



Large Population and Assets to be Affected by Sea Level Rise

Why in News

Recently, a study in journal Scientific reports made predictions that a large population and assets will be globally affected as a consequence of **Sea Level Rise (SLR)**.

Key Points

- SLR is a consequence of climate change, which is predicted to **increase coastal flooding by 2100**.
- The global population potentially exposed to episodic coastal flooding will increase **from 128-171 million to 176-287 million by 2100**.
 - **0.5-0.7%** of the **world's land area** is at risk of **episodic coastal flooding** by 2100, impacting 2.5-4.1% of the population.
- The value of **global assets exposed** to coastal flooding is projected to be between USD 6,000-9,000 billion or **12-20% of the global GDP**.
- Globally, of the 68% area that is prone to coastal flooding, over **32%** can be attributed to **regional SLR**.
- For most of the world, **flooding** incidents that are typically associated with a 1 in a 100-year event could occur **as frequently as 1 in 10 years**, primarily as a result of SLR.

Sea Level Rise

- SLR is an increase in the level of the world's oceans due to the effects of climate change, especially [global warming](#), induced by **three primary factors**:
 - **Thermal Expansion**: When water heats up, it expands. About half of the sea-level rise over the past 25 years is attributable to **warmer oceans** simply occupying more space.
 - **Melting Glaciers**: Higher temperatures caused by global warming have led to greater-than-average summer melting of large ice formations like mountain glaciers as well as diminished snowfall due to later winters and earlier springs. That creates an imbalance between runoff and ocean evaporation, causing sea levels to rise.
 - **Loss of Greenland and Antarctica's ice sheets**: As with mountain glaciers, increased heat is causing the massive ice sheets that cover Greenland and Antarctica to melt more quickly, and also move more quickly into the sea.
- Global sea level has been **rising over the past century**, and the rate has accelerated in recent decades. The average global sea level has risen 8.9 inches **between 1880 and 2015**. That's **much faster than in the previous 2,700 years**.
- **Regional SLR**: SLR is not uniform across the world. Regional SLR may be higher or lower than Global SLR due to **subsidence, upstream flood control, erosion, regional ocean currents, variations in land height, and compressive weight of Ice Age glaciers**.
- Sea level is primarily measured using **tide stations** and **satellite laser altimeters**.
- Earlier, IPCC released '[The Special Report on the Ocean and Cryosphere in a Changing Climate](#)' which underlined the dire [changes taking place in oceans](#), glaciers, and ice-deposits

on land and sea.

- The report expects **oceans to rise between 10 and 30 inches by 2100** with temperatures warming **1.5 °C**.

▪ **Impacts of SLR**

- **Coastal Flooding:** Globally, eight of the world's 10 largest cities are near a coast, which is threatened by coastal flooding. Jakarta (Indonesia) is being known as the world's **fastest-sinking city**, by about 25 cm into the ground every year. Other cities that regularly feature in the lists endangered by climate change include Guangzhou, Jakarta, Miami, **Mumbai** and Manila.
- **Destruction of Coastal Biodiversity:** SLR can cause destructive **erosion, wetland flooding, aquifer and agricultural soil contamination with salt, and lost habitat for biodiversity**.
- **Dangerous Storm Surges:** Higher sea levels are coinciding with more dangerous **hurricanes** and typhoons leading to loss of life and property.
- **Lateral and Inland Migration:** Flooding in low-lying coastal areas is forcing people to migrate to the higher ground causing **displacement** and **dispossession** and in turn a **refugee crisis worldwide**.
- **Effect on Communications Infrastructure:** The prospect of higher coastal water levels threatens basic services such as internet access.
- **Threat to Inland Life:** Rising seas can contaminate soil and groundwater with salt threatening life farther away from coasts.
- **Tourism and Military Preparedness:** Tourism to coastal areas and military preparedness will also be negatively affected by an increase in SLR.

▪ **Adaptation Strategies to the threat of SLR:**

- **Relocation:** Many coastal cities have planned to adopt relocation as a mitigation strategy. For example, Kiribati Island has planned to shift to Fiji, while the **Capital of Indonesia is being relocated from Jakarta to Borneo**.
- **Building Sea wall:** Indonesia's government launched a coastal development project called a **Giant Sea Wall** or "**Giant Garuda**" in 2014 meant to protect the city from floods.
- **Building Enclosures:** Researchers have proposed **Northern European Enclosure Dam** (NEED), enclosing all of the North Sea to protect 15 Northern European countries from rising seas. The **Persian Gulf**, the **Mediterranean Sea**, the **Baltic Sea**, the Irish Sea, and the Red Sea were also identified as areas that could benefit from similar mega enclosures.
- **Architecture to Steer Flow of Water:** Dutch City Rotterdam built barriers, drainage, and innovative architectural features such as a "**water square**" with temporary ponds.

Way Forward

- Reducing future greenhouse gas emissions should be the long-term goal to keep SLR in check.
 - The **Paris Agreement** provides a clear vision on limiting global warming and thus, SLR.
- Some of the steps in this direction would include:
 - Switching from fossil fuels to **clean alternatives** like solar and wind energy.
 - Instituting **carbon taxes** on industries and subsidies for reducing the carbon footprint.
 - **Carbon sequestration** by geoengineering and natural methods like restoring peatland and wetland areas to capture existing greenhouses gases.
 - **Afforestation** and reducing deforestation.
 - Subsidizing research on climate change.

[Source: IE](#)

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