Mass Fish Kill in Bengaluru

Why in news?

Bengaluru lakes have reported 16 instances of mass fishkill in 2023 which is a clear sign of the deteriorating health of the lakes and their entire ecosystem.

What is the science behind mass fishkill?

- The ability of a water body to support its aquatic life is generally ascertained through different parameters.
- **Dissolved Oxygen** - It is the amount of free, non-compound oxygen molecules in water.
- Depleting DO is caused by a ***higher biochemical oxygen demand (BOD)***, often because of a high concentration of nutrients and organic matter that decomposes in an anaerobic condition, releasing ammonia or algal blooms in the water body.
    - Fish usually cannot survive at dissolved oxygen levels less than 4 mg/L and it is desirable to have levels exceeding 9mg/L to support proper flora and fauna.
- **Temperature and Conductivity** - They impact Dissolved Oxygen levels and bear an inverse relationship with the same.
- **pH level** – It is an indicator of the acidic nature of a solution, varying from 0 to 14.
    - Extreme pH values are known to cause physical damage to gills, exoskeleton and fins of fish.
- **Turbidity** – It is a measure of suspended particles. Increased turbidity prevents sunlight reaching the depths of a water body, thereby impacting organism growth and oxygen levels.
- **Nitrogen levels** - Excessive levels of Nitrogen lead to abnormal algal growth, depleting the available oxygen, as the algae die and decompose.
    - A variety of factors including excess nutrients and stratification of water due to saline or temperature gradients can create hypoxic conditions, which would make the water body devoid of any life.
- **Sewage and effluents** - Inflow of untreated effluents, Sewage and garbage dumping majorly contribute to water pollution and low oxygen levels.
- **Heavy Metal poisoning**- Heavy metals get retained by aquatic plants, settle on the beds, get consumed by bottom feeding organisms, and magnify up the food chain to bigger fish.
    - Further, the addition of pollutants drives organisms to consume more oxygen for their degradation, decreasing the available dissolved oxygen.

Eutrophication is the process in which a water body becomes overly enriched with nutrients especially nitrogen and phosphorus, leading to the plentiful growth of simple plant life.

What is the case of Bengaluru?

- **Unhealthy lakes**- Lakes in Bengaluru have become dumping grounds for raw sewage and other effluents, leading to high BOD, creating a DO crisis, choking the fish to death.
- **Infrastructural deficit**- Many places in the city didn't have the basic underground drainage system.
- **Population explosion**- Most fishkills are reported from lakes in outer zones that have seen unregulated growth due to population explosion in these areas.
- **Impact of weather**- Most fishkills in the city's lakes are reported in summer and monsoon months.
    - **Summer**- Rise in temperature rise escalates mass fishkill.
    - **Monsoon**- The rains wash the silt from storm-water drains (SWDs). The silt from SWDs is rich in phosphates, nitrates, and organic matter, leading to a high BOD resulting in a DO crisis.
- **Firing incidents**- The high concentration of nitrates and phosphates in the silt on the lake bed eventually leads to the release of methane gas, causing fire on the lakes. Example- *Bellandur Lake*.
- **Frothing of lakes**- If there is churning and turbidity in these lakes, they also froth, like in *Bellandur and Varthur lakes.*
- **Non-functional STPs**- Sewage treatment plants (STPs) installed by Bangalore Water Supply and Sewerage Board (BWSSB) did not have a Biological Nutrient Removal (BNR) system.

Status of fishkill in Bengaluru
• **Kothanur lake-** It reported 3 fish kills in 2022, major reason is raw sewage inlet. It has no functional Sewerage Treatment Pipes (STPs) • **Multiple fishkills**- It is reported in 2022 and 2023 in - **Kundalahalli Lake-** city's tech corridor near Whitefield - **Bhattarahalli Lake-** It is near K.R. Puram, which have functional STPs • **Kundalahalli lake**- Water quality analysis by ActionAid showed high concentration of faecal coliform bacteria, indicating raw sewage inlet into the lake. • **Unfit for drinking**- Out of 61 lakes surveyed for water quality by KSPCB in 2023, 33 have been categorised as "D", unfit for drinking, but cleared for fisheries.

What lies ahead?

- **Foster accountability**- Address the regulatory inefficiencies as no agencies is held responsible.
    - Bengaluru civic body- Custodian of lakes
    - Karnataka State Pollution Control Board (KSPCB)- Check pollution of all water bodies.
    - Bengaluru Water Supply and Sewerage Board- Responsibility to ensure raw sewage is not let into lakes
- **Strict adherence to laws-** There is a need to book cases under the *Water (Prevention and Control of Pollution) Act, 1974*, and enforce strict penalties to senior officials for non-adherence.
- **Effective monitoring**- Fishkill is stoppable provided there is effective monitoring of

water quality from raw sewage.

References

1. The Hindu- Newest ecological crisis in Bengaluru
2. Indian Express- Kundalahalli lake not a safe haven for fish

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