

4. Cyclone Ditwah- Geography

Cyclone Ditwah weakens; 3 die in rain-related incidents in Tamil Nadu.

Cyclone Ditwah has weakened over the Bay of Bengal after causing severe casualties in Sri Lanka, bringing focus to the mechanics of tropical cyclones, including their formation conditions, intensity classification, and life cycle stages.

Cyclone Ditwah Update

Current Status- Cyclone Ditwah has weakened.

Trajectory- It moved northward over the Bay of Bengal.

Location- The system moved parallel to the coasts of Tamil Nadu and Puducherry.

Conceptual Understanding of Cyclones

Definition- Cyclones are defined as rapid inward air circulation around a low-pressure area.

Direction of Circulation

Northern Hemisphere- Anticlockwise direction.

Southern Hemisphere- Clockwise direction.

Etymology & History

Origin- Derived from the Greek word 'Cyclos', meaning the coils of a snake.

Coinage- The term was coined by Henry Peddington.

Reasoning- Tropical storms in the Bay of Bengal and Arabian Sea visually resemble coiled serpents of the sea.

Classification of Disturbances

The classification is based on wind speed intensity.

Type of Disturbance	Wind Speed (Km/h)	Wind Speed (Knots)
Low Pressure	Less than 31	Less than 17
Depression	31 - 49	17 - 27
Deep Depression	49 - 61	27 - 33
Cyclonic Storm	61 - 88	33 - 47
Severe Cyclonic Storm	88 - 117	47 - 63
Super Cyclone	More than 221	More than 120

Favorable Environmental Conditions

For a cyclone to develop, six specific conditions are required-

Low Vertical Wind Shear- Values must be less than 23 mph (37 km/h). *Definition-* Vertical wind shear is the change in wind speed with height; low shear keeps the storm structure intact.

Warm Ocean Waters- Temperature must be at least 80°F (27°C). This warmth must extend to a depth of about 150 ft (46 m) to provide sufficient energy.

Atmospheric Instability- The atmosphere must cool fast enough with height to encourage moist convection (rising air).

Moisture Availability- Presence of relatively moist air near the mid-level of the troposphere (approx. 16,000 ft / 4,900 m).

Coriolis Force- A minimum distance of at least 300 miles (480 km) from the equator is required to provide the necessary spin.

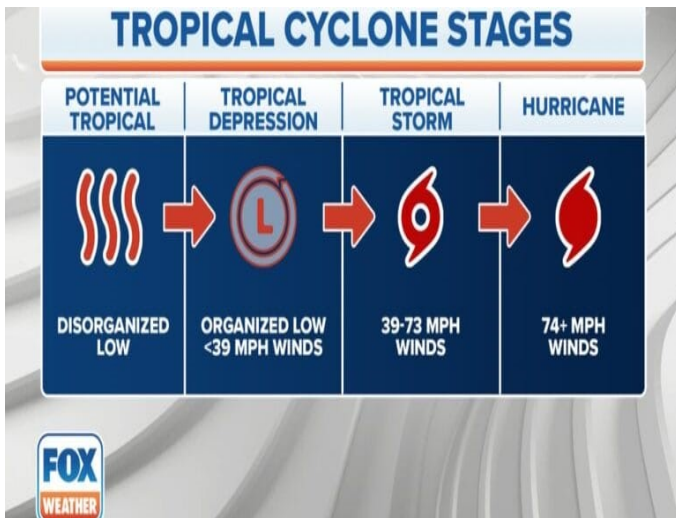
Pre-existing Disturbance- A pre-existing near-surface low-level disturbance is needed to kickstart the rotation.

5 Stages of Cyclone Formation

Formation and Initial Development Stage

Energy Source- The formation depends heavily on the transfer of water vapour and heat from the warm ocean to the atmosphere.

Evaporation- Strong evaporation from the sea surface pumps moisture and heat into the overlying air.



Convection– Warm, moist air rises, leading to the formation of large cumulus clouds.

Latent Heat Release– As the rising air cools, condensation occurs. This releases latent heat, which acts as fuel, further warming the air and causing it to rise faster.

Pressure Drop– This continuous release of heat deepens the low-pressure zone, establishing the early structure of the storm.

Mature Stage

Intensification– The storm intensifies with air rising violently in deep convective thunderstorms.

Outflow– At the tropopause level, the rising air

spreads outward horizontally.

Subsidence (Eye Formation)–The outward spreading creates high pressure at the upper levels. This forces air to descend (subside) in the center. As air descends, it warms by compression, creating the Eye—a calm, warm, low-pressure center.

Structure– The mature cyclone features a concentric pattern of giant, turbulent cumulonimbus cloud bands spiralling around the eye.

Intensity– During this stage, wind speeds are highest, and the cyclone reaches maximum intensity.

Modification and Decay Stage

Cause of Weakening– The cyclone weakens when its main energy source—warm, moist air—is cut off.

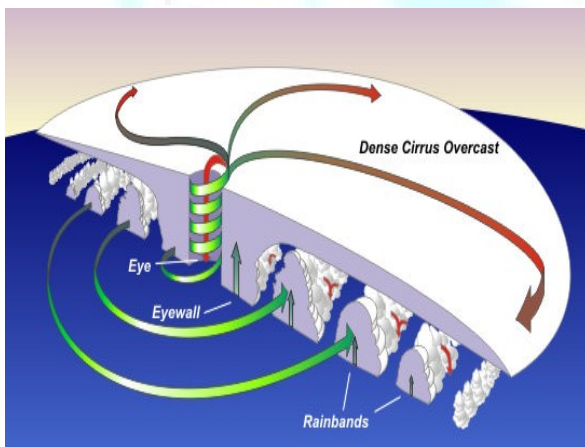
Triggers for Decay

Landfall– Moisture availability drops drastically over land.

Cold Waters– Moving over cold oceans reduces evaporation.

Consequences–The central low pressure begins to rise. Internal heat generation decreases. Wind speeds gradually reduce.

Dissipation– The system eventually degrades into a simple low-pressure area or depression.



Impact of Cyclone Ditrwah- Sri Lanka

Casualties– 334 dead. 370 missing.

Primary Causes– Casualties were driven by heavy rain, resultant landslides, and floods.

Most Affected Districts– Badulla, Kandy, Nuwara Eliya, Matale

Vulnerability Factor– These districts are primarily hilly regions, making them highly susceptible to landslides during heavy rainfall events.

Source– <https://www.thehindu.com/news/national/tamil-nadu/cyclone-ditrwah-weakens-moves-northward-slowly-along-tamil-nadu-coast/article70342177.ece>