Environment & Ecology · GS - III

Seawater intrusion in the coastal aquifers is a major concern in India. What are the causes of seawater intrusion and the remedial measures to combat this hazard?

EXAM YEAR	PAPER	SUBJECT
2025	GS - III	Environment & Ecology

MARKS	WORD LIMIT
10	~150 words

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Answer Hint

Coastal aquifers, over-extraction, hydraulic gradient, sea-level rise, groundwater recharge, saltwater wedge, freshwater barrier, managed aquifer recharge

Model Answer

Introduction

Seawater intrusion occurs when saline seawater moves into freshwater coastal aquifers, reducing groundwater quality. It is particularly significant where coastal communities depend heavily on groundwater.

1. Causes

1. Excessive groundwater extraction for irrigation, industries and urban use lowers freshwater-table levels.
2. Reduced natural recharge due to urbanisation and loss of wetlands weakens freshwater pressure.
3. Sea-level rise associated with climate change increases saline intrusion risk.
4. Droughts and declining rainfall can intensify groundwater stress.
5. Sand mining and coastal geomorphological changes can alter groundwater flows.

2. Remedial measures

1. Regulate groundwater extraction through aquifer-based management.
2. Promote rainwater harvesting and managed aquifer recharge.
3. Develop artificial freshwater barriers in vulnerable zones.
4. Shift from water-intensive crops to suitable alternatives.
5. Promote micro-irrigation and treated wastewater reuse.
6. Establish monitoring networks for groundwater levels and salinity.
7. Protect mangroves, wetlands and coastal recharge zones.
8. Use desalination strategically where economically and environmentally viable.

Conclusion

The sustainable solution lies in maintaining the freshwater–seawater balance. Demand management, recharge and scientific aquifer monitoring must therefore accompany infrastructure-based interventions.

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