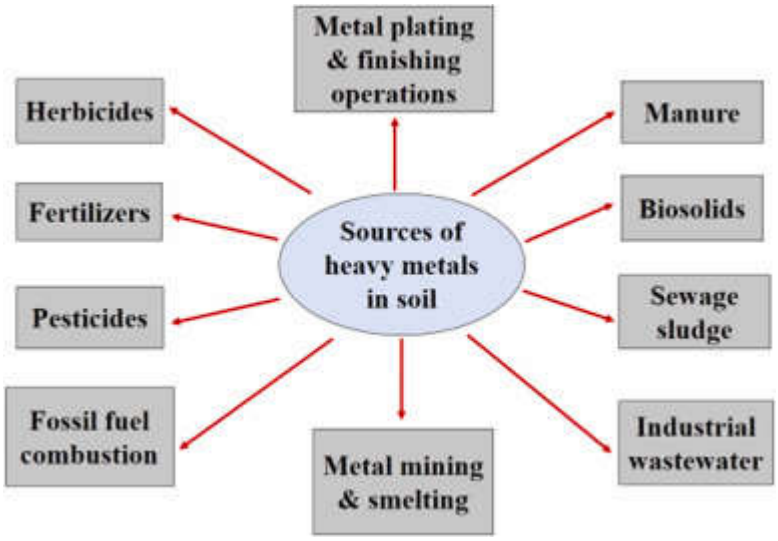
Heavy metal pollution, Eutrophication, Detergents and phosphates in water, Biochemical oxygen demand

1. Heavy-metal pollution

Environmental pollution by metals with relative high atomic mass, such as lead and mercury. These metals derive from a number of sources, including lead in petrol, industrial effluents, and leaching of metal ions from the soil into lakes and rivers by acid rain.

1.1. Sources of heave metals



1.2. Classification of Heavy metals

Heavy metals can be classified as:

- **Essential heavy metals:** include Co, Cu, Fe, Mn, Mo, Zn, Cr and Ni
- **Non-essential heavy metals:** include Cd, Hg and Pb.

2. Eutrophication

Eutrophication is the enrichment of an ecosystem with chemical nutrients, typically compounds containing nitrogen, phosphorus, or both.

2.1. Explanation

Eutrophication is the gradual increase in the concentration of phosphorus, nitrogen, and other plant nutrients in an aging aquatic ecosystem such as a lake. The productivity or fertility of such an ecosystem naturally increases as the amount of organic material that can be broken down into nutrients increases.

This material enters the ecosystem primarily by runoff from land that carries debris and products of the reproduction and death of terrestrial organisms. Water blooms, or great concentrations of algae and microscopic organisms, often develop on the surface, preventing the light penetration and oxygen absorption necessary for underwater life.

Eutrophication can be a natural process in lakes, occurring as they age through geological time. Human activities can accelerate the rate at which nutrients enter ecosystems. Runoff from agriculture and development, pollution from septic systems and sewers, and other human-related activities increase the flux of both inorganic nutrients and organic substances into terrestrial, aquatic, and coastal marine ecosystems (including coral reefs).

3. Detergents and phosphates in water

Much of the phosphorus in streams and lakes is delivered from agriculture, both through soil erosion and fertilizer runoff. Nitrogen from municipal sewage treatment plants and the direct runoff from animal feedlots are serious problems in many places. Pollution control and improved municipal, industrial, and agricultural practices could do much to control the eutrophication of water.

4. Biochemical oxygen demand

Biochemical oxygen demand (BOD also called biological oxygen demand) represents the amount of oxygen consumed by bacteria and other microorganisms while they decompose organic matter under aerobic (oxygen is present) conditions at a specified temperature.

BOD is typically reported as 5-day BOD at 20°C in milligrams of oxygen consumed per liter (mg O/L). BOD 5 is used by regulatory agencies for monitoring waste water treatment facilities and monitoring surface water quality.

A sample with a 5-day BOD between 1 and 2 mg O/L indicates a very clean water, 3.0 to 5.0 mg O/L indicates a moderately clean water and > 5 mg O/L indicates a nearby pollution source.

Biochemical Oxygen Demand (B.O.D.) of safe drinking water must be zero.