirable)

Fertilizer pollution

- Continuous application – Deterioration in soil properties, cultivated soils lose their characteristics
- **Application of Amm. sulphate, Amm. chloride & Urea reduce soil pH**
- Crops – potato, grapes, citrus, beans – sensitive to chloride toxicity
- Application of organic manures and biofertilizers reduce the soil from pollution

Heavy metal pollution

Metals with atomic number greater than 23 or more than 5 gm per ml (eg. Hg – 70gm ml⁻¹)

- They are hazardous, **not acceptable to biological** system
- Toxic to man & other life forms
- Most are slow poison, accumulate in the body and cause serious disorders
- Common toxic metals- Hg, Pb, As, Cr, Cd

Heavy metal (forms)	Source	Effect
Mercury – Hg ⁺⁺	Methyl mercury fungicides, electrical and electronic industries, PVC, plastics, paints	Irreversible neurological damage in man, Minamata disease
Lead - Pb ²⁺ , Pb ⁴⁺	Automobile exhaust of leaded petrol, batteries, pipes, soldering	Mutation in algae and bacteria, blackening in fish, gradual paralysis in man
Arsenic – As ⁺⁺ , Arsenic trioxide, Sodium arsenate	Herbicide, fungicide, wood preservative – Agrochemicals (70%), paints, bullets (20%), glass wares (5%)	Accumulate in hair, nail, skin lesions, act as oxidative uncoupler, damage to kidney, respiratory and nervous disorders

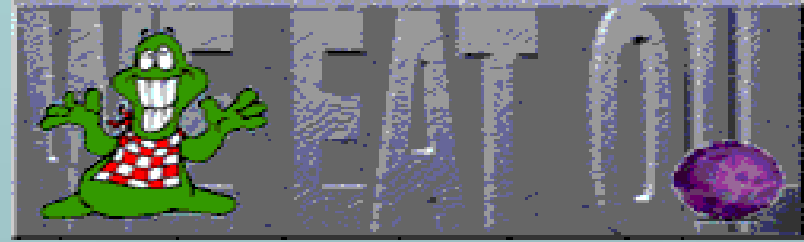
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<p>Chromium – Cr⁺⁶ & CrO₃</p>	<p>Tanneries, electroplating and metal finishing processes, Khaki dyeing textiles</p>	<p>Toxic to aquatic organisms, absorbed through intestinal tract in man</p>
<p>Cadmium - Cd</p>	<p>Pigment and stabilizer for PVC, plastics, tyres, rechargeable cells, electroplating, coal oil, phosphate rocks</p>	<p>Bones become brittle – Itai Itai disease in Japan, gastro enteric distress and pain</p>

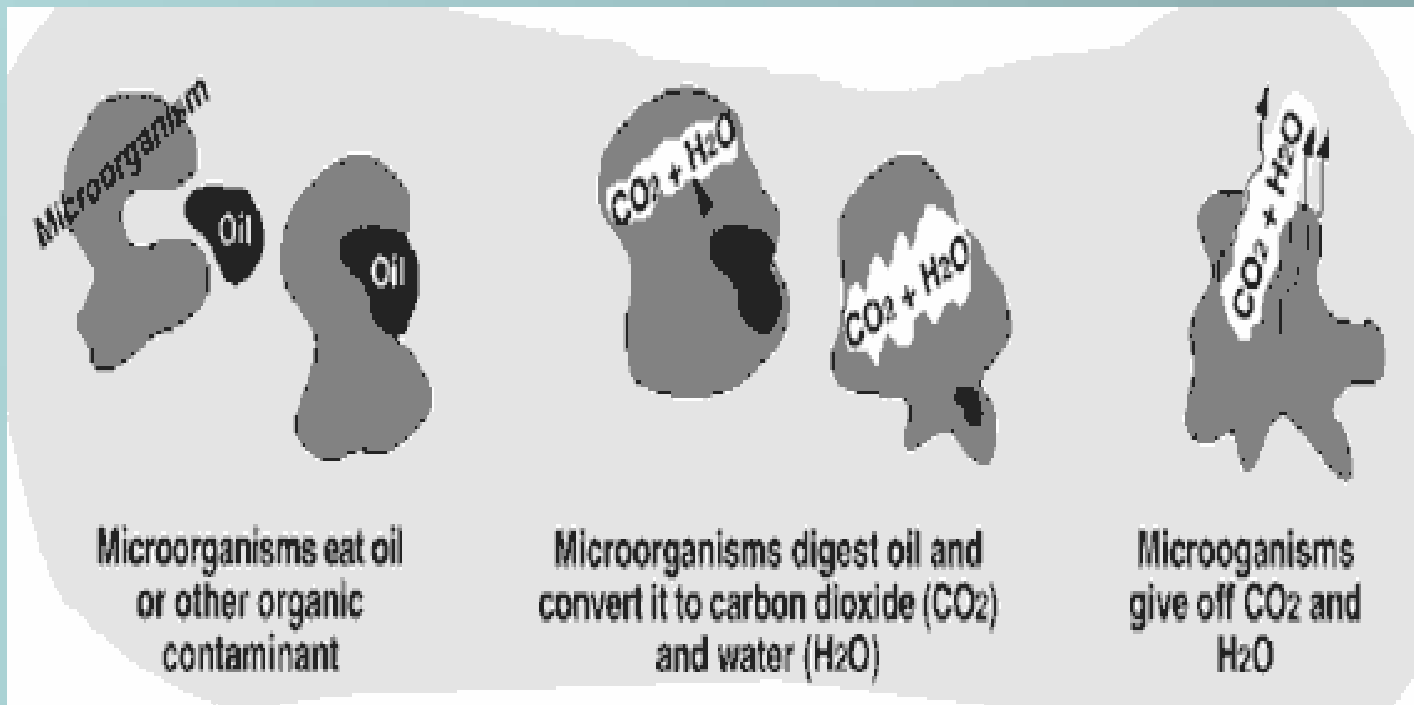
Control of soil pollution

- Use of **pesticides and fertilizers** should be minimized.
- Cropping techniques should be improved to prevent growth of weeds.
- **Special pits** should be selected for dumping wastes.
- Controlled grazing and forest management.
- Wind breaks and wind shield in areas exposed to wind erosion

Bioremediation



- The use of naturally occurring **microorganisms such as bacteria, fungi & plants to break down or degrade toxic chemical compounds that have accumulated in the environment**
- It is a method that treats the soils and renders them non-hazardous, thus eliminating any future liability that may result from landfill problems or violations.



Factors affecting bioremediation

- Microbial factors
- Temperature favorable for organisms
- Availability of water (Moisture content)
- Availability of nutrients (N,P,K)
- C: N (carbon: nitrogen) ratio of the contaminant material < 30:1
- pH
- Availability of Oxygen in sufficient quantity in soil.