Drop in India's Reservoir Water Levels

For Prelims: Central Water Commission (CWC), El Niño, Indian Ocean Dipole (IOD),

For Mains: Significance of India's reservoirs, Consequences of reduced water availability, How El Niño, MJO, and IOD influence India's monsoon patterns and rainfall.

Source: IE

Why in News?

India, a country heavily reliant on **monsoon rains**, faced a significant challenge in **August 2023 with an unprecedented rainfall deficit.**

- As a result, the **water levels in the nation's crucial reservoirs** have experienced a **sharp decline,** raising concerns about water supply for households, industries, and power generation.
- August is typically a month when India's reservoirs see their water storage levels increase significantly. However, **August 2023 was an exception, as it marked the driest August in over 120 years**. Instead of the **expected 255 mm of rainfall, the country received only about 162 mm, resulting in a 36% rainfall deficiency.**

How Dry are India’s Reservoirs?

- According to the **Central Water Commission (CWC)**, the live storage in the **150 reservoirs was 113.417 billion cubic meters (BCM) as of 31st August, 2023,** which was **63% of their total live storage capacity.**
    - This was about **23% less than the storage during the same period in 2022 and about 10% less than the average of the last 10 years.**
- The water levels in the reservoirs varied across different regions and river basins. The southern region, which had a **rainfall deficiency of 60% in August, had the lowest storage level of 49% of its combined capacity.**
- The eastern region, which received normal rainfall, had the **highest storage level of 82% of its combined capacity.**
- Some of the **river basins that had highly deficient or deficient** water levels were:
    - **Highly Deficient:**
        - **Pennar** basin in Karnataka and Andhra Pradesh
        - Mahanadi **basin** in Chhattisgarh and Odisha
    - **Deficient:**
        - Subarnarekha**,** Brahmani **and Vaitarni** basins in Jharkhand, West Bengal and Odisha
        - **Kaveri** basin in Karnataka and Tamil Nadu
        - **Mahi** basin in western India
        - **Krishna** basin in Maharashtra, Karnataka and Telangana
- Water storage in the reservoirs of the eastern, western, central and southern regions, except the northern region is less than last year (2022).

Note:

- A **20% reduction in a river basin is close to normal**, according to the CWC.
- A basin is categorized as **deficient** if the reduction is **greater than 20% and less than or equal to 60%.**
- A reduction of over 60% is called **highly deficient.**

What Are the Consequences of this Water Scarcity?

- **Agriculture:**
  - The reservoirs provide irrigation water for crops, especially **during the** rabi season**.** The reduced water availability can affect crop production and farmers' incomes.
- **Power:**
  - The reservoirs also supply water for hydropower generation, which accounts for over **12% of India's total electricity generation.**
    - The dry August led to an **unexpected increase in power demand**, primarily for irrigation purposes.
      - Power generation reached a record high in August, necessitating additional electricity production by coal-fired power plants due to the precarious water levels in the reservoirs.
- **Environment:**
  - The reservoirs also **support biodiversity and ecosystem services,** such as **flood control, groundwater recharge, fisheries and recreation.** The lower water levels can affect these functions and cause ecological damage.
- **Impact on Water Supply:**
  - India's annual rainfall primarily occurs during the **southwest monsoon season**, making these reservoirs vital for water supply year-round. This scarcity in water storage threatens households.

What are the Causes for the Rainfall Deficit?

- **El Niño:**
  - **El Niño** is a climatic phenomenon that occurs when the **sea surface temperature in the central and eastern Pacific Ocean rises above normal.**
    - It affects the global weather patterns and reduces rainfall in India during the monsoon season.
    - According to the **India Meteorological Department (IMD)**, El Niño was present during August 2023 and was expected to continue till September.
    - The IMD has forecasted that rainfall in **September will likely not be more than 10% deficient.**
      - However, the looming threat of El Niño in the **equatorial Pacific Ocean,** which is still gaining strength, poses a significant risk to India's water resources.
- **Indian Ocean Dipole (IOD):**
  - The **Indian Ocean Dipole (IOD)** is defined by the **difference in sea surface temperature between two areas (or poles, hence a dipole)** – a western pole in the Arabian Sea (western Indian Ocean) and an eastern pole in the eastern Indian Ocean south of Indonesia.
  - The IOD affects the climate of Australia and other countries that surround the Indian Ocean Basin, and is a significant contributor to rainfall variability in this region.
    - According to IMD, IOD was expected to turn favourable for the monsoon rainfall this year, but did not have much impact.

Way Forward

- Promote **efficient water management practices** in agriculture, including the adoption of drip irrigation and rainwater harvesting techniques.
    - Encourage **crop diversification and the cultivation of drought-resistant crops** to reduce the reliance on water-intensive farming.
- Water innovation initiatives, such as **desalination, wastewater treatment, smart water technologies, and climate-resilient agriculture**, can help enhance water supply and efficiency and cope with water challenges and uncertainties.
- Invest in **renewable energy** sources like solar and wind power to reduce the dependency on hydropower generation, especially during dry periods.
- **Raise awareness** among the public about responsible water usage and the importance of conservation.

UPSC Civil Services Examination Previous Year Question (PYQ)

Prelims

Q. With reference to 'Indian Ocean Dipole (IOD)' sometimes mentioned in the news while forecasting Indian monsoon, which of the following statements is/are correct? (2017)

1. IOD phenomenon is characterised by a difference in sea surface temperature between tropical Western Indian Ocean and tropical Eastern Pacific Ocean.
2. An IOD phenomenon can influence an El Nino's impact on the monsoon.

Select the correct answer using the code given below:

(a) 1 only
(b) 2 only
(c) Both 1 and 2
(d) Neither 1 nor 2

Ans: (b)

Mains

Q: How far do you agree that the behaviour of the Indian monsoon has been changing due to humanizing landscape? Discuss. **(2015)**

Q. 'Climate change' is a global problem. How India will be affected by climate change? How Himalayan and coastal states of India will be affected by climate change? **(2017).**