The Monsoon Mayhem

Why in news?

The monsoon deficit due to the delayed onset has been nearly wiped out, but the distribution of rainfall remains patchy.

What is monsoon?

- The seasonal reversal of wind direction during a year accompanied by corresponding changes in precipitation.
- The monsoon or southwest monsoon is a sea-breeze from the Arabian Sea and the Bay of Bengal that officially onsets over Kerala on June 1 and retreats from Rajasthan by the end of September.
- It is then replaced by the retreating, or northeast monsoon in November which is the key source of rainfall for several parts of Tamil Nadu, Andhra Pradesh and north interior Karnataka.

What is the status of the monsoon in 2023?

- **Onset -** The onset of monsoon was delayed by unforeseen interactions between typhoons and cyclones.
- Cyclone Biparjoy disrupted the monsoon winds and delayed the arrival of monsoon over Mumbai by 2 weeks.
- The monsoon arrived together in Mumbai and Delhi for the first time in over half a century.
- The monsoon trough had an exaggerated curvature over northwest India.
- **Rainfall -** The distribution of rainfall remains as patchy as ever.
- The northern Western Ghats into Northwest India saw excess rainfall.
- Deficits extended in a horseshoe pattern from Uttar Pradesh into Odisha and back to the east into Chhattisgarh, Madhya Pradesh, and Maharashtra.
- **Himachal -** Some areas received heavy rainfall and few arts had extreme heat.

How was the monsoon system affected by Cyclone Biparjoy?

- The monsoon normally arrives in Mumbai on June 11 and Delhi on June 27, according to long-term assessments by IMD.
- The monsoon has arrived in both Mumbai and Delhi simultaneously on June 25, 2023.
- Such an incident previously happened on June 21, 1961.
- Typhoons Mawar and Guchol pulled winds and moisture from the Indian Ocean.
- The typhoons created weak winds over the Arabian Sea, which allowed cyclone Biparjoy to form very late and last very long.
- Cyclone Biparjoy, in turn, disrupted the monsoon winds, created a delayed arrival of the monsoon over Mumbai.

What else could be driving the summer monsoon mayhem?

- **Global warming** - With this, a warm and humid atmosphere acts like a steroid for the weather.
- **Wildfires -** So far this year, wildfires have burned over 3-times the normal area and have contributed to the warming.

> *Excess rainfall over northwest India is consistent with the Arabian Sea having warmed by about 1.5 degrees Celsius since January.*

- **Arabian Sea -** Rainfall this pre-monsoon was above normal due to a combination of the warm Arabian Sea and an unusually high number of western disturbances.
- **Land factor -** Disuniform terrain and heterogeneous land-use patterns accounts for uneven distribution of rainfall.
- **Pre-monsoon rainfall -** June contributes only about 15% of the rainfall to the seasonal total.
- **Atlantic Ocean -** A warm tropical Atlantic generally tends to suppress monsoon rainfall (*Atlantic Niño*).
- The entire Atlantic Ocean has been warmer than normal since March and its impact on monsoon is not clear.
- **Upper atmospheric circulation -** The strongest winds in the upper atmosphere can break into clockwise and anticlockwise patterns when they run into mountainous terrain (The Himalayas).
- Strong clockwise winds in the upper atmosphere demand an anticlockwise circulation near the surface, in order to feed the upper level outflow.
- Such a convergence near the surface can drive excess rainfall.
- **Himalayas -** Warming over the Himalaya has not been uniform
- Some parts of the mountain chain are amplifying global warming, leading to rapid local warming.
- Irregular weather patterns during the monsoon superpose on these local features resulting in cloudbursts, heavy rains or even heatwaves.

References

1. The Hindu - North India's monsoon mayhem is a confluence of factors
2. DTE - Global warming, Cyclone Biparjoy worked in tandem to bring monsoon to Mumbai and Delhi on same date

SHANKAR IAS PARLIAMENT
Information is Empowering