

The Paradox of Coastal Flooding

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Context :

- A recent study published in the journal **Frontiers in Forests and Global Change** suggests that **rising sea levels** and **coastal flooding** may actually **enhance the resilience** of certain coastal tree species, while **adversely affecting** others.

Background :

- **Global warming** is leading to **rising sea levels** and increased flooding in specific regions.
- Traditionally, researchers have attributed these phenomena to the **decline in growth rates** of various coastal tree species.
- However, the new study urges a **reconsideration of this perspective**.

Coastal Flooding :

- **Coastal flooding** refers to the **sudden inundation** of coastal environments due to a **temporary increase** in water levels from **storm surges** and **extreme tidal events**.
- The extent and severity depend on:
 - **Coastal topography**
 - **Storm surge conditions**
 - **Overall bathymetry** of the area

Causes of Coastal Flooding :

- **Rising sea levels** from global warming increase the **frequency** and **intensity** of coastal flooding:
 - According to the **UN's Intergovernmental Panel on Climate Change (2014)**, sea levels are projected to rise between **28 and 98 centimeters** by **2100**, with a likely median increase of **55 centimeters**.
- **Storm surges**, caused by events like **tsunamis** and **cyclones**, are major contributors to flooding.
- Natural disasters can exacerbate flooding, leading to **significant damage** and loss of **life and property**.
- The construction of **infrastructure** (ports, resorts) along coastlines can **heighten vulnerability** to flooding.
- The combination of **rising sea levels** and more powerful storms accelerates **erosion**, resulting in the loss of **beaches** and **wetlands** that act as natural buffers.
- **Deforestation** and degradation of coastal ecosystems weaken natural defenses against flooding.

Impacts of Coastal Flooding :

- Results in **considerable loss of life** and **extensive property damage**, especially in **densely populated** regions.
- Critical infrastructure (roads, bridges) may suffer **severe damage**, disrupting **essential services**.
- Industries reliant on coastal regions, such as **tourism, fisheries, and agriculture**, experience direct losses from:
 - **Interrupted operations**
 - **Diminished productivity**
 - **Damaged assets**
- Ongoing flooding may necessitate the **relocation of communities**, leading to:
 - **Internal migration**
 - Strains on **urban infrastructure**
 - Potential for **social conflicts** in receiving areas.
- Coastal ecosystems, including **mangroves** and **coral reefs**, face severe impacts from flooding, leading to **biodiversity loss**.

Government Initiatives for Coastal Management :

- The **MISHTI Initiative** aims to increase **mangrove coverage** along coastlines and on **saltpan lands**.
- The **National Centre for Sustainable Coastal Management** promotes integrated and sustainable management of coastal and marine areas in India for the benefit of **traditional coastal and island communities**.
- The **Integrated Coastal Zone Management Plan** uses a comprehensive approach to manage coastal zones, considering **geographical** and **political boundaries** to achieve sustainability.
- The **Coastal Regulation Zone** notification, issued in **1991** under the **Environmental Protection Act of 1986**, regulates activities in **India's coastal areas**.

