GEOTUBING: GEOGRAPHY

NEWS: Study finds geotubing at Poonthura effective in controlling coastal erosion

WHAT'S IN THE NEWS?

India faces severe coastal erosion along 33.6% of its shoreline, with innovative solutions like geo-tubing showing promise in areas like Kerala, while integrated policies, natural buffers, and sustainable engineering are essential for long-term coastal protection.

Context:

- A recent study found that geotubing technology deployed at Poonthura, Kerala, has been highly effective in mitigating coastal erosion, a growing concern across India's vast coastline.

What is Geo-Tubing Technology?

1. Definition and Function:

- Geotubes are large synthetic fabric containers filled with sand, slurry, or dredged material.
- Placed strategically along the coast, they act as wave breakers, absorbing and reducing the energy of incoming waves.

2. Role in Coastal Protection:

- The multi-layered structure enhances their durability and stability even under strong sea currents.
- Prevents shoreline retreat and protects infrastructure, habitats, and coastal communities.

3. Successful Implementations:

- Apart from Poonthura (Kerala), Pentha village in Odisha also witnessed success in erosion control using geotubes.

Status of Coastal Erosion in India:

1. Revised Coastal Length:

- India's coastline was officially revised to 11,098.81 km using modern satellite-based methodology (previously 7,516.6 km).

2. Coastal Geography:

- Comprises 9 coastal states and 2 Union Territories, with 66 coastal districts.
- Morphological Composition:
- 43% sandy beaches
- 36% muddy flats
- 11% rocky shores
- 10% marshy areas
- 97 estuaries and 34 lagoons

3. Erosion Statistics (As per NCCR Monitoring):

- 33.6% of the Indian coastline is eroding.
- 26.9% is witnessing accretion (land gain due to sediment deposition).
- 39.6% remains stable.
- Worst affected states:
- West Bengal (60.5%)
- Kerala (46.4%)
- Tamil Nadu (42.7%)

Causes of Coastal Erosion:

1. Climate Change and Sea-Level Rise:

- Melting glaciers and thermal expansion of oceans due to global warming raise sea levels.
- Increases the frequency and intensity of wave action, hastening shoreline erosion.

2. Extreme Weather Events:

- Cyclones, storm surges, and intense monsoon patterns cause sudden erosion and flooding.

3. Human Activities:

- Sand mining, unplanned port development, and urban encroachment disturb natural sediment dynamics.
- Construction of seawalls and jetties often causes downstream erosion.

4. Loss of Natural Buffers:

- Mangrove destruction and coral reef degradation reduce natural protection against waves and storm surges.

Government Policies and Programmes for Coastal Management:

1. Integrated Coastal Zone Management Project (ICZMP):

- World Bank-assisted initiative.
- Implemented in Gujarat, Odisha, and West Bengal.
- Focuses on sustainable coastal development, ecosystem conservation, and climate resilience.

2. Coastal Regulation Zone (CRZ) Notification (2019):

- Regulates activities along the coast through No Development Zones (NDZ).
- Supports sustainable livelihoods and preservation of ecological balance.
- Includes:
- Coastal Zone Management Plans (CZMP)
- Shoreline Management Plans (SMP)

3. Coastal Vulnerability Index (CVI):

- Developed by INCOIS to classify coastal stretches based on:
- Tidal range
- Shoreline change rate
- Sea-level trends
- Population density
- Natural buffer presence

4. Financial Support – 15th Finance Commission:

- Allocated ₹2,500 crore for:

- Erosion control
- Resettlement of displaced coastal communities

5. National Assessment of Shoreline Changes:

- Offers data-driven erosion management strategies.

Innovative and Eco-Friendly Engineering Measures:

1. Geo-Tube Installations:

- Low-maintenance and scalable solution.
- Cost-effective for high-energy wave environments.

2. Artificial Reefs:

- Reduce wave energy before it reaches the shore.
- Support biodiversity regeneration and fishery development.

3. Eco-friendly Breakwaters:

- Made using natural materials like coir, rock, or recycled concrete.
- Offer shoreline protection without disrupting marine ecosystems.

4. Mangrove and Shelterbelt Plantation:

- Mangroves absorb wave energy and stabilize coastlines.
- Shelterbelts made of Casuarina or other coastal species help mitigate cyclone impacts.

Conclusion:

- India's 33.6% eroding coastline threatens millions of livelihoods, critical infrastructure, and biodiversity-rich ecosystems.
- Technologies like geo-tubing, combined with nature-based solutions, policy regulation, and scientific monitoring, offer a comprehensive path forward.
- Integrating community participation, disaster resilience, and climate adaptation is key to sustainable coastal zone management.

Source: https://www.thehindu.com/news/national/kerala/study-finds-geotubing-at-poonthura-effective-in-controlling-coastal-erosion/article69564389.ece