1. Sea Level Rise

A study on coral microatolls in the Maldives shows sea levels in the central Indian Ocean have been rising since the late 1950s.

Key Highlights of Sea-Level Rise Trends

Long-Term Rise Confirmed - Scientific records show that global mean sea level rose by approximately **0.3 metres between 1930 and 2019**, clearly indicating a sustained and accelerating trend over the past century.

Rates of Sea-Level Rise Over Time - Between 1930 and 1959, the rise was relatively modest, averaging 1–1.8 mm per year. From 1960 to 1992, the rate almost doubled, ranging from 2.7–4.1 mm per year. During 1990–2019, the rise accelerated further to 3.9–4.8 mm per year. Post-1959 Average - Since 1959, the overall average sea-level rise has been about 3.2 mm per year, increasing to nearly 4 mm per year in recent decades, confirming a clear acceleration.

Regional Hotspot – Maldives and Lakshadweep - The Maldives–Lakshadweep region of the central Indian Ocean has recorded a dramatic rise of 30–40 cm in the last 50 years, making it one of the most vulnerable island clusters in the world.

Key Findings of the Report

Earlier Acceleration than Believed - Contrary to earlier assumptions that acceleration began only in the 1990s, evidence shows that sea-level rise started accelerating in the 1950s itself.

Strong Scientific Evidence - Coral growth band studies combined with uranium-thorium dating techniques provided highly accurate, long-term reconstructions of sea-level changes across centuries.

Climatic Event Linkages - Coral growth interruptions were linked to El Niño events, the Indian Ocean Dipole (IOD), and lunar tidal cycles, establishing a strong correlation between sea-level fluctuations and major climatic oscillations.

Unique Central Indian Ocean Dynamics - Unlike most coastlines, the central Indian Ocean experienced earlier and faster sea-level rise, driven by specific oceanographic and atmospheric conditions unique to the region.

Causes of Sea-Level Rise

Thermal Expansion - The continuous absorption of heat by the oceans causes seawater to expand, contributing significantly to rising sea levels.

Melting of Glaciers and Ice Sheets - Accelerated melting of the Himalayan glaciers, as well as Arctic and Antarctic ice sheets, is adding vast quantities of freshwater into oceans, amplifying global sea-level rise.

Above-Average Indian Ocean Warming - The Indian Ocean is warming faster than the global average, which intensifies ocean currents, alters circulation patterns, and drives disproportionately higher sea-level rise in the region.

Climate Variability - Periodic climatic phenomena such as El Niño, IOD events, and shifting wind systems amplify short-term regional fluctuations, compounding the long-term rise.

Implications of Rising Sea Levels

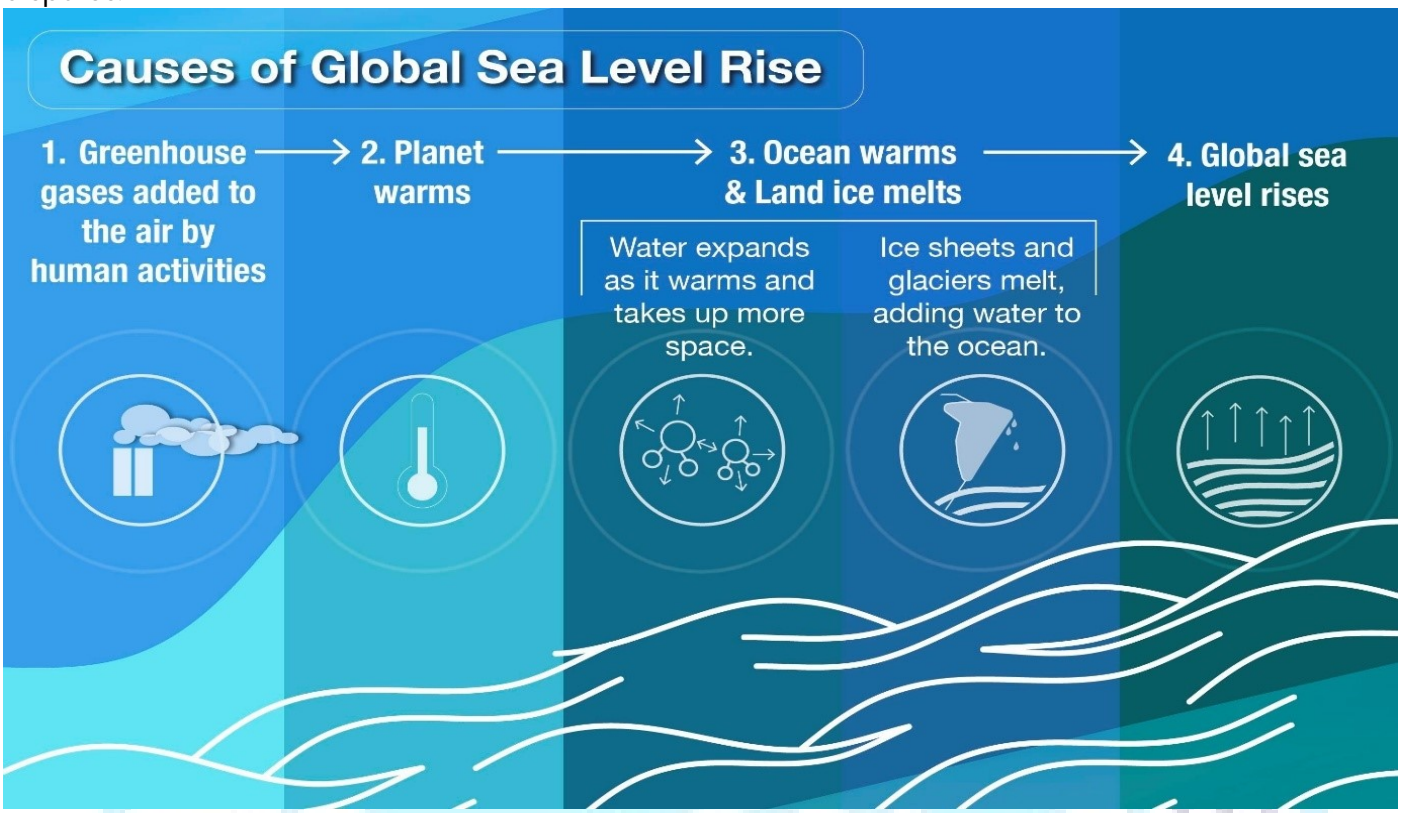
Ecological Consequences - Rising seas threaten coral reefs, mangroves, lagoons, and coastal wetlands, undermining marine biodiversity and weakening natural buffers against storms and cyclones.

Human and Social Impact - Millions of people in low-lying coastal communities face risks of displacement, livelihood losses (fisheries, agriculture), and increasing health risks due to salinity intrusion, waterlogging, and flooding.

Economic Challenges - Rising seas place critical sectors such as ports, shipping, fisheries, and coastal tourism under threat, while governments face rising costs for infrastructure reinforcement and disaster recovery.

Geopolitical Concerns - Accelerated sea-level rise poses challenges to maritime boundaries, Exclusive

Economic Zones (EEZs), and sovereignty of small island nations, potentially intensifying regional security disputes.



Way Forward and Adaptation Strategies

Scientific Monitoring & Research - Strengthen long-term monitoring through coral microatolls, tide gauge networks, and satellite altimetry, enabling accurate forecasts of sea-level change.

Building Coastal Resilience - Implement nature-based solutions such as mangrove restoration and coral conservation, along with engineered measures like seawalls, dykes, and raised infrastructure.

Regional Cooperation - Foster stronger collaboration among Indian Ocean Rim nations to share data, develop early warning systems, and coordinate adaptation measures against rising seas.

Global Climate Action - Urgent international cooperation is needed to meet the Paris Agreement targets, cutting greenhouse gas emissions to limit ocean warming and sea-level acceleration.

India-Specific Priorities (Lakshadweep Focus) - India must conserve fragile island ecosystems, strengthen disaster preparedness systems, and invest in adaptation infrastructure to protect vulnerable populations in Lakshadweep and Andaman & Nicobar Islands.

Global Scientific Frameworks and Reports

IPCC AR6 (2021–22) - Projects a global mean sea-level rise of 0.28–1.01 metres by 2100, depending on emission pathways, with the Indian Ocean expected to experience higher-than-average rise.

WMO – State of the Global Climate 2023 - Confirms that the Indian Ocean is warming at a faster rate than the global mean, intensifying regional anomalies such as more frequent marine heatwaves and sea-level surges.

UNFCCC & Paris Agreement - International commitments to limit warming to well below 2°C are directly tied to reducing ocean warming and mitigating risks for vulnerable island nations.

Source - https - //www.thehindu.com/sci-tech/science/data-show-seas-rising-faster-around-maldives-lakshadweep-than-believed/article69996142.ece