**GOVERNMENT OF PAKISTAN**
**PAKISTAN METEOROLOGICAL DEPARTMENT**

# *Quarterly Drought Bulletin of Pakistan*
# *April-June 2026*

**National Drought Monitoring and Early Warning Centre**
Post Box No. 1214, Sector H-8/2, Islamabad, Pakistan
URL: https://ndmc.pmd.gov.pk/new/

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## 1. Introduction

Pakistan's latitudinal range contributes to significant variability in rainfall across different seasons. The country's climate exhibits a spectrum from arid to hyper-arid in its lower southern regions, while the northern half ranges from semi-arid to humid. Certain areas experience persistent dry conditions, rendering them vulnerable to drought throughout the year. Prolonged absence of precipitation can exacerbate these conditions, leading to widespread drought impacts. Historically, all provinces of Pakistan have grappled with significant drought events.

In contrast to sudden-onset disasters such as floods, cyclones, and earthquakes, droughts typically develop slowly and last for extended periods. In some cases, however, intense heatwaves can lead to the rapid development of flash droughts. Although its impacts are not immediately apparent, they can affect vast regions and a larger population than other environmental hazards.

The Pakistan Meteorological Department (PMD) established the National Drought Monitoring and Early Warning Centre (NDMC) in 2004-05, following the severe drought of 1999-2002. The primary objective of NDMC is to proactively monitor drought conditions nationwide and issue timely early warnings.

The NDMC operates a central office in Islamabad, complemented by four Regional Drought Monitoring Centers (RDMCs) in Lahore, Karachi, Peshawar, and Quetta. These RDMCs serve as central hubs for gathering, consolidating, and analyzing drought-related data from all regions of the country. To strengthen monitoring capabilities, Automatic Weather Stations (AWS) have been strategically installed, particularly in drought-prone areas. However, maintenance and regular acquisition of data from the remote regions of the country have always posed a significant challenge.

Figure 1 represents the countrywide network of observatories and AWS of Pakistan Meteorological Department. This network ensures sufficient spatial coverage, particularly in drought-prone and vulnerable districts across all four provinces and administrations. The data received from these stations play a vital role in monitoring precipitation trends, validating satellite-based rainfall estimates, and supporting the assessment of drought intensity and spatial extent.

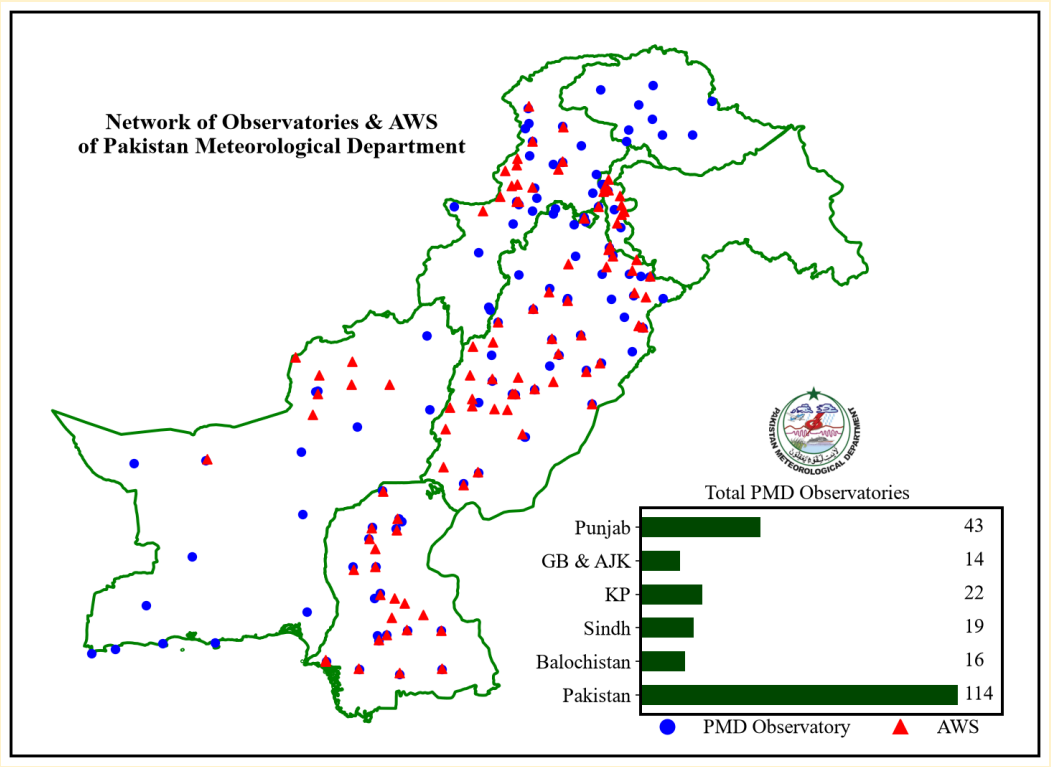


*Figure-1: PMD's observatories & AWS across Pakistan*

## 2. Historical Background

The tropical monsoon climate of the Indian subcontinent is characterized by pronounced variability in rainfall intensity and spatial distribution. Seasonal and regional shifts in atmospheric circulation associated with the monsoon constitute a fundamental component of the region's climatology. Two primary rainfall systems govern the weather patterns: the Southwest Monsoon (SW), which occurs from late June to September, and precipitation associated with mid-latitude westerly disturbances prevailing from December to March.

Pakistan, situated within the monsoon-influenced region of South Asia, receives substantial rainfall during the summer months from the SW monsoon and in winter from western disturbances. The SW monsoon contributes approximately 65% of the country's annual rainfall, primarily between July and September (Waqas and Athar, 2019; Ullah et al., 2021; Ullah et al., 2023). Monsoon rainfall exhibits significant spatial and temporal variability. Droughts in Pakistan mainly arise from deficits in SW monsoon rainfall, while seasonal droughts can also occur due to winter rainfall deficits. Additionally, the strength and variability of monsoon activity are significantly influenced by El Niño and La Niña events.

These droughts around the year 1999-2002 had significantly affected agricultural yield. Major crops experienced a decline of nearly 10% in growth, contributing to an overall negative growth rate of 2.6% for the agricultural sector. The water shortage in Pakistan persisted in 2001-2002, reaching

levels of up to 51% below normal supplies, worsening from the 40% deficit in the previous year (Shahid Ahmad, et al 2004).

Pakistan has experienced several significant drought episodes across its provinces. The Punjab province faced severe droughts in 1899, 1920, and 1935, while the northwestern region of Khyber Pakhtunkhwa (KP) experienced worst droughts in 1902 and 1951. Sindh was affected by major droughts in 1871, 1881, 1899, 1931, 1947, and 1999 (Chandrasekara, S. S. K., et al. 2021). Among the most severe nationwide droughts was the 1999-2002 event, that impacted large parts of Balochistan, Sindh, Punjab, and KP. Recently, in 2025, the western and southwestern parts of Balochistan faced drought conditions due to prolonged rainfall deficit.

Climate change has altered rainfall patterns, increasing variability between wet and dry periods. This has resulted in heavier precipitation during wet spells and reduced rainfall during dry phases (Weng, X., et al. 2024). Consequently, prolonged dry conditions often trigger droughts, whereas intense rainfall events contribute to various types of flooding, including flash floods, urban floods, coastal floods, and riverine floods.

## 3. Rainfall Distribution (April-June 2026)

During the second quarter of 2026 (April-June), Pakistan experienced above-normal precipitation, with a countrywide rainfall departure of 13% from the long-term average. Regionally, Azad Jammu and Kashmir (AJK) recorded a 5% positive departure, Punjab 23%, Khyber Pakhtunkhwa (KP) 15% and Balochistan 10%. In contrast, below-normal departures in precipitation were observed over Gilgit-Baltistan (GB) -17% and Sindh -1%, as depicted in Figure 2.

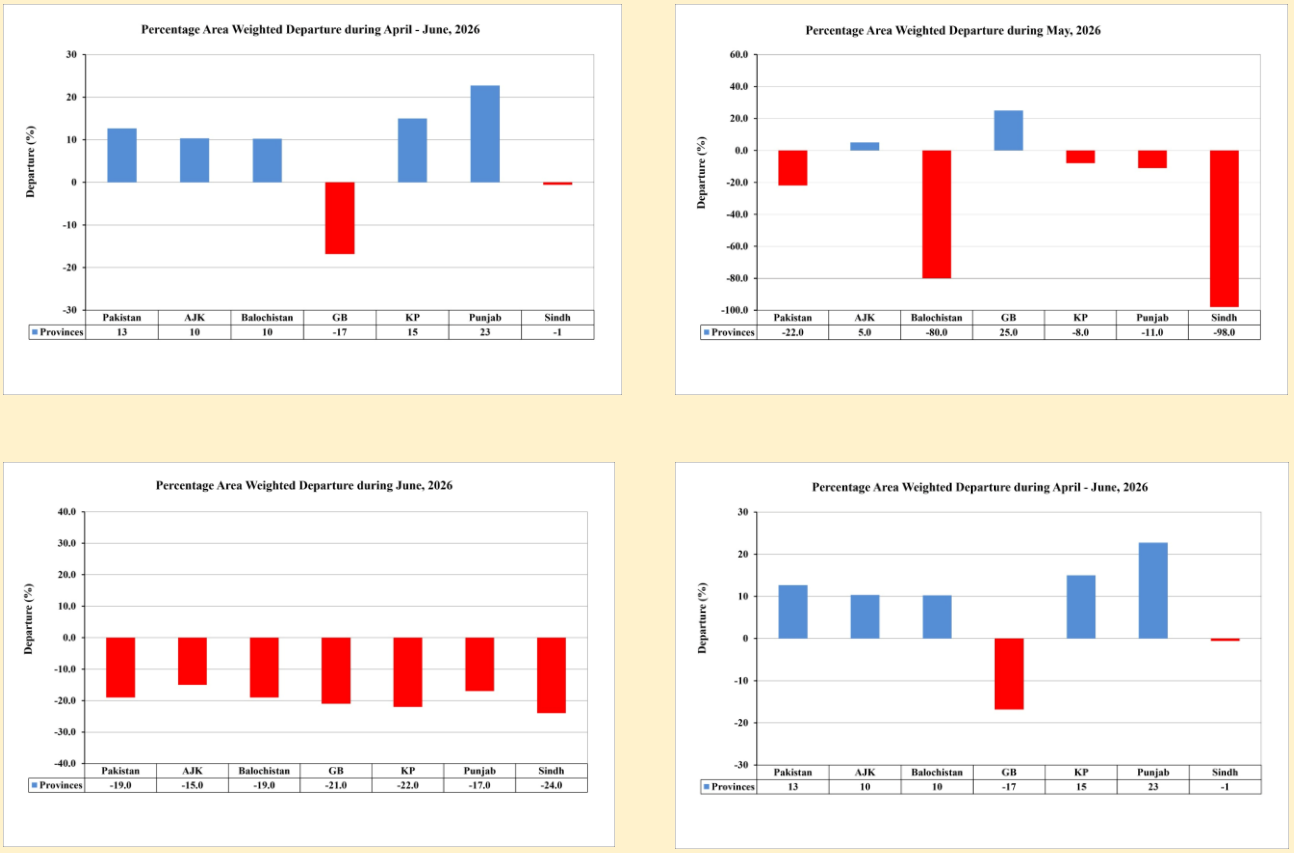


*Figure-2: Percentage area weighted departure of rainfall during April-June 2026*

The quarterly rainfall analysis indicates that overall Pakistan received above-normal rainfall during the second quarter of 2026. Figure 3 illustrates the spatial distribution of rainfall and its departure from normal (1991-2020) for the period April-June. During this quarter, rainfall events occurred across most parts of the country, with the most notable events recorded in the southern parts of KP, AJK, Punjab and northern Balochistan. However, rainfall remained below normal over most parts of GB, upper KP, southwestern Balochistan and parts of southeastern Punjab. The highest rainfall amounts recorded during this period are presented in Figure 4.

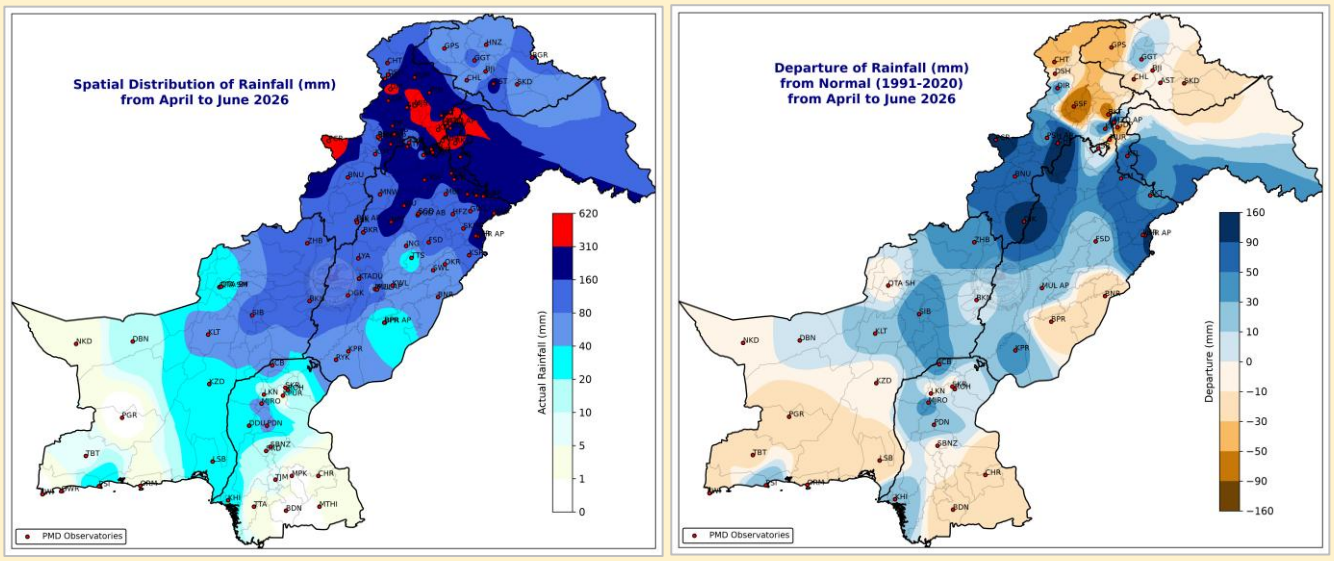


*Figure-3: Spatial Distribution and Departure of Rainfall during April-June 2026*

### 3.1 PMD Stations with Highest Rainfall (mm) (April-June 2026)

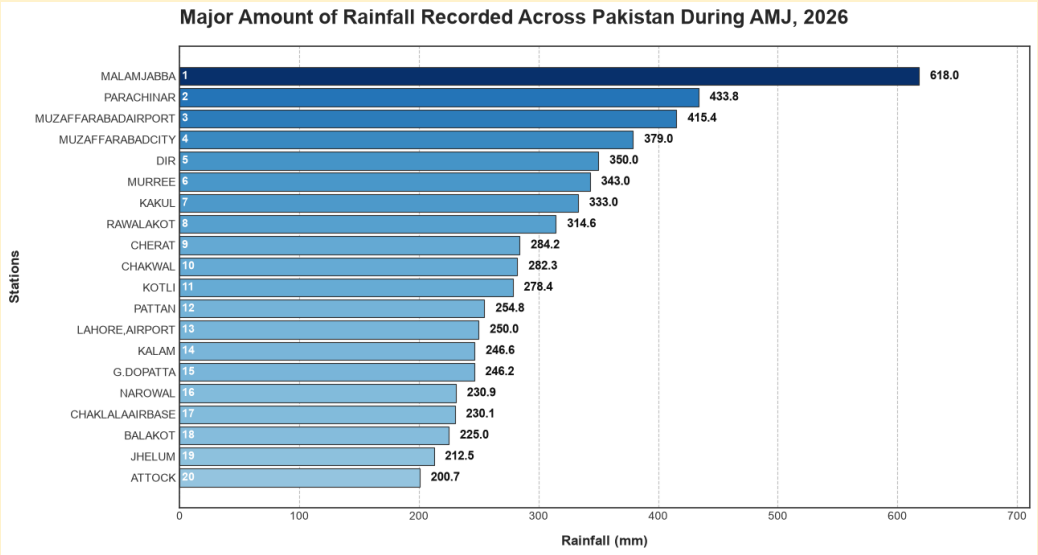


*Figure-4: Major Amount of Rainfall (mm) during April-June 2026*

### 3.2 The Maximum Length of Dry Spell

The maximum length of dry spell, expressed as Consecutive Dry Days (CDD) from 20$^{th}$ March to 30$^{th}$ June 2026, is illustrated in Figure 5. The longest dry spell is currently prevailing in western Balochistan and southern Sindh with Badin having the highest number of CDDs, 103. It is pertinent to note that a daily rainfall threshold of 1.0 mm is used to define the termination of a dry spell at any station.

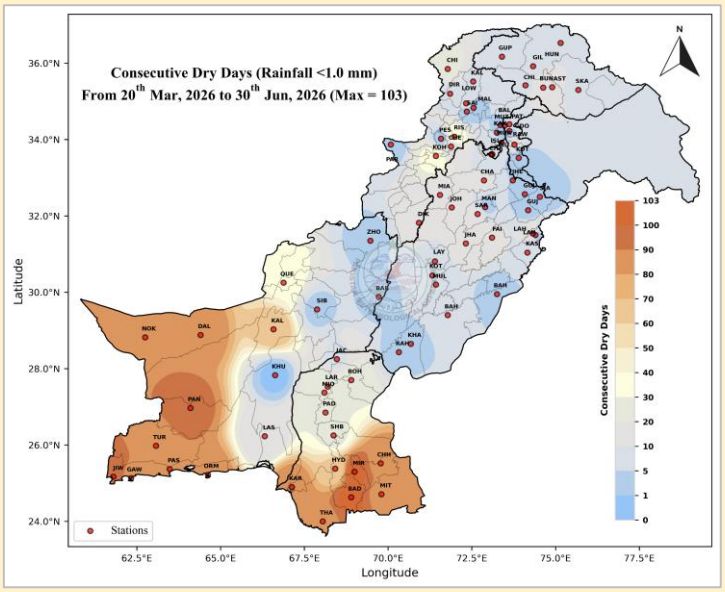


*Figure-5: Maximum Length of Dry Spell up to 30th June, 2026*

# 4. Drought Products

## 4.1 Drought Monitor

The drought monitor map for June 2026 (Figure 6) illustrates the district-wise variation in drought conditions across the country. This composite map is based on meteorological analysis, drought-monitoring indices, and ground-based observations from PMD observatories. At present, normal conditions related to drought are prevailing in the country.

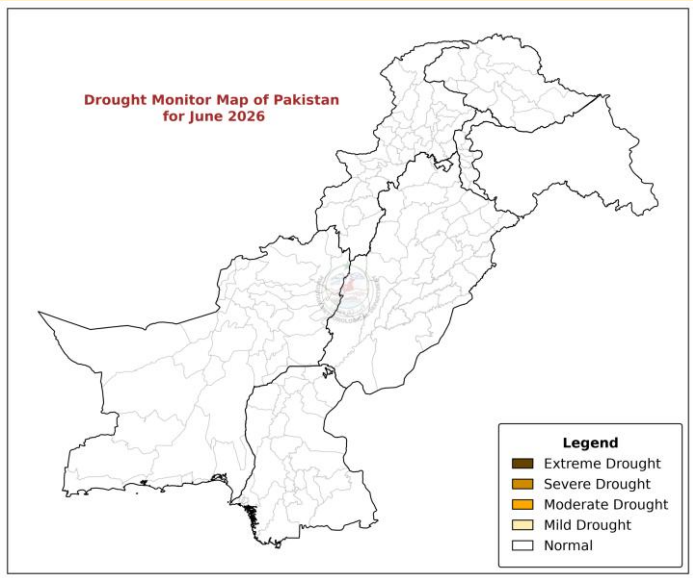


*Figure-6: Drought Monitor for the Month of June 2026*

## 4.2 Standardized Precipitation Evapotranspiration Index (SPEI)

The Standardized Precipitation Evapotranspiration Index at a 3-month timescale (SPEI-3) quantifies the cumulative climatic water balance by integrating precipitation deficits against evapotranspiration demand over the antecedent April-June 2026 period. The spatial distribution reveals a pronounced negative moisture anomaly concentrated over parts of southern Sindh and western Balochistan, indicative of sustained precipitation deficiency compounded by elevated potential evapotranspiration (PET). In light of these prevailing conditions, continuous drought monitoring remains imperative in these regions. Near-normal to wet conditions prevail over parts of Punjab and southern KP, as illustrated in Figure 7.

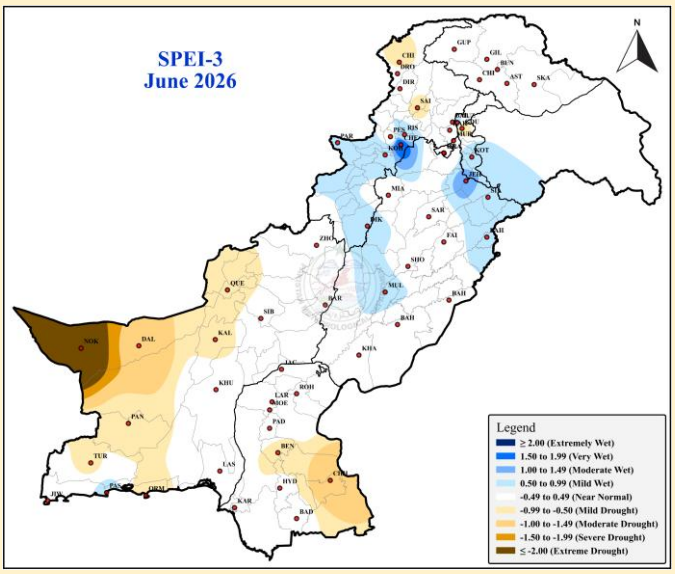


*Figure-7: Standardized Precipitation Evapotranspiration Index (SPEI-3)*

## 4.3 Cumulative Precipitation Anomaly (CPA)

The Cumulative Precipitation Anomaly (CPA) was computed for the period from 1st December 2025 to 30th June 2026 (Figure 8). Notably, upper KP, parts of GB, western Balochistan, parts of Sindh, along with parts of Punjab recorded negative CPA, exhibiting negative anomalies of up to -200 mm. In contrast, most parts KP, Sindh, Balochistan, some parts of Punjab and GB received positive CPA values of up to 300 mm.

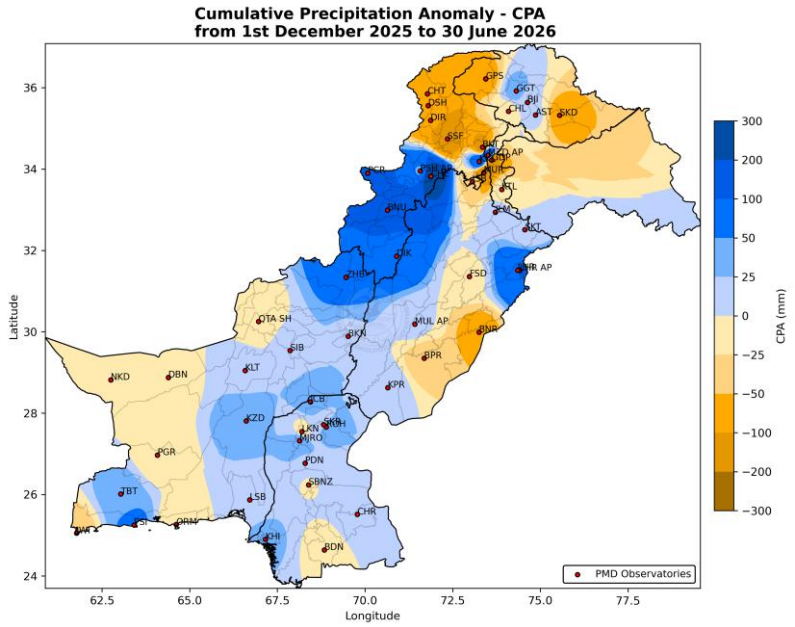


*Figure-8: Cumulative Precipitation Anomaly (Till June 2026)*

### 4.4 Soil Moisture Anomaly (SMA)

Figure 9 illustrates the Soil Moisture Anomaly for April-June 2026 period, derived from NOAA's Leaky Bucket model and represents the deviation of current estimated soil moisture (measured in millimeters) from a long-term historical climatological baseline (1991-2020). It indicates above-normal soil moisture conditions across the country including GB, Sindh, Punjab and most parts of KP and Balochistan. However, soil moisture levels remain notably below-normal in western Balochistan, Murree along with adjoining areas and northern KP.

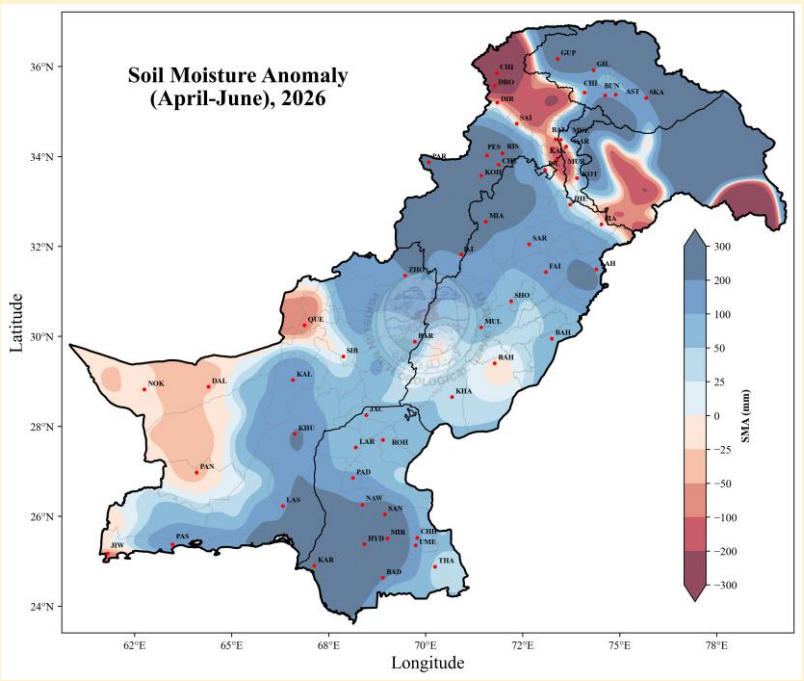


*Figure-9: Soil Moisture Anomaly (April-June 2026)*

## 4.5 Water Level of Reservoirs

Figure 10 presents percent of water level for Tarbela and Mangla dams. Both reservoirs maintained significantly above-average water storage levels throughout April to June 2026, with usable storage consistently ranging above the 21-year historical averages across both facilities. While a steady seasonal decline was observed in Tarbela, a gradual increase was observed in Mangla. This above-normal storage at both major reservoirs is a positive indicator for irrigation water availability.

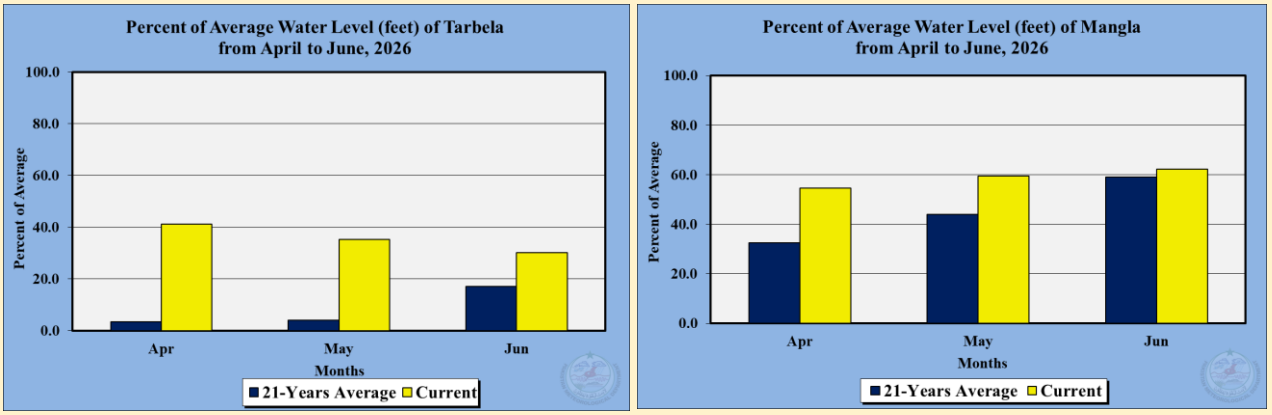


*Figure-10: Percent of the Water Level of Mangla and Tarbela (April-June 2026)*

## 4.6 District-wise Drought Outlook

Currently, normal drought conditions are prevailing over the country. Below-normal rainfall combined with above-normal temperatures is forecasted for the upcoming season (July-August-September 2026). Consequently, mild rainfall deficits may emerge in parts of country particularly in western Balochistan.

## 4.7 Kharif Season Forecast of Mangla and Tarbela Dams (2026)

The forecasted water availability (in MAF) for the two major reservoirs, Tarbela and Mangla, during the Kharif season (April 2026-September 2026) is presented in Figure 11.

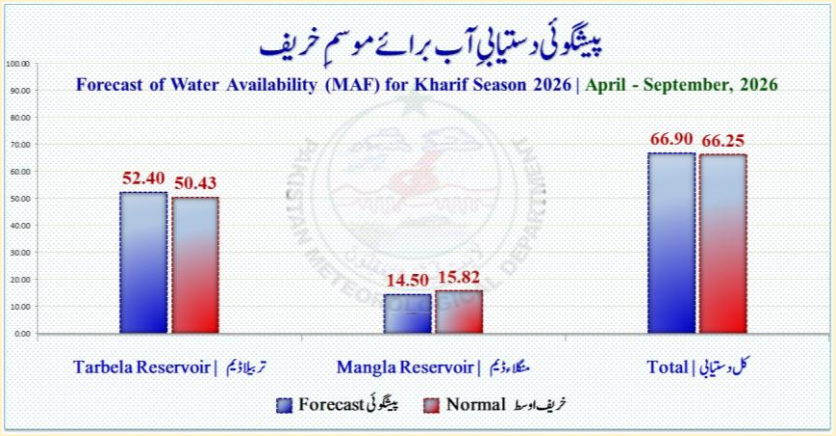


*Figure-11: Kharif Season Forecast of Mangla and Tarbela dams*

## Summary

During the second quarter of 2026 (April to June), Pakistan overall experienced above-normal precipitation with a positive departure of 13%. While Punjab, Balochistan, Khyber Pakhtunkhwa, and Azad Jammu & Kashmir benefited from above-normal rainfall, notable deficits were recorded across Gilgit-Baltistan and Sindh. This uneven pattern contributed to localized dry spells, with consecutive dry days extending up to 103 days in southern Sindh, specifically in Badin and western Balochistan. The SPEI-3 highlights a pronounced negative moisture anomaly concentrated over parts of southern Sindh and western Balochistan, driven by sustained precipitation deficiency compounded by elevated potential evapotranspiration. In contrast, the quarter's rainfall events have supported adequate to above-normal soil moisture across Punjab, Sindh, Gilgit-Baltistan, parts of Khyber Pakhtunkhwa and Balochistan (except western parts). Moreover, the availability of water in major reserves is highly sufficient, with usable water storage in the Tarbela and Mangla dams consistently staying well above their 21-year historical averages throughout the quarter. Currently, normal conditions prevail across the country, whereas anticipated below-normal rainfall and above-normal temperatures in the upcoming season warrant continued monitoring.

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