MERCURY POISONING

Prelims: Environment- Pollution & Waste management

Mains: GS-III- Conservation, environmental pollution and degradation, environmental impact assessment.

Context:

- IIT-H, Harvard varsity study mercury accumulation in fish
- The joint research looked into how climate change impacted accumulation of the metal

Background:

- A joint research by the Indian Institute of Technology, Hyderabad (IIT-H), Harvard University, and Fisheries and Oceans Canada, a Canadian government agency, has found that though there has been a **decrease in the levels of mercury pollution,** the **amount of mercury found in fish have been different in different species** – some types of fish have less mercury than before, and some, alarmingly more.

What is Mercury:

- Mercury is naturally occurring element in the Earth's crust that is released into the environment with natural events such as volcanic activity.
- Mercury commonly occurs in three forms: elemental, inorganic and organic.
- **Activities that release mercury**
  - Human activities like coal burning, gold mining and chloralkali manufacturing plants currently contribute the vast majority of the mercury released into our environment,

Explanation of Mercury Entering Food Chain:

- When mercury is released into the atmosphere, it is dissolves in fresh water and seawater.
- A type of mercury called **methylmercury** is most easily accumulated in the body is and is particularly dangerous.
- About 80 to 90 percent of organic mercury in a human body comes from eating fish and shellfish, and 75 to 90 percent of organic mercury existing in fish and shellfish is methylmercury,
- Once in the water, mercury makes its way into the food chain. Inorganic mercury and methylmercury are first consumed by phytoplankton,

- Next, the phytoplankton are consumed by small animals such as zooplankton.
- The methylmercury is assimilated and retained by the animals, while the inorganic mercury is shed from the animals as waste products,
- Small fish that eat the zooplankton are exposed to food-borne mercury that is predominantly in the methylated form.
- These fish are consumed by larger fish, and so on until it gets to humans.
- **"Because the methylmercury is highly assimilated and lost extremely slowly from fish, there is a steady build-up of this form of mercury in aquatic food chains, such that long-lived fish at the top of the food chain are highly enriched in methylmercury,**
- Methylmercury therefore displays clear evidence of **biomagnification**, where its concentrations are higher in predator tissue than in prey tissue."

What is Biomagnification?

- Biomagnification stands for Biological Magnification, which means the increase in concentration of contaminated substances or toxic chemicals that take place in the food chains.
- These substances often arise from intoxicated or contaminated environments.
- The contaminants include heavy metals namely mercury, arsenic, pesticides such as DDT, and polychlorinated biphenyls (PCBs) compounds which are then taken up by organisms because of the food they consume or the intoxication of their environment.

Causes of Biomagnification

- Agriculture
- Organic contaminants
- Industrial manufacturing activities and pollution
- Mining activities in the ocean

Effects of Biomagnification

- Impact on human health
- Effects on reproduction and development of marine creatures
- Destruction of the coral reefs
- Disruption of the food chain

Findings of The Study:

- The variations in the accumulation of mercury in fish is the result of changes in sea temperature in the recent years and changes in the dietary pattern of fish due to overfishing.
- There are three factors that result in mercury accumulation in

- Fish overfishing which leads to dietary changes among marine animals,
- Variations in the temperature of the sea water,
- Which leads to changes in fish metabolism that gears towards survival rather than growth, and changes in the amounts of mercury found in sea water as a result of pollution,

Minamata Convention:

- The Minamata Convention on Mercury will be implemented in the context of sustainable development with the objective to protect human health and environment from the anthropogenic emissions and releases of mercury and mercury compounds.
- The Convention protects the most vulnerable from the harmful effects of mercury and also protects the developmental space of developing countries. Therefore, the interest of the poor and vulnerable groups will be protected.
- **India has Ratified the convention.**