

# **Monthly Drought Bulletin for the Month of June 2024**



## **National Drought Monitoring Centre (NDMC)**

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## Table of Contents

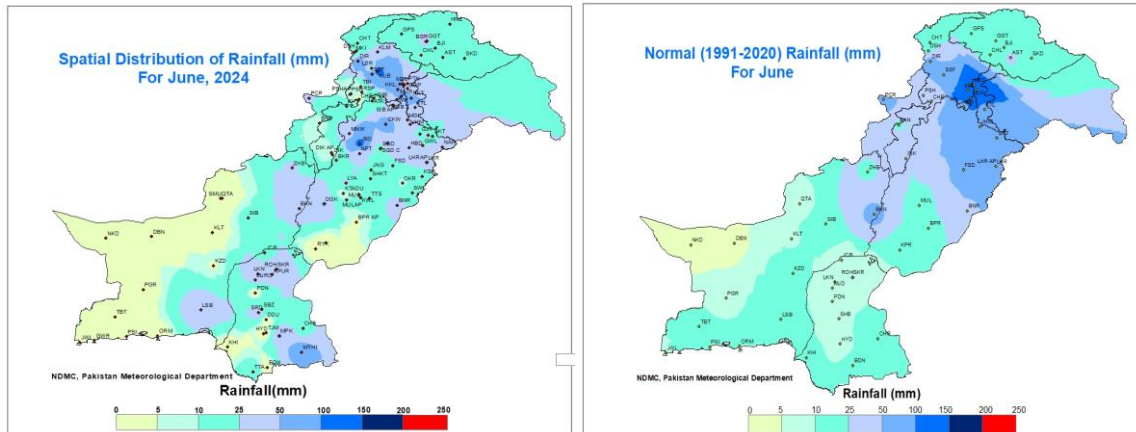
Contents	Page
1. Weather Summary for the Month of June, 2024	4
2. Monthly Rainfall and Temperature Analysis	5
2.1 Mean Temperature Comparison	5
2.2 Provincial Comparison of Stations Rainfall (mm)	6
2.3 Stations with Maximum Rainfall During the Month	7
3. Temperature Vegetation Index (TVDI)	8
4. Normalized Difference Vegetation Index (NDVI)	8
5. Length of Consecutive Dry Days	9
6. Satellite-Based Surface Soil Moisture	9
7. SPI and SPEI Analysis	10
8. Water Availability/ Dams Flow Data	12
9. Drought Situation Analysis	13
10. Weather Outlook for July, 2024	14
11. Drought Outlook for July, 2024	14
12. Crop Condition	14
13. Advice for Farmers	15

## Highlights

- During the month of June 2024, light to moderate rainfall events were reported across the country except western part of the Baluchistan.
- During the month of June 2024, normal to above-normal mean temperatures were recorded in most parts of the country. The mean temperature anomalies were in range from -8.0 to 3.0°C in the country.
- Seasonal forecast predicts July 2024 rainfall to be near normal nationwide. The daytime maximum temperature is expected to be nearly normal however northern Khyber Pakhtunkhwa and Gilgit-Baltistan may experience warmer than normal maximum temperature during the season.
- Based on SPEI, SPI, NDVI, TVDI, GRACE Soil Moisture, mild drought may be observed in Nokkundi and Dalbandin (Balochistan).
- Flash Drought like conditions will dissipate due to expected monsoon rains in the affected areas of Sindh, Balochistan and southern region in Punjab.
- Keeping in view the weather forecast for the month of July 2024, disaster management authorities are advised to plan disaster risk management (DRM) activities accordingly.

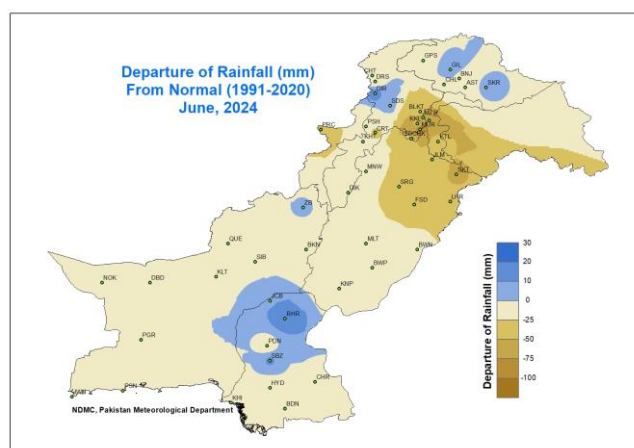
## 1. Weather Summary for the Month of June, 2024

During the month of June 2024, light to moderate rainfall events reported across the country, where as western Baluchistan remained dry. Malam Jabba Jauharabad and Balakot received highest rainfall 132mm and 119.6 and 85mm respectively as shown in Figure 1. The chief amounts of monthly rainfall recorded across Pakistan during June 2024 are shown in Table 1. Figure 2 depicts the normal rainfall for the month of June 2024.



**Figure 1:** June 2024 Spatial Distribution of Rainfall **Figure 2:** June Normal (1991-2020) Rainfall

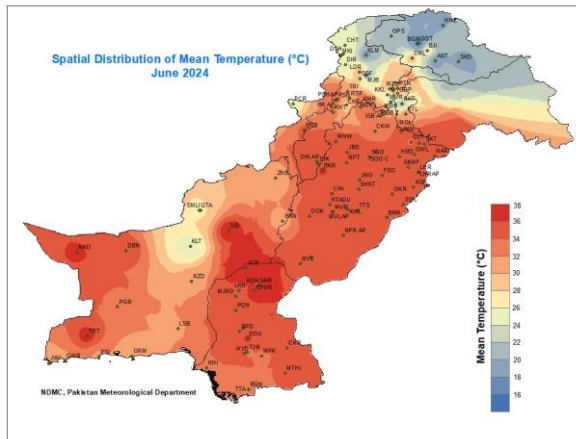
Figure 3 shows the departure of rainfall from the normal. Significantly below normal rainfall was reported in most parts of the country except Rohri, Jacobabad, Shaheed Benazirabad, Zhob, Saidu Shareef, Dir, Gilgit and Skardu.



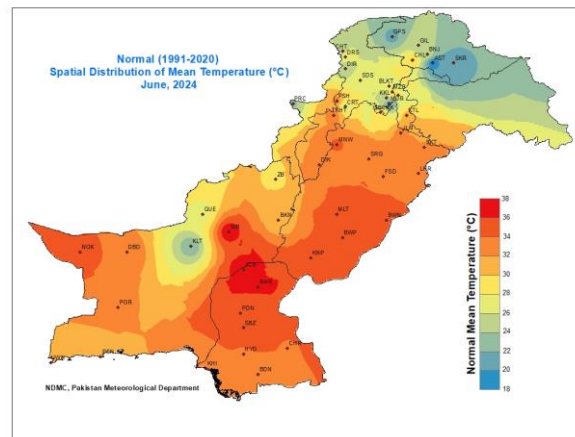
**Figure 3:** Departure of rainfall from Normal (1991-2020)

## 2.1 Mean Temperature Comparison

During the month of June 2024, spatial distribution of mean temperature recorded at PMD stations for the month of June 2024 is shown in Figure 4, while Figure 5 depicts the normal (1991-2020) temperature climatology for the month. During the month southern parts of the country maximum mean temperature crossed 38°C.

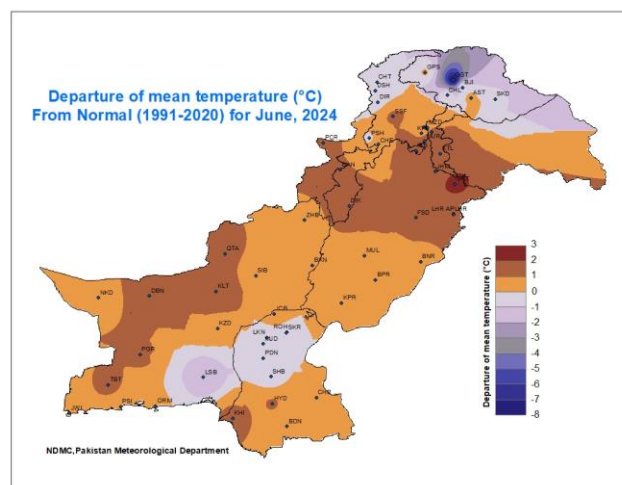


**Figure 4:** Mean Temperature (°C) June 2024.



**Figure 5:** Normal (1991-2020) mean temperature (°C)

Departure of mean temperature from the normal (1991-2020) is shown in Figure 6, which show normal to above-normal mean temperatures across most part of the country, while some areas like Lesbella and Shaheed Benazirabad, Larkana, Paddidan and northern part of KP and Gilgit Baltistan observed below normal mean temperature during the month.



**Figure 6:** Departure of Temperature (°C) from Normal

## 2.2 Provincial comparison of stations rainfall (mm)

The comparison of actual rainfall to normal (1991-2020) for the month of June 2024 for Khyber Pakhtunkhwa is shown in Figure 7 (a), 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). All provinces received below normal precipitation as shown by the graphs.

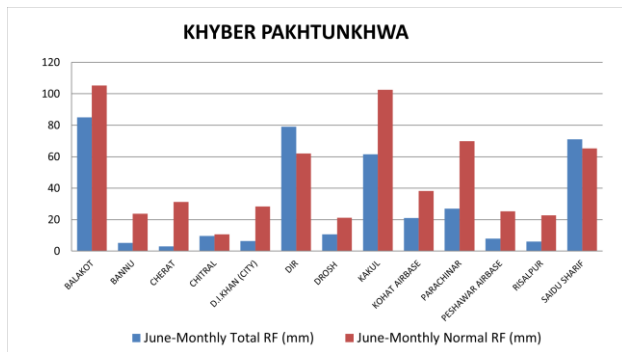


Figure 7a

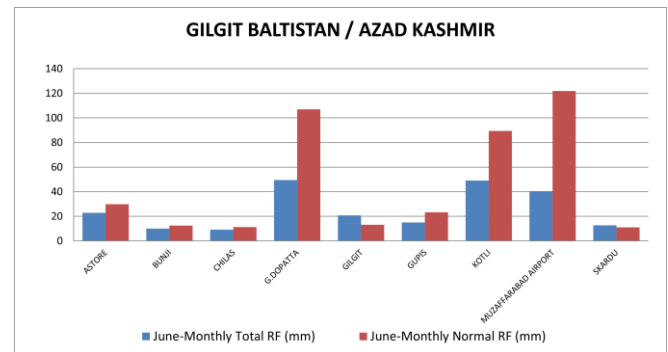


Figure 7b

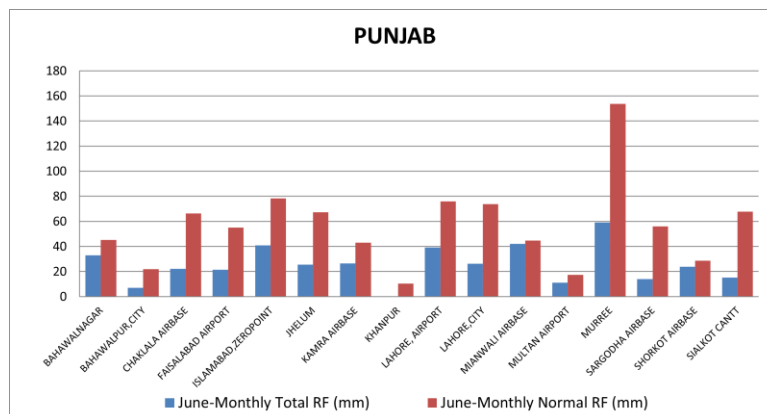


Figure 7c

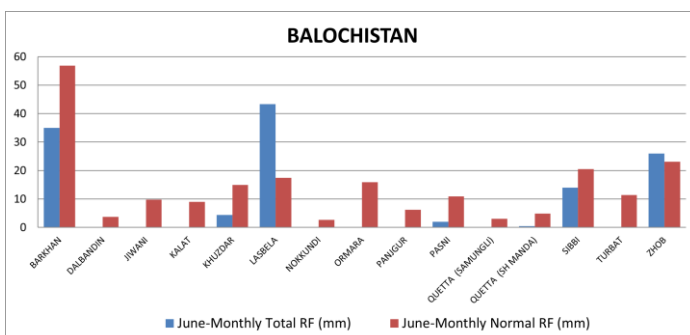


Figure 7d

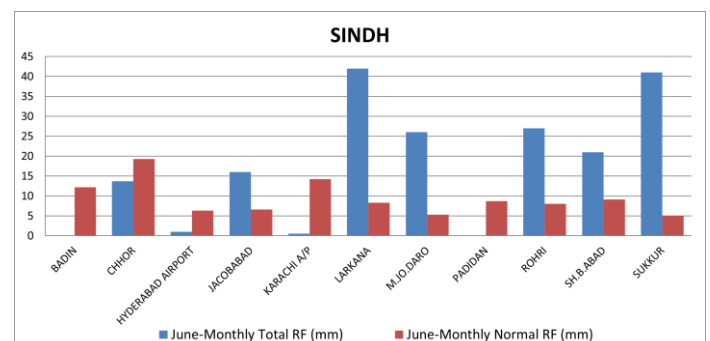


Figure 7e

### 2.3 Stations with Maximum Rainfall During the Month

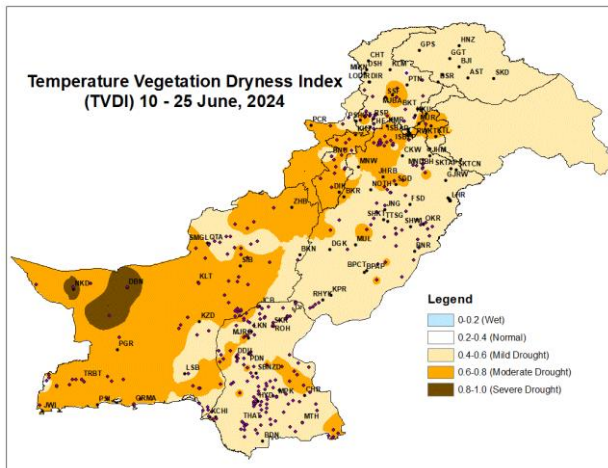
Highest rainfall stations are shown in Table1 below. Malamjabba, Jauharabad, Balakot, Dir, Saidu Sharif and Mithi received maximum amount of rainfall 132.0mm, 119.6mm, 85.0mm, 79.0mm, 71.0mm and 70.0mm respectively. The detailed data about maximum rainfall is displayed in the below table.

**Table 1:** Chief amount of rainfall recorded across Pakistan during the month of June, 2024.

Sr. No.	Station	Rainfall(mm)	Sr. No.	Station	Rainfall(mm)
1	Malamjabba	132.0	11	Mirpur Khas	53.0
2	Joharabad	119.6	12	D.G Khan	51.4
3	Balakot	85.0	13	Rawalakot	51.0
4	Dir	79.0	14	G. Dupatta	49.5
5	Saidu Sharif	71.0	15	Kotli	49.0
6	Mithi	70.0	16	Muzaffarabad City	46.2
7	Chakwal	65.6	17	Sakrand	44.0
8	Kakul	61.6	18	Hafizabad	43.4
9	Murree	59.0	19	Lasbela	43.3
10	Mandibhauddin	53.0	20	Narowal	42.82



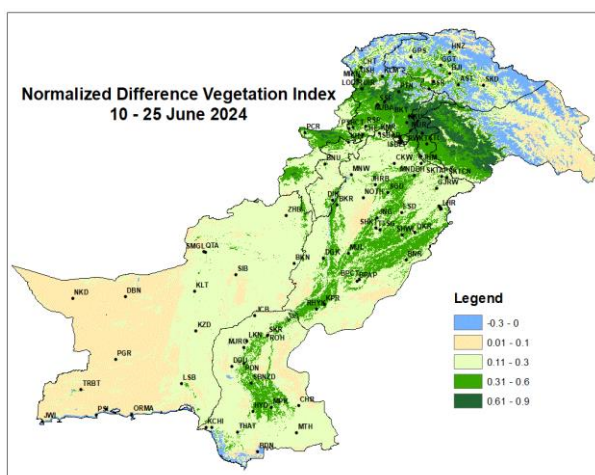
### 3. Temperature Vegetation Dryness Index (TVDI)



**Figure 8:** Temperature vegetation dryness index (TVDI)

Temperature Vegetation Dryness Index (TVDI) derived from MODIS products MOD12A2 (NDVI) and MOD11A2 (LST) is shown in Figure 8, which indicates moderate dry conditions showing the dryness and soil moisture deficit over isolated parts of the country particularly over south western parts of Balochistan, like Dalbandin and Nokkundi Pakistan.

### 4. Normalized Difference Vegetation Index (NDVI)

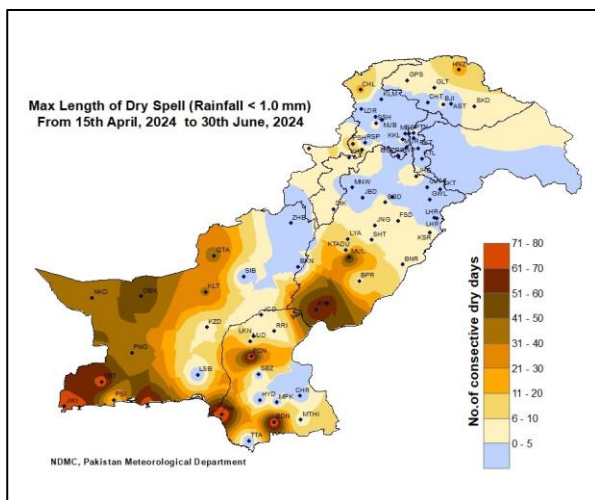


**Figure 9** Normalized difference vegetation index (NDVI)

Normalized Difference Vegetation Index values for June 2024 are shown in Figure 9. NDVI conditions in AJK, Punjab, Khyber Pakhtunkhwa, and along the Indus Belt are good, while in rest of the areas NDVI have improved due to some good rainfall events during the period.



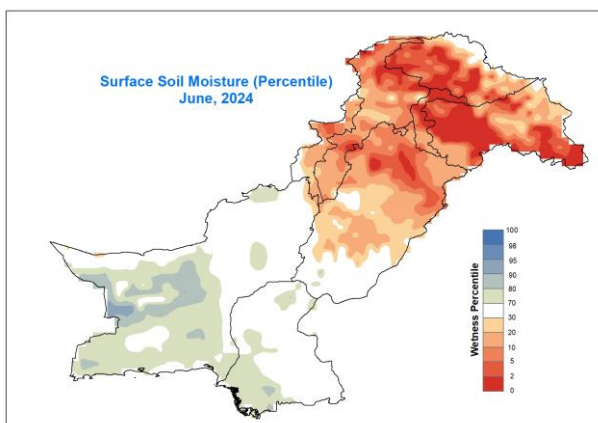
## 5. Length of Consecutive Dry Days



**Figure 10:** No. of consecutive dry days

The maximum length of consecutive dry days spell with rainfall, 1.0 mm is shown in Figure 10. Number of consecutive dry days has reached from up to 70-80 days in few districts of Sindh, coastal Balochistan and Rahim Yar Khan in Punjab. This may be because there is very sparse observational network of rain gauges.

## 6. Satellite-Based Surface Soil Moisture

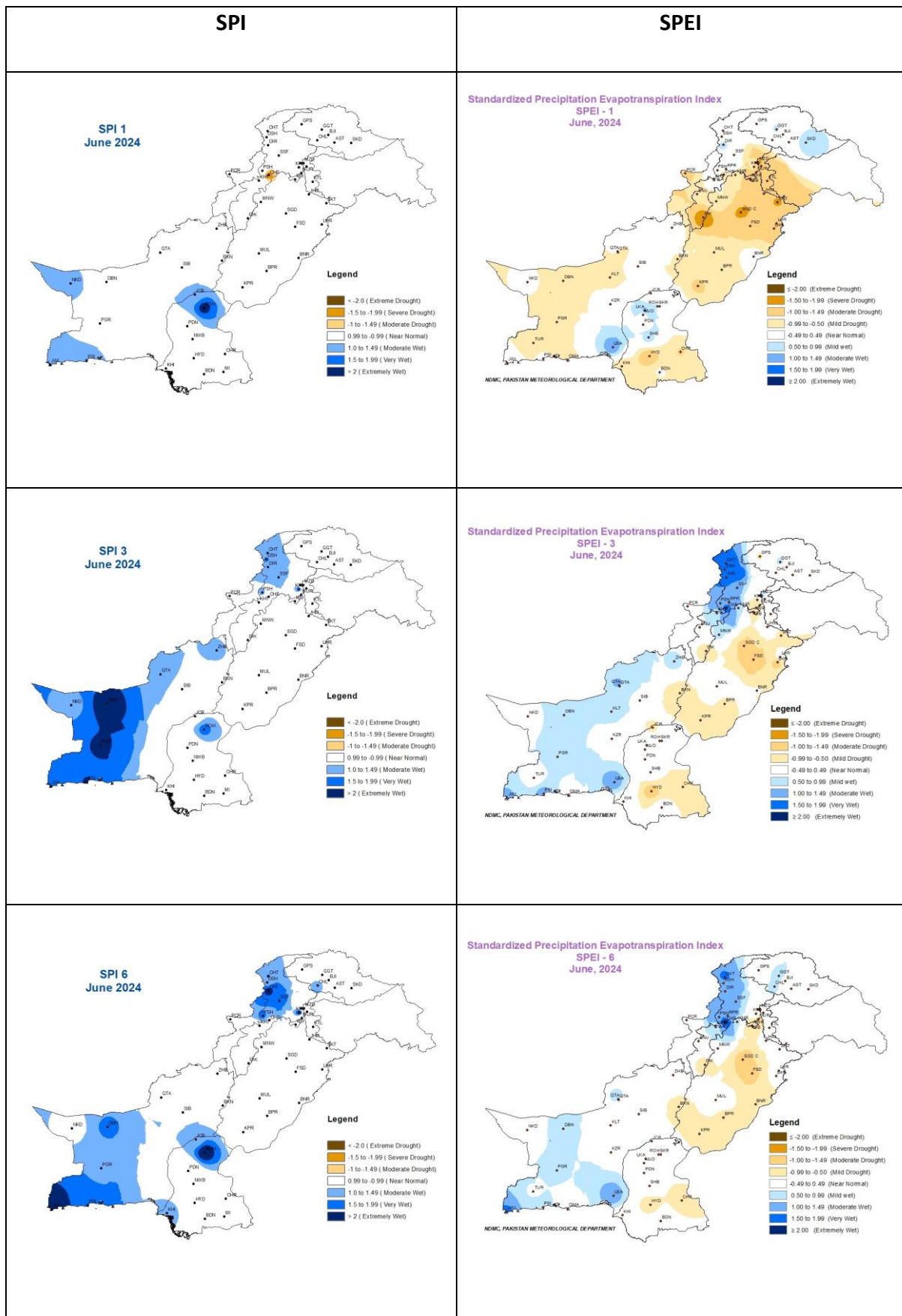


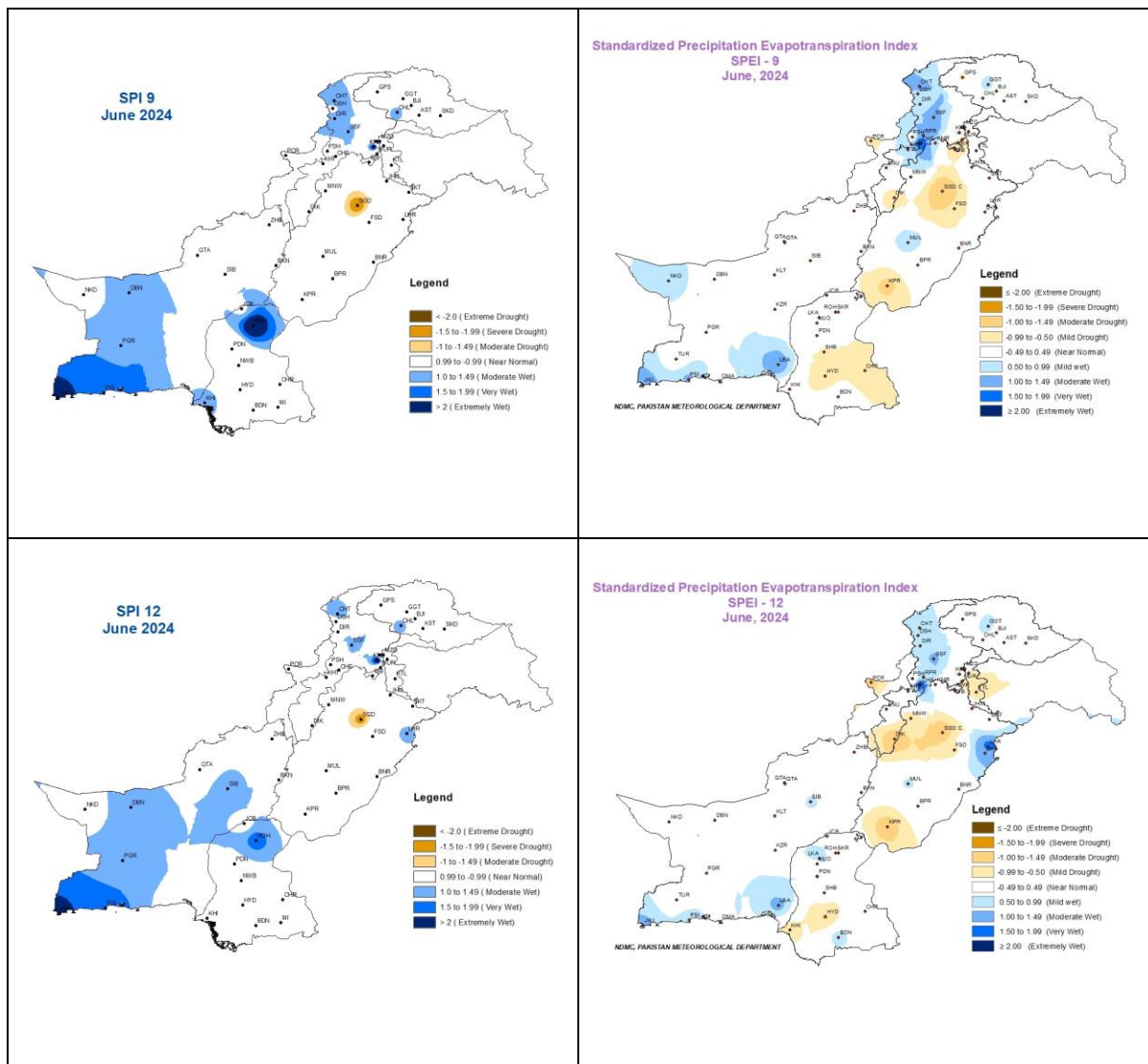
**Figure 11:** Surface Soil Moisture

Surface soil moisture for June 2024 is given in Figure 11. This product is based on NASA terrestrial water storage observations derived from GRACE-FO satellite data and integrated with other observations. It describes current wet or dry conditions, expressed as a percentile showing the probability of occurrence for that particular location and time of year, with lower values (warm colors)

meaning dryer than normal, and higher values (blues) meaning wetter than normal. Wetness percentiles are relative to the period: 1948-2012.

## 7. SPI and SPEI Analysis



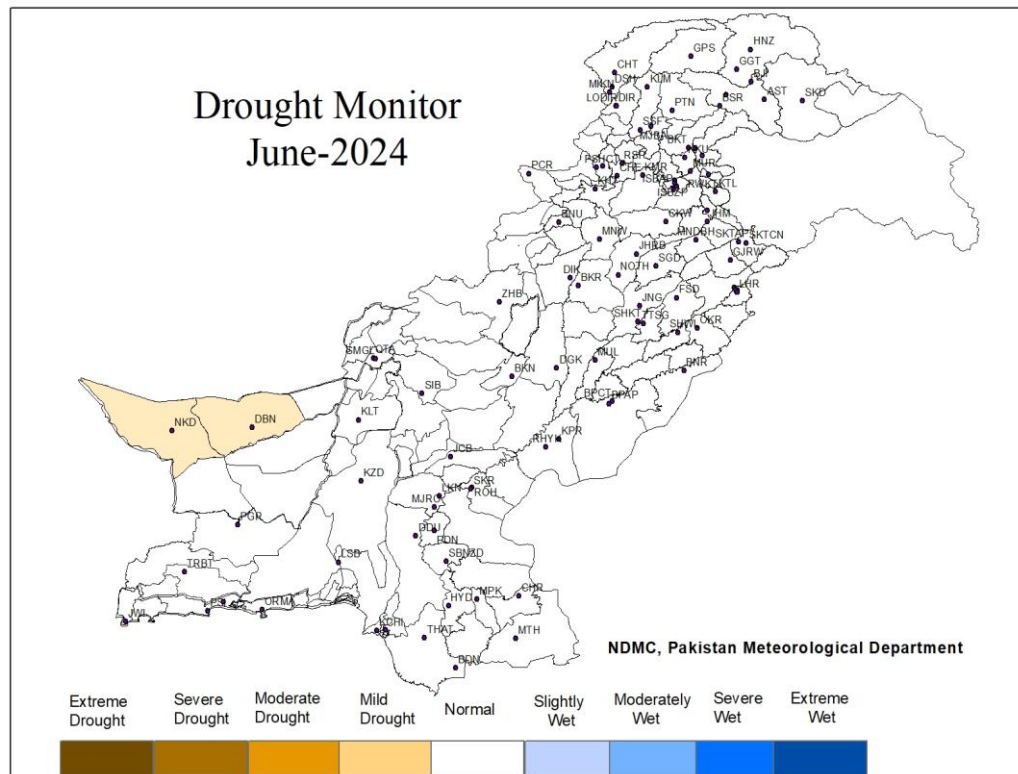


**Figure 12 SPI and SPEI Analysis**

Figure 12 draws the comparison between Standardized Precipitation Index (SPI) and Standardized Precipitation Evapotranspiration Index (SPEI), calculated on station data of precipitation and temperature.

## 8. Drought Situation Analysis

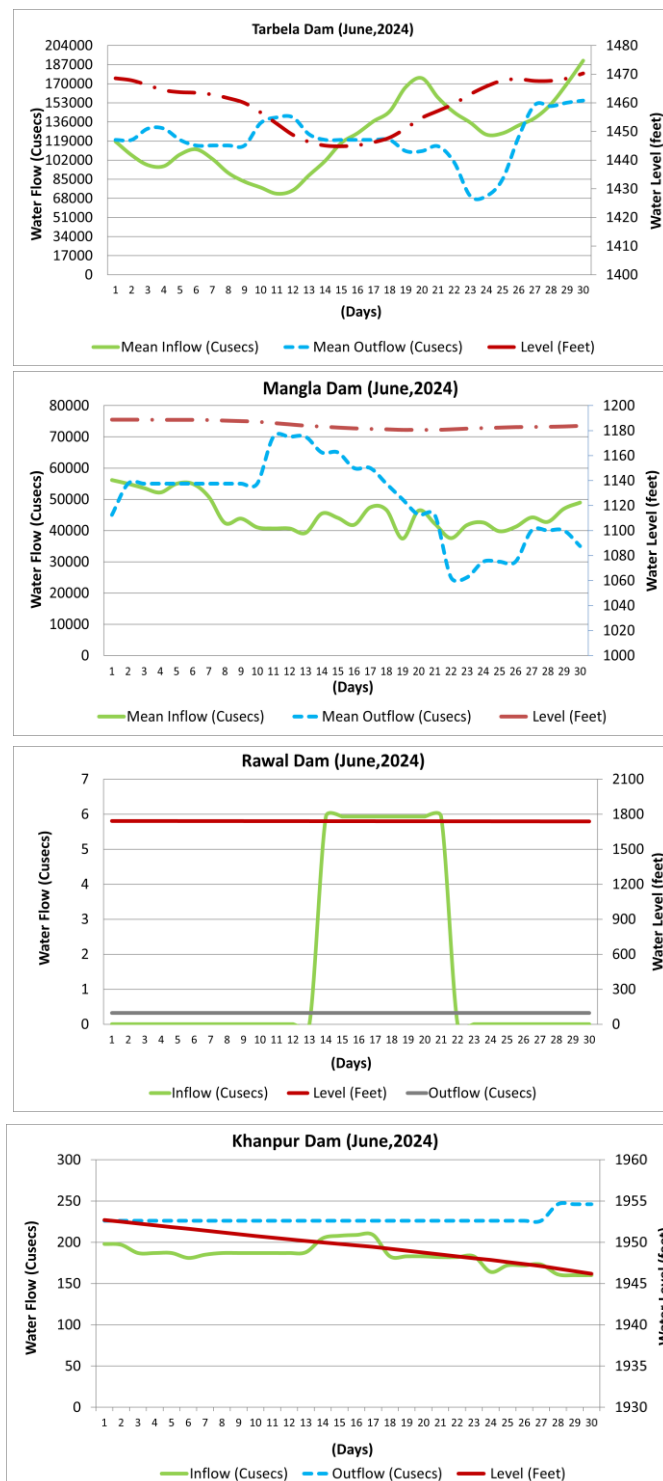
The spatial drought monitor map based on the output results from different drought monitoring indices (e.g Figure 8-12) and Pakistan Meteorological Department ground station data of precipitation and temperature across Pakistan is represented in Figure 13. Mild Drought like conditions may be observed over some parts of Balochistan, while in rest of the area's conditions are normal.



**Figure:13** Drought Monitor of Pakistan.

## 9. Water Availability/Dams Flow Data

The water inflow, outflow and levels of the Rawal, Khanpur, Tarbela and Mangla dams for the month of June 2024 are shown in the four panels of Figure 14. The level at Tarbela remained unchanged at 1473 feet while Mangla reservoir has increased to 1180 feet due to improved water flow as a result of snow melting in their catchment areas. The maximum levels (storage capacity) of the major reservoirs (Tarbela and Mangla) are 1550 feet and 1242 feet respectively. However, no change has been observed at Rawal reservoir.



**Figure 14:** Water inflow, outflow and level of Rawal, Khanpur, Tarbela and Mangla Dam.

## **10. Weather Outlook for July 2024**

During the month of July 2024, as per the outlook normal to above normal rainfall is expected in most parts of the country, with maximum departure over central to northern Punjab and southern Sindh. Northern Khyber Pakhtunkhwa and Gilgit Baltistan may get nearly normal rainfall whereas most parts of Balochistan may get slightly above normal rainfall during the July 2024. Moreover, the second half of the month is expected to be wetter than the first half.

Nationwide, the daytime maximum temperature is expected to be nearly normal however northern Khyber Pakhtunkhwa and Gilgit-Baltistan may experience warmer than normal maximum temperature during the month. Nighttime temperatures are likely to exceed normal levels across most regions of the country, with marked deviation anticipated over northern Khyber Pakhtunkhwa, Gilgit-Baltistan and southwestern Balochistan.

## **11. Drought Outlook for July 2024**

Keeping in view the forecast for July 2024, drought-affected areas of Sindh, Balochistan and southern Punjab will get good relief in continuation to the previous month (June 2024).

All stakeholders are advised to make all efforts to save the water available across rain-fed areas of Sindh, Balochistan and southern Punjab, especially areas under influence of heat wave and plan DRM activities accordingly.

## **12. Crop Condition**

Based on recent extreme heat wave events, the amount of soil moisture available is currently under stress in most parts of the country. Accordingly, the seasonal crops like cotton, peanut, sugarcane, seasonal vegetables and orchards are under water stress and require additional irrigation in most parts of the country major agricultural soils (particularly in the upper half) hold a considerable moisture based on the recently prevailed weather conditions.

### **13. Advice for Farmers**

- I. During the expected monsoon season, strong winds / thunderstorm along with mostly above-normal rains are expected in particular monsoon belt of the country. Accordingly, the irrigation and spray-related activities for cotton, rice, sugarcane, peanut and gram crops may be scheduled following the expected weather conditions.
  - II. During the harvesting, farmers are advised to keep themselves abreast of the weather conditions and keep listening & watching carefully the weather advisories issued through radio and televisions on a regular basis.
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