

DISASTER MANAGEMENT

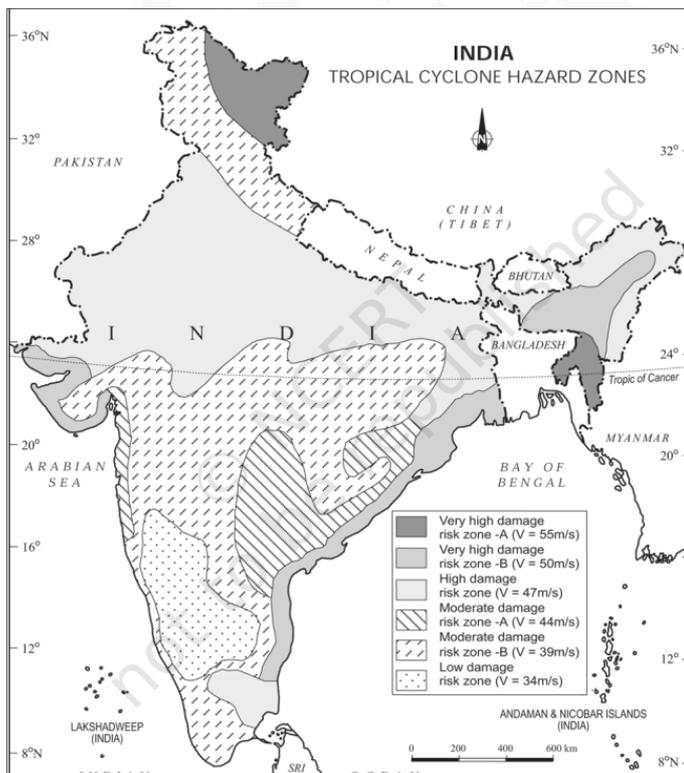
Tropical Cyclones

- Tropical cyclones are intense low-pressure areas confined to the area lying between 30°N and 30°S latitudes, in the atmosphere around which high velocity winds blow. Horizontally, it extends up to 500-1,000 km and vertically from surface to 12-14 km. A tropical cyclone or hurricane is like a heat engine that is energised by the release of latent heat on account of the condensation of moisture that the wind gathers after moving over the oceans and seas.

Conditions for Formation of Cyclone

- (i) Large and continuous supply of warm and moist air that can release enormous latent heat.
- (ii) Strong Coriolis force that can prevent filling of low pressure at the centre (absence of Coriolis force near the equator prohibits the formation of tropical cyclone between 0 -5 latitude).
- (iii) Unstable condition through the troposphere that creates local disturbances around which a cyclone develops.
- (iv) Finally, absence of strong vertical wind wedge, which disturbs the vertical transport of latent heat.

Vulnerability of India to Cyclone



- Most of the cyclones originate between 10°-15° north latitudes during the monsoon season, yet in case of the Bay of Bengal, cyclones mostly develop during the months of October and November.
- Here, they originate between 16°-2° N latitudes and to

the west of 92° E. By July the place of origin of these storms shifts to around 18 N latitude and west of 90°E near the Sunderban Delta

Facts and Figures:

- About 5,700 km of the India's coastline encompassing 84 Coastal districts (roughly 8% of the geographical area) in 13 Coastal States and Union Territories (UTs) are affected by severe tropical cyclones year after year.
- Approximately 40% of India's population is living within 100 km of the coastline.
- Though the frequency of Tropical Cyclones (TCs) in the North Indian Ocean(NIO) covering the Bay of Bengal and the Arabian Sea is the least in the world (7% of the global total), their impact on the east coast of India is relatively more devastating due to storm tidal effect in the area.
- This is evident from the fact that in the past, 21 of the 23 major cyclones (with a loss of about 10,000 lives or more) worldwide occurred over the area surrounding the Indian subcontinent.
- 1977 Cyclone – 10,000 death Andhra Pradesh
- 1990 Super Cyclone - 967 people in Andhra Pradesh
- 1996 Very Severe Cyclonic Storm with a fatality of 1,057 people in Andhra Pradesh
- 1999 Super Cyclone - Odisha with a fatality of about 10,000 people, destroying 275,000 homes and leading to 1.67 million homeless.
- October 12 2013, Cyclone Phailin hit the states of Odisha and Andhra Pradesh with maximum sustained wind gusting up to 220 km per hour, heavy rains measuring up to 25 cm and storm surge over 3 m; the sea pushed in as much as 40 m along parts of the coast.
- Affecting about 13.2 million people in 171 blocks in 18 Districts of the state, and resulting in 44 human casualties.
- It was the strongest cyclone to hit the Indian coast, similar to the Super Cyclone of 1999 which hit Odisha.

Consequences of Cyclones in India

- Loss of Life and Injury: Cyclones can lead to casualties and injuries, especially in coastal regions where populations are more vulnerable due to the proximity to the sea.
- As many as 117 cyclones hit India in 50 years from 1970-2019 claiming over 40,000 lives, according to a study on extreme weather events, which also states the mortality rate due to tropical cyclones has come down significantly over the past 10 years.
- Property Damage: Strong winds, heavy rainfall, and storm surges associated with cyclones can cause significant damage to buildings, roads, bridges, and other infrastructure, leading to economic losses.

- **Displacement and Migration:** Cyclones can force people to evacuate their homes, leading to temporary or long-term displacement. This can create challenges related to shelter, healthcare, and livelihoods.
- **Impact on Agriculture:** Cyclones can damage crops, livestock, and fisheries, affecting the livelihoods of coastal communities that depend on agriculture and fishing for their sustenance.
- **Environmental Consequences:** Cyclones can lead to soil erosion, flooding, and contamination of water sources, impacting ecosystems and biodiversity.
- **To mitigate the impact of cyclones, India has adopted various approaches and measures:**
- **Impact based Forecast:** The Impact-based forecast is an innovative approach to not only understand “what the weather will be” but go a step further to inform “what the weather will do”.
- **State of art Early Warning Systems:** India has invested in advanced meteorological technology and established robust early warning systems to forecast cyclones accurately. This allows authorities to issue timely alerts and advisories, enabling communities to prepare and evacuate if necessary.
- **Evacuation and Shelter Management:** Authorities conduct evacuation drills and identify cyclone shelters in vulnerable areas to ensure the safety of residents. These shelters are equipped with essential supplies and facilities to accommodate evacuees.
- **Infrastructure Resilience:** India has focused on building resilient infrastructure that can withstand cyclonic winds and storm surges. This includes constructing buildings, roads, and bridges with cyclone-resistant designs and materials.
- **Community Awareness and Preparedness:** Awareness campaigns and community-based disaster management programs are conducted to educate people about cyclone risks, preparedness measures, and evacuation protocols. This empowers communities to take proactive steps during cyclone events.
- **Mangrove Conservation:** Mangrove forests act as natural barriers against storm surges and coastal erosion. India has undertaken initiatives for mangrove conservation and restoration to enhance coastal resilience to cyclones.
- **International Cooperation:** India collaborates with international organizations and neighboring countries to share expertise, resources, and best practices for cyclone preparedness and response.

Floods

- India is highly vulnerable to floods. Out of the total geographical area of 329 million hectares (mha), more than 40 mha is flood prone.
- Floods are a recurrent phenomenon, which cause huge loss of lives and damage to livelihood systems, property, infrastructure and public utilities.
- Inundation of land and human settlements by the rise of water in the channels and its spill-over presents the condition of flooding. Unlike other natural