



## Desalination Plants

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### Why in News

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Recently, Maharashtra announced the setting up of a desalination plant in Mumbai.

- The plant will process **200 million litres of water daily (MLD)**, and will help in overcoming the **water shortage faced by Mumbai** in the months of **May and June**.
- **Maharashtra** will be the **fourth state** to experiment with Desalination Plants.

### Key Points

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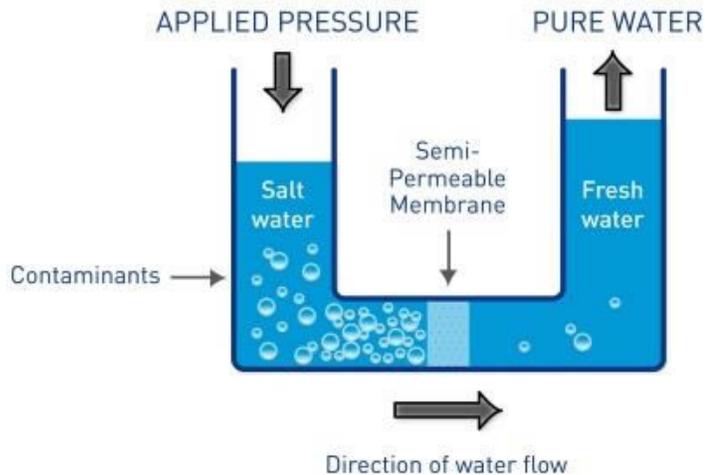
- **Desalination Plants:**

- A **desalination plant** turns salt water into water that is fit to drink.

**Desalination** is the process of **removing salts from water** to produce water that meets the quality (salinity) requirements of different human uses.

- Most commonly used **technology** for the process is **reverse osmosis**.

### REVERSE OSMOSIS



- An external pressure is applied to push solvents from an area of high-solute concentration to an area of low-solute concentration through a semi-permeable membrane.
- The **microscopic pores** in the membranes allow water molecules through but leave salt and most other impurities behind, releasing clean water from the other side.

- These plants are mostly set up in areas that have access to **sea water**.

- **Advantage of Desalination Plants:**

- It can extend water supplies beyond what is available from the **hydrological cycle**, providing an “**unlimited**”, **climate-independent** and **steady supply** of high-quality water.
- It can **provide drinking water** in areas where no natural supply of potable water exists.
- As it generally **meets or exceeds** standards for **water quality**, water desalination plants can also **reduce pressure on freshwater supplies** that come from **areas** (over exploited water resources) that need protecting.

- **Disadvantage of Desalination Plants:**
  - **Costly to build and operate** desalination plants as the plants require huge amounts of energy.
    - **Energy costs** account for **one-third to one-half of the total cost** of producing desalinated water.
    - Because energy is such a large portion of the total cost, the **cost is also greatly affected by changes in the price of energy.**
  - **The environmental impact** is another disadvantage to water desalination plants. Disposal of the salt removed from the water is a major issue.
    - This discharge, known as **brine**, can change the salinity and lower the amount of oxygen (**Hypoxia**) in the water at the disposal site, stressing or killing animals not used to the higher levels of salt.
    - In addition, the desalination process **uses or produces numerous chemicals including chlorine, carbon dioxide, hydrochloric acid and anti-scalants** that can be **harmful in high concentrations.**
- **Opportunities:** The environmental problem can be changed into an economic opportunity as:
  - The **discharge (brine)** can also contain **precious elements like uranium, strontium as well as sodium and magnesium** which have the potential to be mined.
  - **Brine** has been used for **aquaculture**, with **increases in fish biomass of 300%**. It has also been successfully used to cultivate the **dietary supplement Spirulina**, and to irrigate forage shrubs and crops.
- **Use of Desalination Plants in India:**
  - It has largely been limited to countries in the **Middle East** and has recently started being used in parts of the **United States and Australia.**
  - In India, **Tamil Nadu** has been the pioneer in using this technology, setting up two desalination plants near **Chennai in 2010 and then 2013.**
  - The other states that have proposed these plants are **Gujarat and Andhra Pradesh.**

## Way Forward

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- There is a **need to make desalination technologies more affordable**, i.e. increasing the viability of desalination for addressing **Sustainable Development Goal 6 (SDG-6: Ensure Access to water and Sanitation for All)**.
- To do this, **technological refinement for low environmental impacts** and **economic costs**, along with **innovative financial mechanisms** to support the sustainability of desalination schemes, will likely be required.

**Source:IE**