Environment & Ecology · GS - III

The widespread presence of PFAS and microplastics in the environment highlights the limitations of conventional pollution-control approaches. Analyse their implications for human health and ecological security, and suggest measures for addressing this emerging environmental challenge.

EXAM YEAR	PAPER	SUBJECT
DAILY PRACTICE 18/11/2026	GS - III	Environment & Ecology

MARKS	WORD LIMIT
15	~250 words

Answer Hint

Persistent organic pollutants, PFAS, microplastics, endocrine disruption, bioaccumulation, food chains, drinking water contamination, precautionary principle, circular economy, chemical regulation, environmental monitoring, One Health.

Model Answer

Introduction

PFAS and microplastics are emerging environmental contaminants increasingly detected in water, food, soil and consumer products. Their persistence and widespread exposure create long-term environmental and public health concerns.

Environmental and Health Implications

- **PFAS persistence:** Strong carbon-fluorine bonds make many PFAS resistant to degradation, allowing certain compounds to remain in the environment for decades.
- **Human health:** Exposure to certain PFAS has been associated with immune-system effects, hormonal disruption, altered cholesterol levels and specific cancers.
- **Microplastic exposure:** These particles enter the human body through food, water and air. Their long-term health effects remain under scientific investigation.
- **Ecological impacts:** Contamination can affect aquatic organisms, soil ecosystems and food chains.
- **Bioaccumulation:** Certain persistent chemicals can accumulate in organisms, increasing exposure risks across trophic levels.

Measures Required

1. **Regulatory framework:** Strengthen chemical registration, risk assessment and restrictions on hazardous substances.
2. **Monitoring:** Develop national surveillance systems for PFAS and microplastics in drinking water, food and ecosystems.
3. **Pollution prevention:** Promote safer chemical alternatives, plastic reduction and improved waste management.
4. **Research:** Invest in toxicological studies, exposure assessment and affordable remediation technologies.
5. **International cooperation:** Strengthen implementation of relevant international chemical and waste-control agreements.

Conclusion

PFAS and microplastic pollution require a preventive, science-based approach. Integrating environmental regulation, public health surveillance and sustainable production is essential for protecting ecological and human health.