COASTAL FLOODING - GEOGRAPHY

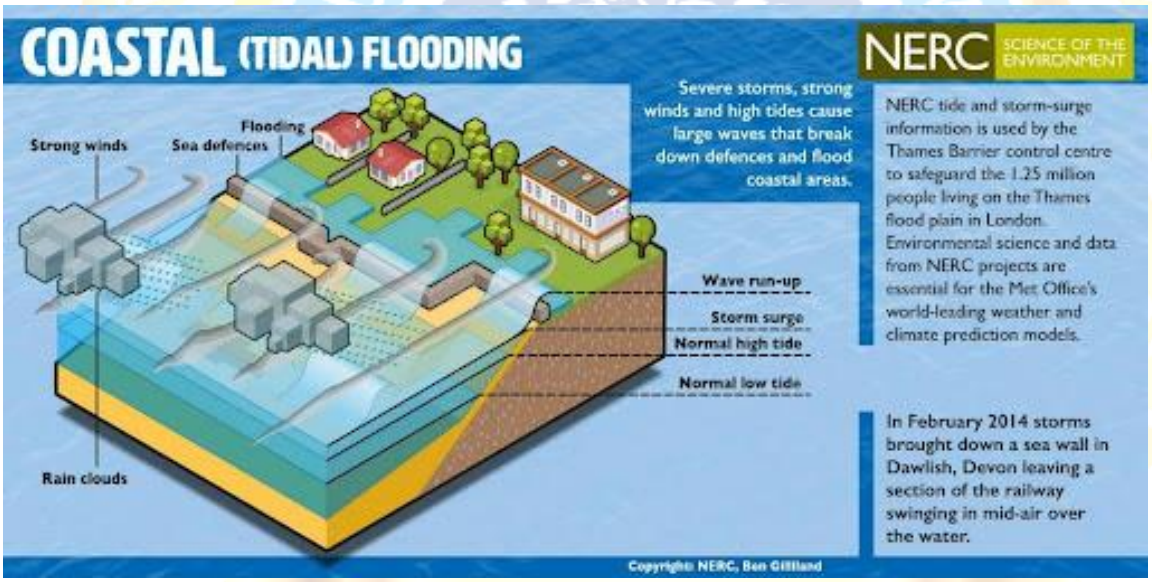
NEWS: According to a study paper published in the journal ***Frontiers in Forest and Global Change***, Global warming is raising sea level rise and making floods more common in some areas.

WHAT'S IN THE NEWS?

Key findings of the study

- **Researchers used Dendrochronology** to understand how trees respond to conditions. Scientists estimate when a tree forms a tree ring and **develop a time-wise correlation between a climatic condition and the tree's response.**
- The study highlights that **sea levels were increasing by around 2 mm/year in 1993**. This rate has since **doubled and climate** researchers expect floods in coastal areas will **increase threefold by 2050.**
- The study underscores the importance of local conditions on tree growth in coastal forests. **Non-linear relationship** that may contribute to tree response.

About Coastal Flooding

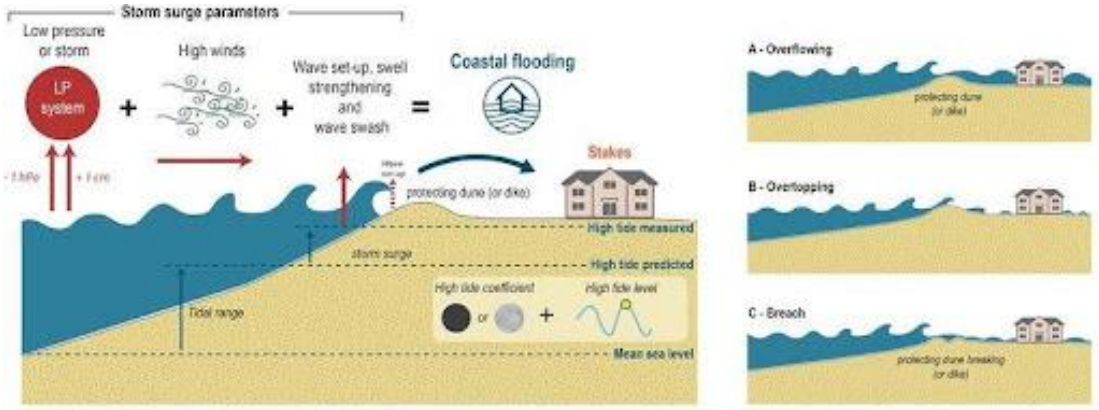


It is a **sudden and abrupt inundation of a coastal environment** caused by a **short-term increase** in water level due to a storm surge and extreme tides. The magnitude and extension depend on the coastal **topography**, **storm surge** conditions and broader bathymetry of the coastal area.

Coastal flooding is generally a natural process and constitutes an important part of the natural coastal dynamics, especially for salt marshes and mangrove forests. In areas with human activities, however, it can constitute a major challenge and lead to loss of property and lives.

Over the last 200 years, it is estimated that about two million people have been killed in flood events mainly in South Asia and with growing coastal populations and sea level rise, the world faces increasing potential for coastal flood disasters.

Causes of Coastal Flooding



- **Rising Sea Levels:** Global warming is causing sea levels to rise, increasing the frequency and intensity of coastal flooding. As per **the UN's Intergovernmental Panel on Climate Change, 2014, there is a high degree of certainty that sea levels will rise by between 28 - 98cm by 2100**, with the most likely rise being 55cm by 2100.
- **Storm surges:** A lot of coastal flooding is a result of storm surges. Storm surges are short-term changes in sea levels caused by events such as tsunamis and cyclones. A storm surge is only measured by the water level that exceeds the normal tidal level, excluding waves.
- **Extreme Weather Events:** Cyclones, storms, and tsunamis can exacerbate coastal flooding, leading to severe damage and loss of life. **For e.g.** the Netherlands, IJsselmeer polders, is subject to subsidence due to water abstraction via crop evapotranspiration
- **Unsustainable Coastal Development:** Construction of infrastructure, such as ports and resorts, in coastal areas can increase vulnerability to flooding.
- **Deforestation and Erosion:** Deforestation and erosion of coastal ecosystems can weaken natural barriers against flooding. Erosion is when materials are being worn away, for example, by waves and soft geology and transported elsewhere by natural forces such as wind or water.
    - An example is Holderness, in Yorkshire, England. Waves, storms and tidal surges constantly batter the coastline of Holderness.

Examples of coastal flooding

As a low-lying country, the **Netherlands** has had its fair share of floods. One of the biggest floods was the North Sea flood of 1953.

On 23 August 2005, Hurricane Katrina hit New Orleans, **Louisiana (US),** leaving behind a trail of destruction.

On 26 December 2004, one of the deadliest natural disasters in recorded history happened: an all-powerful tsunami, caused by an undersea earthquake, hit the countries and islands in the Indian Ocean.

Impacts of Coastal Flooding

- **Loss of Life and Property:** Coastal flooding can result in significant loss of life and property damage, particularly in densely populated areas.
- **Infrastructure Damage:** Roads, bridges, and other infrastructure can be severely damaged or destroyed, disrupting essential services.
- **Economic Disruption:** Coastal flooding can disrupt economic activities, including tourism, fisheries, and agriculture.
- **Environmental Degradation:** Coastal ecosystems, such as mangroves and coral reefs, can be severely impacted by flooding, leading to loss of biodiversity.

Mitigation Strategies

- **Integrated Coastal Zone Management (ICZM):** Implementing ICZM plans to promote sustainable development and reduce vulnerability to coastal hazards.

India's Coastal Vulnerability

Coastline Statistics:

India's coastline spans 7,516 kilometers, encompassing 5,422 kilometers on the mainland and 2,094 kilometers across islands belonging to nine states and four Union Territories.

This coastline supports 90% of the country's trade and encompasses 3,331 coastal villages and 1,382 islands.

According to an analysis, about 43.5 of the coastline is under highly vulnerable zone and about 1 is under a very highly vulnerable zone.