Southwest Monsoon Causes Heavy Rainfall in Rajasthan

Why in News?

Rajasthan has come under the influence of the active **southwest monsoon**, resulting in widespread and intense rainfall across various parts of the State.

- **Niwai in the Tonk district recorded the highest rainfall in the State, measuring 165 mm.**

Key Points

Rainfall Distribution in Rajasthan

- **Rainfall Patterns:**
  - Rajasthan shows a marked variation in rainfall distribution across different regions.
    - The mean annual rainfall in **East Rajasthan** is about **64.9 cm**.
    - In **West Rajasthan**, it drops to around **32.7 cm**.
  - The **eastern part of Rajasthan** receives considerably more rainfall than the west, with the **southwest monsoon accounting for about 91%** of the state's total annual rainfall.
  - **Western Rajasthan** is dominated by arid and semi-arid conditions, with the northwest being the driest.
    - **Jaisalmer** is Identified as the driest district, with an annual rainfall of less than**100 mm**.
  - **Southern Rajasthan**: Records the highest rainfall in the state, particularly in districts like **Jhalawar** and **Banswara**.
    - **Jhalawar** records the **highest average annual rainfall** among all districts in Rajasthan.
  - **Aravalli Range Influence**: The western slopes of the Aravalli Range, such as **Pali** and **Jalore** districts, receive more rainfall than other parts of western Rajasthan.
- **Seasonal Variation:**
  - **Monsoon Season (June to September)**: Accounts for about **90%** of the total annual rainfall.
  - **Cold Weather Season (January and February)**: Receives minor rainfall due to local weather conditions.
  - **Post-Monsoon Season**: Contributes a small fraction to the overall annual rainfall.

Southwest Monsoon

- **About: The rainfall received from the southwest monsoon is seasonal and occurs mainly between June and September every year.**
- **Factors Influencing its Formation:**
  - **Differential Heating and Cooling:** Land heats up faster than water, creating a low-pressure zone over India and high pressure over surrounding seas.
  - **Intertropical Convergence Zone (ITCZ):** A low-pressure belt where northeast and southeast trade winds converge.
  - **High-Pressure Area East of Madagascar:** Located around 20°S in the Indian Ocean.
  - **Tibetan Plateau Heating:** Intense summer heating creates strong upward air currents

and a low-pressure zone at high altitudes.
    - **Jet Streams:** Westerly Jet Stream moves north of the Himalayas in summer.
    - **Southern Oscillation (SO):** Periodic reversal of air pressure between the Pacific Ocean and Indian Ocean affects monsoon patterns.
- **Mechanism and Onset of Southwest Monsoon:**
    - **ITCZ Movement:** Shifts north with the Sun's movement
    - **Wind Direction:** Southeast trade winds cross the equator, deflect due to the Coriolis force, and blow as southwest monsoon winds.
    - **Monsoon Trough:** In July, ITCZ reaches 20°–25°N, located over the Indo-Gangetic Plain.
    - **Two Main Branches:** Arabian Sea Branch and Bay of Bengal Branch.
    - **Breaks in Monsoon:** Rainfall is not continuous; dry spells (breaks) occur due to shifts in the **monsoon trough**.