

Tackling PFAS (Forever Chemicals)

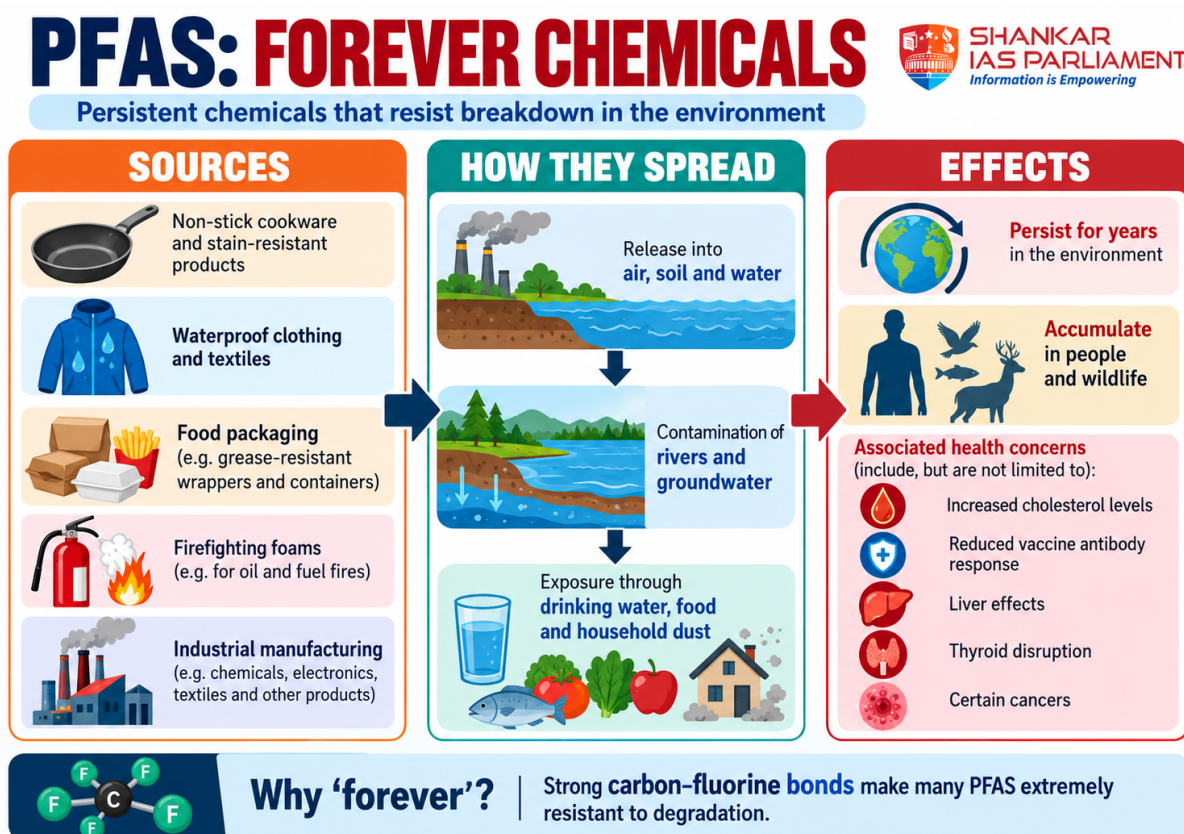
Mains: GSIII - Environment

Why in News?

Studies have found persistent PFAS chemicals in Indian water sources. India lacks specific drinking-water limits for PFAS, and conventional treatment methods cannot effectively remove them.

What are PFAS (Forever Chemicals)?

- **Definition** - PFAS are synthetic chemicals containing multiple carbon-fluorine bonds, widely used in coatings, textiles and industrial products.
- **Persistence** - Their strong chemical bonds make them resistant to degradation, allowing them to persist in the environment for long periods.
- **Environmental contamination** - PFAS have been detected in groundwater, surface water, sewage and seawater across different parts of India.
 - The International Agency for Research on Cancer (IARC) classified perfluorooctanoic acid (PFOA) as carcinogenic to humans.



Extent of PFAS Contamination in India

- **Chennai** – A 2024 IIT-Madras study detected PFAS in groundwater, surface water and samples from different stages of a water treatment plant.
 - Groundwater near garbage dumps had the highest levels,
 - Treated-water concentrations of the eight target PFAS were 5%–103% higher than raw-water concentrations.
- **Visakhapatnam** – A 2026 study detected 38 PFAS compounds among 77 types tested in seawater and sewage.
 - Modelling estimated that sewage contributed about 41% of median PFAS concentrations along the coast.
- **Data gaps** – Differences in sampling and testing methods, limited monitoring and unidentified chemical precursors make it difficult to assess.

What are the Major Challenges in Tackling PFAS Contamination?

- **Ineffective conventional treatment** – Conventional biological wastewater treatment cannot effectively remove PFAS, while adsorption-based technologies require further development.
- **Limited detection** – Testing for a fixed list of chemicals may miss other PFAS, unidentified precursors and transformation products.
 - High-resolution mass spectrometry can improve detection.
- **Unclear pollution sources** – Municipal sewage and industrial discharges can mix, making it difficult to identify and hold specific polluters accountable.
- **Insufficient exposure data** – India lacks adequate baseline data to reliably estimate human exposure and associated health risks.
- **Regulatory gaps** – India has no PFAS-specific drinking-water limit under IS 10500 -2012 and no specific regulation banning PFAS manufacturing.

What Measures are needed to Address PFAS Pollution?

- **Establish standards** – Introduce precautionary interim limits for well-studied PFAS and establish enforceable drinking-water standards.
- **Strengthen monitoring** – Develop harmonised testing methods and conduct nationwide baseline monitoring of water, industrial discharges and consumer products.
- **Adopt advanced treatment** – Develop affordable adsorption materials and other effective technologies for removing PFAS from drinking water and wastewater.
- **Apply the precautionary principle** – Regulate hazardous PFAS groups, including precursors and transformation products, rather than fixed list of named chemicals.
- **Ensure accountability** – Identify pollution sources through systematic sampling and establish clear mechanisms for enforcement and penalties.
- **Strengthen research** – Expand toxicological studies, laboratory capabilities and cooperation with international scientific programmes.

Conclusion

- PFAS contamination presents an emerging environmental and public-health challenge and are difficult to remove using conventional treatment methods.
- India needs harmonised monitoring, advanced treatment technologies and stronger

polluter accountability to prevent long-term contamination.

Reference

[The Hindu| India's water plants are failing to catch elusive 'forever chemicals'](#)

