

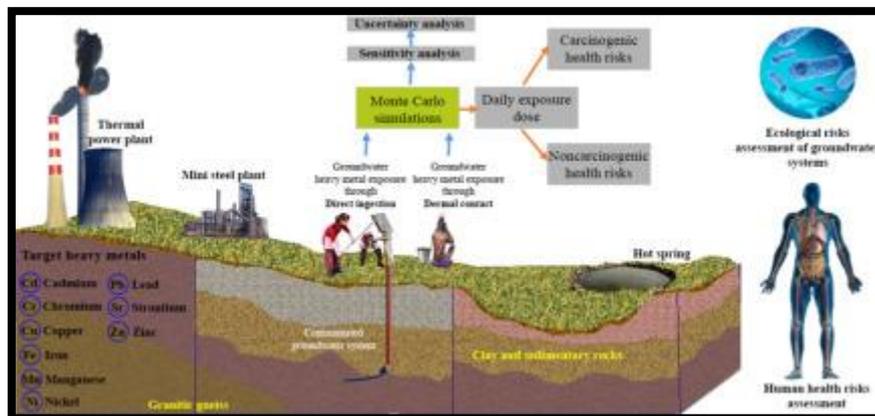
Heavy Metal Pollution

The Center for Science and Environment has reported that rivers of India are facing severe metal pollution. Three out of every four river monitoring stations in India have observed alarming levels of heavy toxic metals such as lead, iron, nickel, cadmium, arsenic, chromium and copper.

Heavy Metals: Heavy metals may be defined as elements with an atomic number larger than 20 and an atomic density greater than 5 g cm⁻³ that must possess metal-like characteristics. Example: arsenic, cadmium, chromium, copper, lead, manganese, mercury, nickel, uranium etc.

Heavy Metal Pollution:

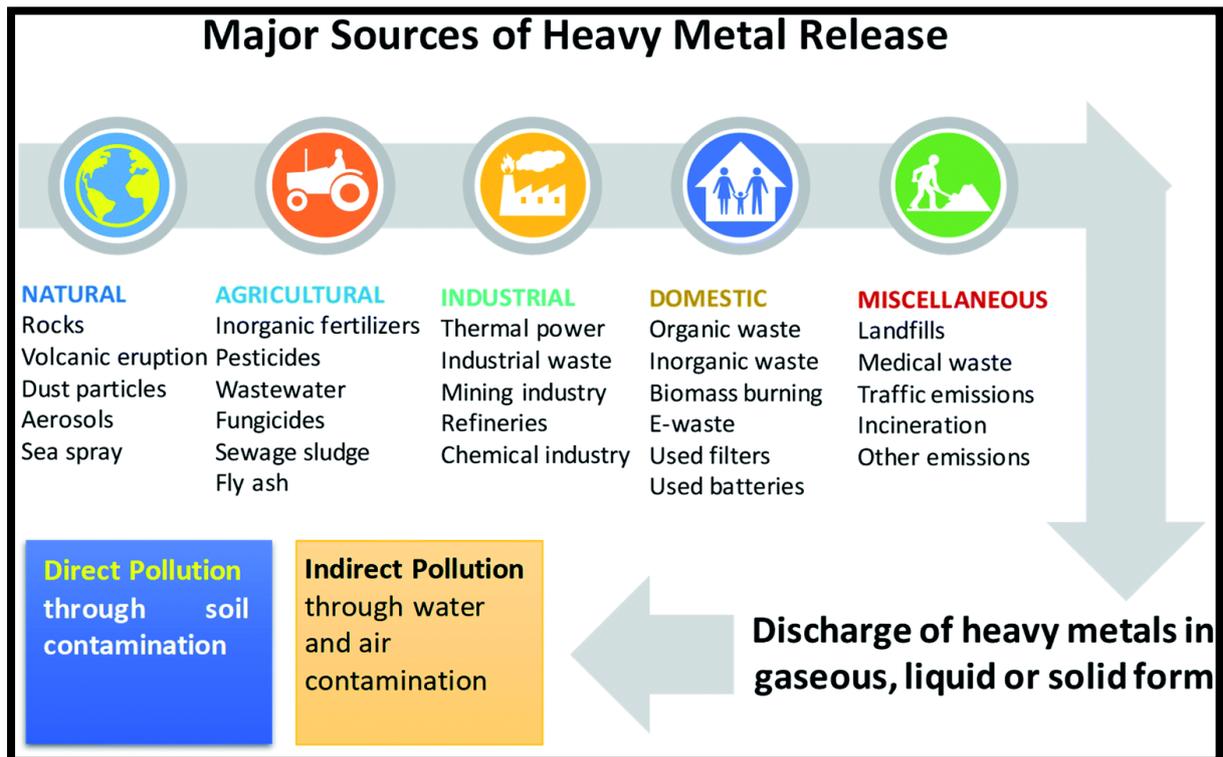
- Heavy metal pollution has been caused in our rivers, soils, and environment as a result of rapidly growing agriculture and metal industries, improper waste management, heavy use of fertilizers, and pesticides.
- Agricultural and industrial operations, landfilling, mining, and transportation are the primary sources of heavy metals in groundwater.
- Through the agricultural water runoff heavy metals reach upto river.
- Discharge of wastewater from industries (like the tannery industry which is a big source of chromium heavy metals) directly into river bodies intensified the severity of the heavy metal pollution.
- Heavy metals have the property of long persistent in plants, animals and environment.



Sources of Heavy Metals: There are two kinds of sources through which the heavy metals enter into the environment.

- Natural Source: Heavy Metals are naturally present in the earth's crust. Rocks are the natural source of heavy metals. Heavy Metals are present in the rocks in the form minerals. Examples: arsenic, copper, lead etc.
- Anthropogenic Source:
 - Mining, industrial, and agricultural operations are all anthropogenic sources of heavy metals in the environment.

- These heavy metals are produced during the mining and extraction of various elements from their respective ores.
- Heavy metals emitted into the atmosphere during mining, smelting, and other industrial activities are deposited on land by dry and wet deposition.
- Discharge of wastewaters such as industrial effluents and domestic sewage add heavy metals to the environment.
- Application of chemical fertilizers and combustion of fossil fuels also contribute to the anthropogenic input of heavy metals in the environment.



Observation in Monitoring of Heavy Metal Pollution:

- There are 764 river quality monitoring stations in India, spread over 28 states.
- Out of the 33 monitoring stations in Ganga, 10 had high levels of heavy metals contaminants.
- The Central Water Commission examined water samples from 688 sites for heavy metals between August 2018 and December 2020.
- Total coliform and biochemical oxygen demand were high in 239 and 88 of the 588 water quality stations examined for pollution throughout 21 states.
- It indicates that wastewater treatment from industry, agricultural, and domestic households is inadequate.
- According to the Center for Science and Environment's State of the Environment Report 2022, the river, which is the focus of the Namami Gange mission, contains high levels of lead, iron, nickel, cadmium, and arsenic (CSE).
- The report is a yearly compilation of data on environmental development obtained from public sources.

- According to the Central Pollution Control Board, ten states do not treat their sewage at all.
- In India, 72% of sewage waste is dumped untreated.

Consequences of the Heavy Metal Pollution:

- These toxic heavy metals entering the environment may lead to bioaccumulation and biomagnifications.
- Bioaccumulation: The net accumulation of a pollutant in an organism from all sources, including water, air, and food, is known as bioaccumulation.'
- Biomagnifications: Biomagnification is the accumulation of a chemical by an organism as a result of water and food exposure, resulting in an increase in concentration that is higher than would have been expected from equilibrium.
- Some heavy metals have an effect on biological activities and growth, while others accumulate in one or more organs, resulting in a variety of severe diseases such as cancers, skin diseases, nervous system disorders etc.
- Metal toxicity results in the production of free radicals, which damages DNA.
- These heavy metals are not readily degradable in nature and accumulate in the animal as well as human bodies to a very high toxic amount.
- Heavy metal intake has been related to developmental retardation, renal damage, a variety of cancers, and even death in extreme cases.

References:

<https://www.thehindu.com/news/national/75-of-river-monitoring-stations-report-heavy-metal-pollution-centre-for-science-and-environment/article65487675.ece>