

# Effects of Monsoon Fluctuations on Marine Life in Bay of Bengal

**Prelims (GS I) - Indian and World Geography-Physical, Social, Economic Geography of India and the World.**

**Mains (GS I) - Geographical features and their location-changes in critical geographical features (including water-bodies and ice-caps) and in flora and fauna and the effects of such changes.**

## Why in news?

A recent study published in the journal *Nature Geoscience* has revealed how monsoon patterns significantly impact marine productivity in the Bay of Bengal.

*Despite covering less than 1% of the world's ocean area, the Bay of Bengal it provides nearly 8% of global fishery production.*

## Key Findings of the study

- **Extreme Monsoon conditions** - The study found that both abnormally strong and weak monsoons throughout history caused *major disruptions in ocean mixing*.
- This mixing play important role in climate, marine life, and cycles carbon and oxygen in the ocean.

### Ocean mixing

- **Ocean mixing** - It is the process of warm, sun-filled surface water mixing with cold, nutrient-rich water near the bottom of the ocean.
- Winds, ocean currents, and tides are responsible for most ocean mixing.

### Types of Ocean Mixing

- **Vertical Mixing** - It occurs when water from different depths mixes, often driven by Wind, Turbulence, Convection.
- **Horizontal/Lateral Mixing** - Driven by ocean currents.
- **Diapycnal Mixing** - Mixing across density surfaces, often due to *turbulence or internal wave breaking*.
- **Tidal Mixing** - Tides interacting with seafloor features (e.g., seamounts, continental shelves) generate internal waves and turbulence.

- **Reduced food availability** - Up to 50% reduction in food availability for marine life in surface waters.
- **Historical trend** - Significant declines happened in certain period when extreme monsoon weather was observed.
  - Heinrich Stadial 1 (a cold phase between 17,500 and 15,500 years ago).
  - Early Holocene (about 10,500 to 9,500 years ago).
- **Impact on plankton growth** - The ability of the ocean to support plankton growth is reduced which forms the base of the marine food chain.
- **Impact on food security** - The decline in ocean productivity reduces fish stocks and impacts food security for coastal communities.

## Reasons for Disruption

- **During strong monsoons** - Increased rainfall leads to greater river runoff into the Bay and this excess freshwater creates a buoyant surface layer which prevents nutrient mixing from deeper waters.

*Buoyant surface layer formed as a result of difference in density of water where warm, less dense water floats on top of cooler, denser water.*

- **During weak monsoons** - Due to reduced wind-driven mixing that limits the upwelling of nutrient-rich deep waters.
  - Surface waters become starved of essential nutrients.

## Reference

[The Hindu| Changes in monsoon affect marine productivity](#)

