

The Paradox of Coastal Flooding

Posted at: 05/11/2024

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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.

