

Pakistan Meteorological Department



Monthly Drought Bulletin For the Month of December 2024

Highlights

- During the month of December 2024, light to moderate rainfall was recorded in various parts of the country.
- Mean monthly temperatures were recorded 1°C to 4°C above-normal across the country except Gilgit Baltistan and western Baluchistan where temperature was recorded below normal.
- During the month of January 2025, overall near-normal rainfall is expected all over the country. A tendency for slightly above normal rainfall is expected in central Khyber Pakhtunkhwa along with North and East Punjab during January 2025. However, the southern parts of the country, are expected to receive near normal rainfall.
- Mean temperatures are expected to remain above normal nationwide, with maximum departure over Kashmir and adjoining areas of Gilgit Baltistan, Khyber Pakhtunkhwa.
- Slightly above normal rains during January 2025 may provide relief to drought prone areas of the country except coastal Baluchistan and adjoining areas of Sindh province.
- Keeping in view the weather forecast for the month of January 2025, disaster management authorities may be requested to plan DRM activities accordingly.

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1. Monthly Rainfall and Temperature Analysis for the Month of December, 2024

During the month of December 2024, light to moderate rainfall received in various parts of the country. The spatial distribution of rainfall is shown in Figure 1. Chief amounts of rainfall was recorded across upper Khyber Pakhtunkhwa (KP) and Khuzdar (Baluchistan). The highest amounts of monthly rainfall are shown in Table1.

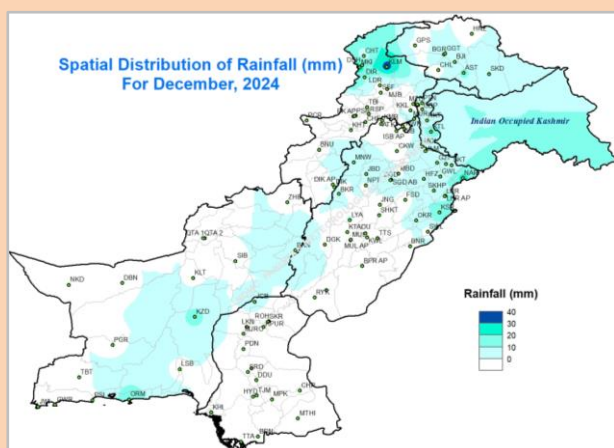


Figure 1: Spatial Distribution of Rainfall

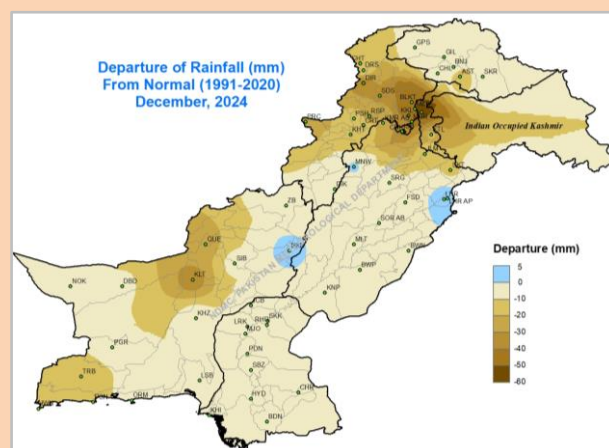


Figure 2: Departure of rainfall from Normal

Figure 2 depicts the departure of rainfall from the normal(1991-2020). Slightly above-normal rainfall was recorded Barkhan, Mianwali and Lahore whereas below normal rainfall reported across the country.

Sr.No.	Station	Rainfall(mm)	Sr.No.	Station	Rainfall(mm)
1	Kalam	33.0	11	Sialkot Airport	9.1
2	Mirkhani	29.6	12	Barkhan	9.0
3	Narowal	21.9	13	Dir	9.0
4	Drosh	16.2	14	Skardu	8.8
5	Kasur	15.6	15	Mianwali Airbase	8.0
6	Kotli	13.0	16	Lahore, City	8.0
7	Ormara	13.0	17	Rawalakot	7.9
8	Lahore, Airport	12.0	18	Gujranwala	7.8
9	Astore	11.1	19	Hafizabad	6.9
10	Khuzdar	11.1	20	Joharabad	6.2

Spatial distribution of mean temperature recorded at PMD stations for the month of December 2024 are shown in Figure 3. During the month, 12°C to 15°C mean temperature was recorded in Punjab, 15°C to 18°C in Sindh, varied from 3°C to 18°C in Balochistan, 3°C to 15°C in KP, -4°C to 3°C in GB and 6°C to 12°C in AJK.

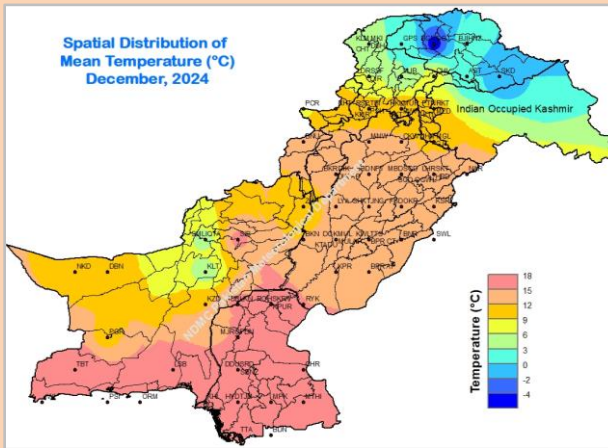


Figure 3: Monthly Mean Temperature (°C)

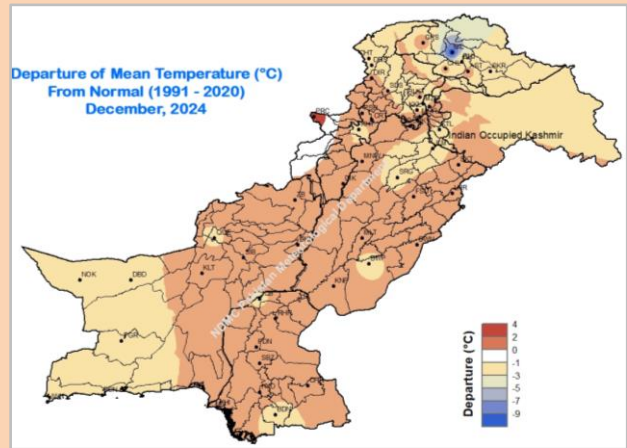


Figure 4: Monthly Departure from Normal

Departure of mean temperature from the normal (1991-2020) is shown in Figure 4, which show above-normal mean temperatures across most part of the country except northern Gilgit Baltistan, western Balochistan, Badin, northwestern Punjab and Bahawalpur where temperature was recorded below normal.

Monthly normal (1991-2020) rainfall and monthly normal mean temperature(°C) for the month of December are shown in the Figures 5 and 6 respectively.

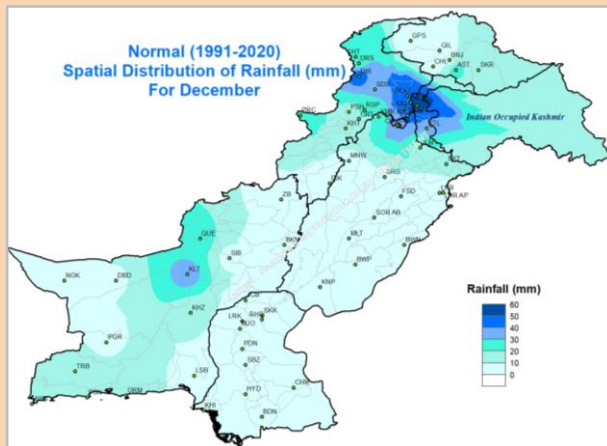


Figure 5: Monthly Normal Rainfall (mm)

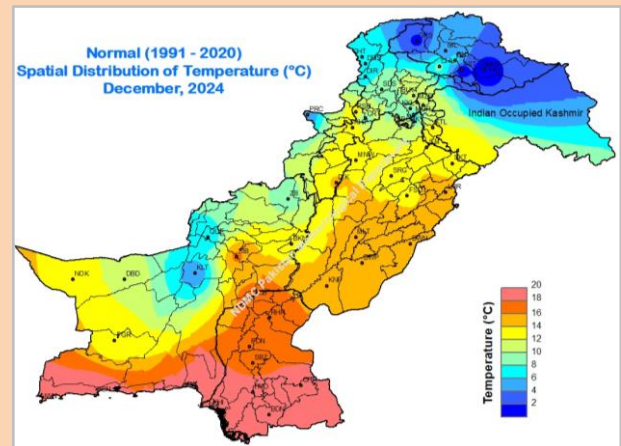


Figure 6: Monthly Mean Temperature (°C)

2. Comparison of Actual to Normal Monthly Rainfall for December

The comparison of actual to normal rainfall (1991-2020) for month of December 2024 are shown in Figure 7 (a) for Khyber Pakhtunkhwa, Gilgit Baltistan and Azad Jammu & Kashmir in Figure 7 (b), Punjab in Figure 7 (c), Balochistan in Figure 7 (d), and Sindh in Figure 7 (e).

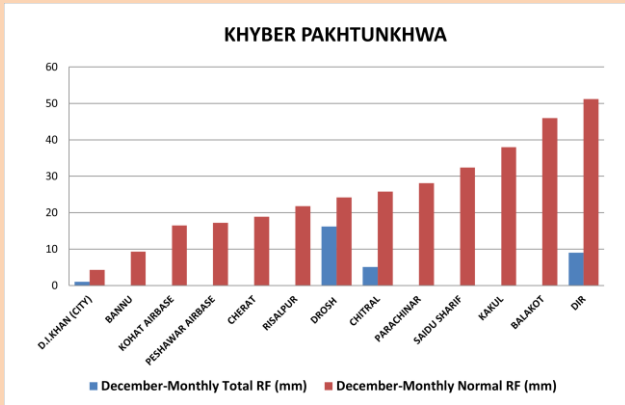


Figure 7a

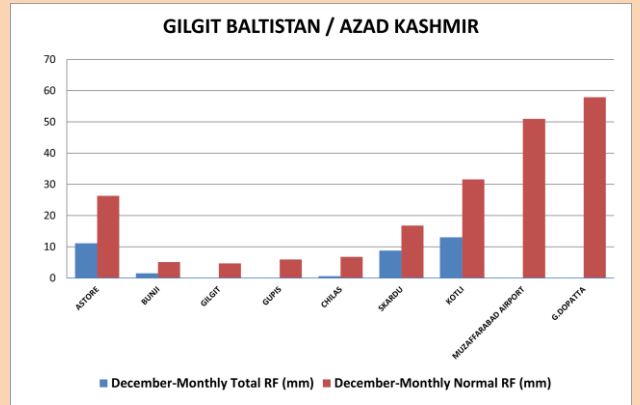


Figure 7b

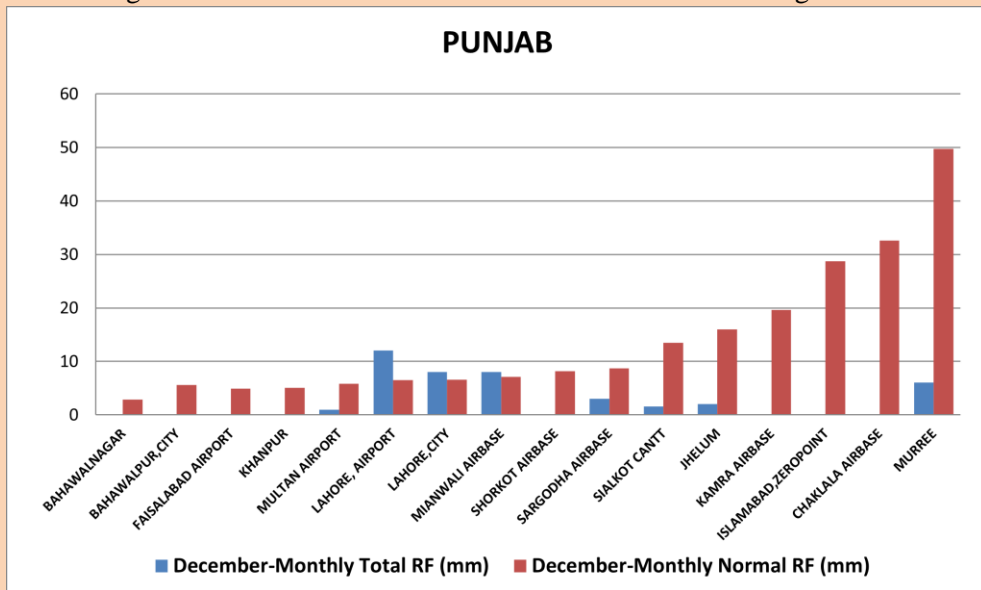


Figure 7c

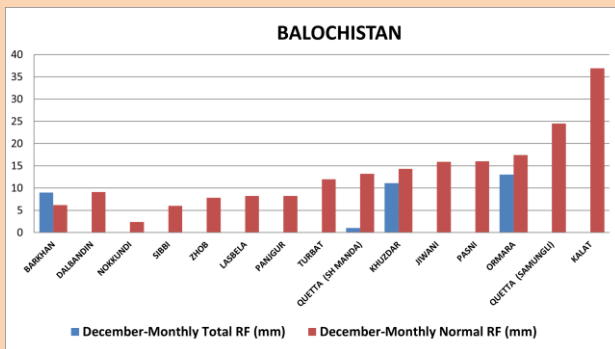


Figure 7d

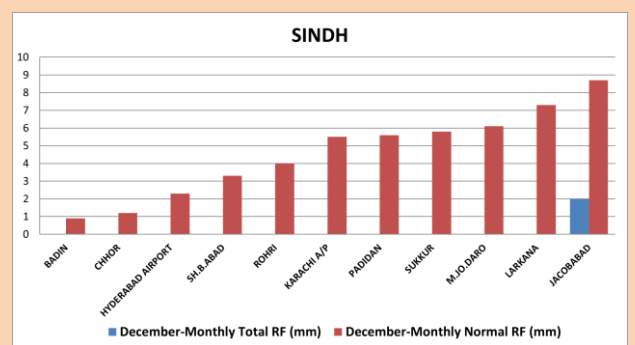


Figure 7e

3. Normalized Difference Vegetation Index (NDVI)

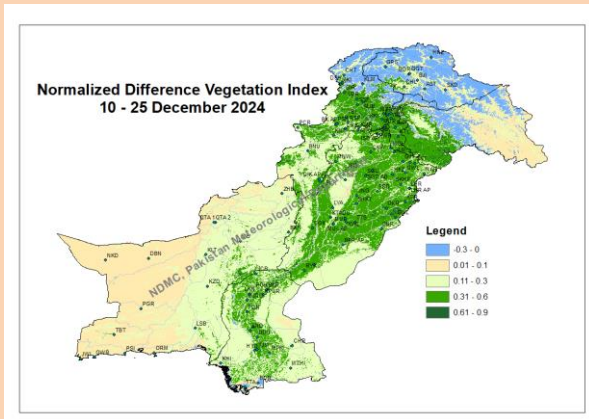


Figure 8: NDVI

Normalized Difference Vegetation Index values for December 2024 are shown in Fig.8. NDVI conditions are high in AJK, Punjab, Khyber Pakhtunkhwa, and along the Indus belt, depicting the widespread vegetation in fields. Such condition nourish the chlorophyll content stored in the plants and enhance the vegetation cover over the fields.

4. Land Surface Temperature (LST)

Land Surface Temperatures (LST) for the period 10 to 17 December 2024 are represented in Figure 9. The central parts of the country (South Punjab, Northeastern Sindh) observed the average daytime temperatures between 10-20°C, while in western parts of Balochistan, the temperature was recorded between 20-25°C during the period.

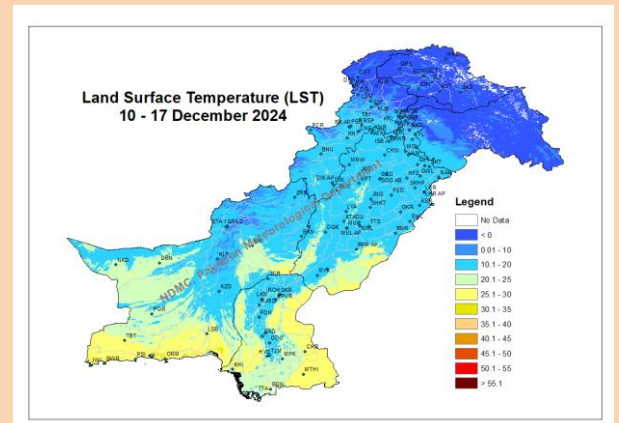


Figure 9: LST (°C)

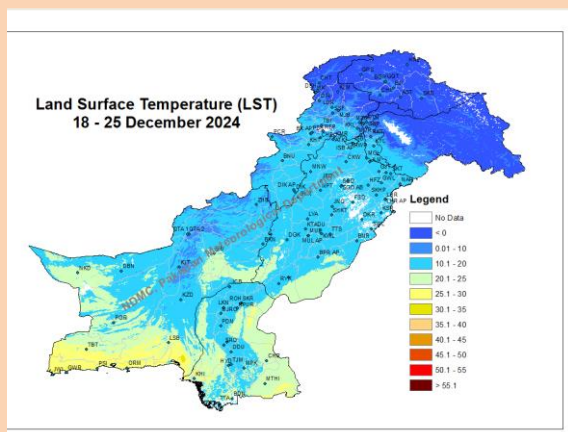


Figure 10: LST (°C)

Land Surface Temperatures during the period 18 to 25 December are shown in Figure 10. The country experience decrease in temperature over western Baluchistan, Sindh and southeast Punjab.

5. Temperature Vegetation Dryness Index (TVDI)

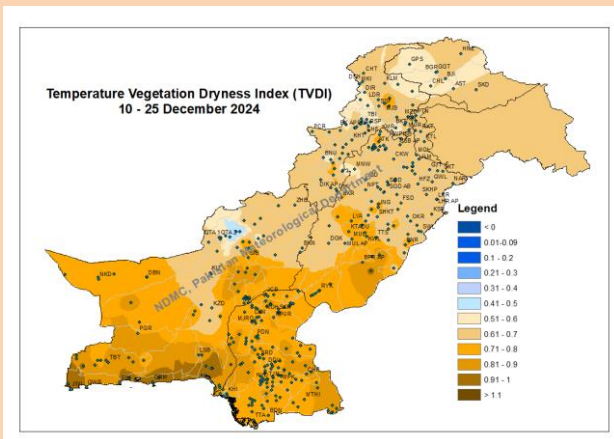


Figure 11: TVDI

Temperature Vegetation Dryness Index (TVDI) derived from MODIS data sets MOD13A2 (NDVI) and MOD11A2 (LST) is shown in Figure 11, which indicates moderate dry like conditions in the west Balochistan, Sindh and Bahawalpur (Punjab) as highlighted by the TVDI Index. It indicates the start of dryness and deficient soil moisture conditions in the western parts and coastal areas of Balochistan.

6. Length of Consecutive Dry Days:

The maximum length of consecutive dry days (CDD) is shown in Figure 12. Number of consecutive dry days has increased from 81 to 228 days across western Balochistan (Nokundi, Dalbandin), while southeast Punjab and most of the Sindh experienced 30 to 80 dry days.

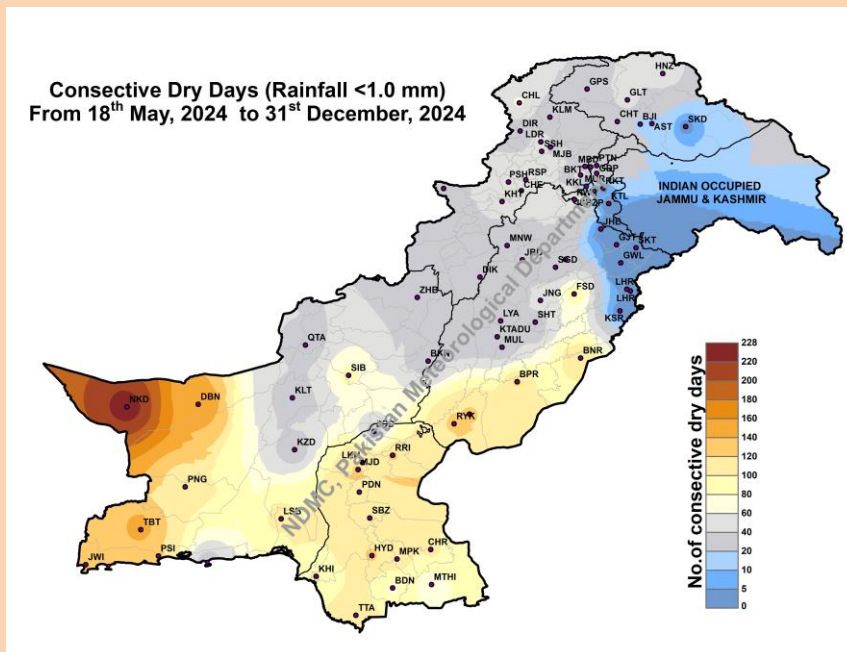


Figure 12: No. of consecutive dry days

7. Drought Monitor for the Month of December 2024

Based on the different drought monitoring indices as narrated above and ground station data observed by the Pakistan Meteorological Department Network across the country, the spatial drought monitor map is represented in Figure 13 below.

Western parts of Balochistan are experiencing moisture stress due to below-average rainfall over the past three months. Additionally, moisture stress is also developing in southeast Punjab, most parts of Sindh as well as the Potohar region.

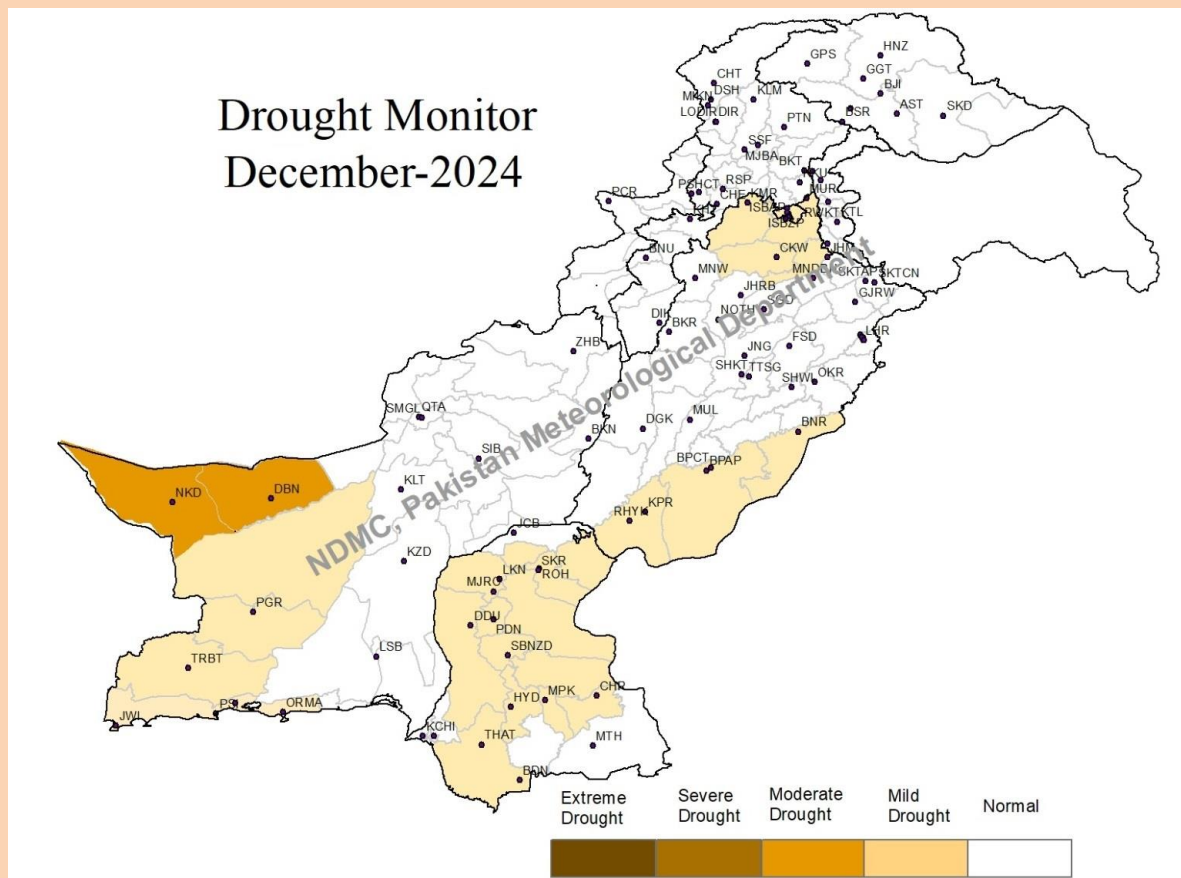


Figure 13: Drought Monitor of Pakistan for the month of December 2024

8. Water availability/ Dams flow data:

During the month of December 2024, water inflow, outflow and levels of the Rawal, Khanpur, Tarbela and Mangla dams are shown in Figure 14. The water level at Mangla, Tarbela and Khanpur reservoirs has started to decrease due to less amount of rainfall received during the month. However, the water level in Rawal Dam remained unchanged.

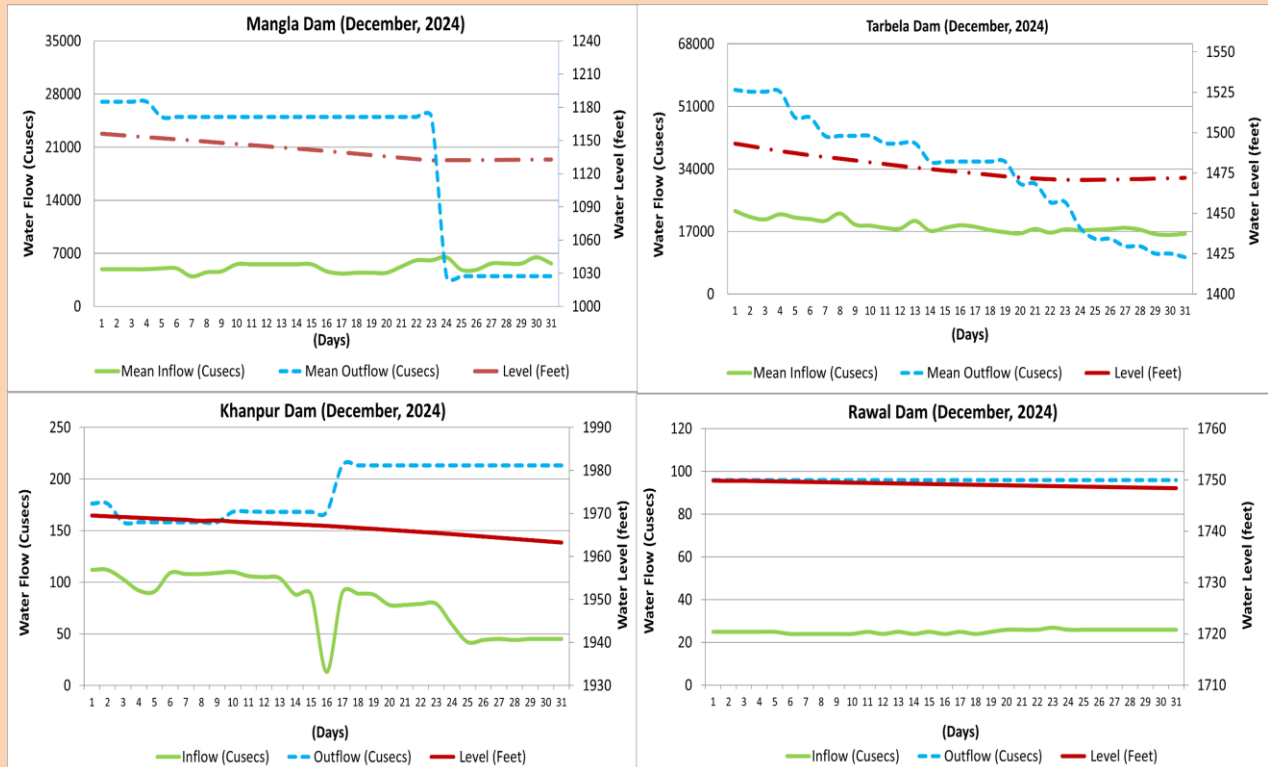


Figure 14: Water inflow, outflow and level of Rawal, Khanpur, Tarbela and Mangla Dams

9. Weather Outlook for January 2024

During January 2024, overall near-normal rainfall is expected all over the country. A tendency for slightly above normal rainfall is expected in central Khyber Pakhtunkhwa along with North and East Punjab during January 2025. However, the southern parts of the country, are expected to receive near normal rainfall

Mean temperatures are expected to remain above normal nationwide, with maximum departure over Kashmir and adjoining areas of Gilgit Baltistan, Khyber Pakhtunkhwa.

10. Drought Outlook for January 2024

Keeping in view the forecast for January 2024, near normal rainfall is expected which may improve soil moisture conditions except in the southwestern areas of the country where there is forecast of below normal rainfall which may cause soil moisture deficit.

All stakeholders across the country are advised to make efforts to save and judicious use of the available water so that the stored water may be utilized in the upcoming months of deficient rainfalls.

11. Crop Condition

- Punjab: Harvested Kharif crops like rice and maize, while preparing fields for Rabi crops such as wheat and vegetables.
- Sindh: Sowing of Rabi crops like wheat and vegetables began, but dry conditions indicated water stress.
- Khyber Pakhtunkhwa: Harvested early maize, prepared land for wheat, and sowed vegetables like cauliflower and onions.
- Baluchistan: Satisfactory conditions for crops and orchards, with fruit harvesting and pulse sowing for Rabi season.
- Gilgit Baltistan: Potatoes and maize growing normally.

12. Advice for Farmers

- Reasonable soil moisture is available due to above normal rains during monsoon season. Further, soil moisture may improve due to slightly above normal rainfall.
- Isolated showers / hails/ windstorm may disrupt the harvesting activities of Kharif crops, particularly in the northwestern parts of the country.
- In addition to a gradual fall in temperature during the next month, slightly near normal rainfall (snowfall on hills) is expected in most parts of the country, especially in the upper regions.
- Considerable amount of water would be available for irrigation particularly over the upper half, during the forecast period.
- However, judicious use of available water stock is recommended for the lower half of the country.

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