

GOVERNMENT OF PAKISTAN
PAKISTAN METEOROLOGICAL DEPARTMENT



*Quarterly Drought Bulletin
of Pakistan
April-June 2025*



National Drought Monitoring and Early Warning Centre

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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.

Apart from other natural disasters such as floods, cyclones, and earthquakes, drought sometimes get gradual onset with prolonged duration and sometime as a result of heat waves emerge as flash drought. Its effects are less immediately visible and can extend across vast geographical areas, impacting 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- 2001. The primary objective of NDMC is to proactively monitor drought conditions nationwide and issue timely advisories.

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 focal points for gathering, consolidating, and analyzing drought-related data from across the country. To enhance monitoring capabilities, Automatic Weather Stations (AWS) have been strategically installed, particularly in drought-prone areas. The maintenance and regular acquisition of data from the remote areas of the country has always been a challenge.

NDMC also installed Ordinary Rain Gauges (ORG) network across the country covering most of the vulnerable districts in the four provinces, as illustrated in Figure-1.

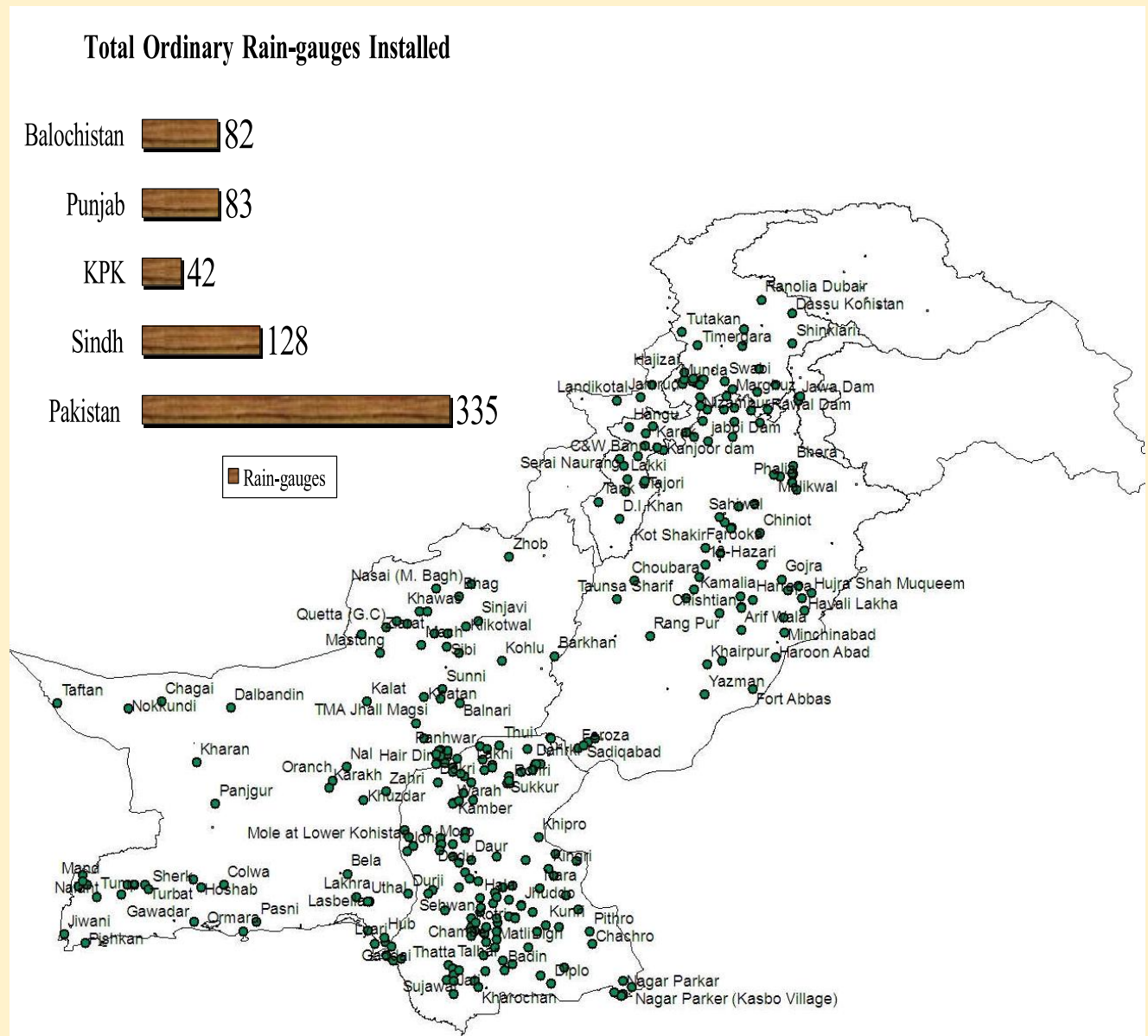


Figure-1: Ordinary Rain-Gauges (ORG) network of NDMC

2. Historical Background

The Indian subcontinent experiences a tropical monsoon climate, characterized by significant fluctuations in rainfall both in quantity and distribution. Feature in addition to this climate are the regional and temporal shifts in atmospheric flow patterns associated with the monsoon. Two primary rainfall systems govern the region: the Southeast or Summer monsoon (from the end of June till September), and the Winter Monsoon/Westerlies (from December to the end of March).

Pakistan, fortunately situated within this region, receives substantial rainfall during the summer months from the Southeast (SE) monsoon and in winter due to western disturbances. The summer monsoon contributes 65% of the annual rainfall in Pakistan from July to September (Waqas, A., et al. 2019). Monsoon rainfall varies widely across both space and time. Droughts in Pakistan primarily result from rainfall deficiencies associated with the southeast monsoon or seasonal droughts due to winter rainfall deficit. Furthermore, there appears to be a correlation between El Niño and La Niña events and weakened monsoon activity.

Pakistan has witnessed several drought episodes with significant impacts across its provinces. The Punjab province experienced severe droughts in 1899, 1920, and 1935. North west of Khyber Pakhtunkhwa (KP) experienced worst droughts in 1902 and 1951, while Sindh faced notable droughts in 1871, 1881, 1899, 1931, 1947, and 1999. Among the most severe nationwide droughts were those in 1999–2000, extending into 2002 (Adnan, S., et al 2016). These droughts significantly affected agricultural output, with a notable setback during 2000–2001. 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 persisted into 2001–2002, reaching levels of up to 51% below normal supplies, compared to 40% in the previous year (Ahmad, S., et al 2004).

Climate change has introduced fluctuations in rainfall patterns, leading to increased precipitation during wet periods and decreased rainfall during dry spells. Consequently, periods of reduced rainfall result in droughts, while heavy rainfall events lead to various types of floods, including flash floods, urban floods, coastal floods, and riverine floods.

3. Rainfall Distribution (April-June) 2025

During the second quarter of 2025 (April-June), Pakistan experienced below-average precipitation, recording a decrease of -09%. During the month of April, significant decrease in rainfall was recorded across the country except GB, specifically in Sindh, Balochistan and Punjab with departures -100%, -98% and -83% respectively. In addition, month of May witnessed an increase in rainfall with a 16% departure overall. Month of June also witnessed above normal rainfall with 31% departure overall across Pakistan. In second quarter, Kashmir, KP, and Balochistan experienced a decrease in rainfall with departures -11%, -41% and -33% respectively.

Overall, the quarterly analysis indicates below-average rainfall across the country. The area weighted rainfall is depicted in Figure 2.

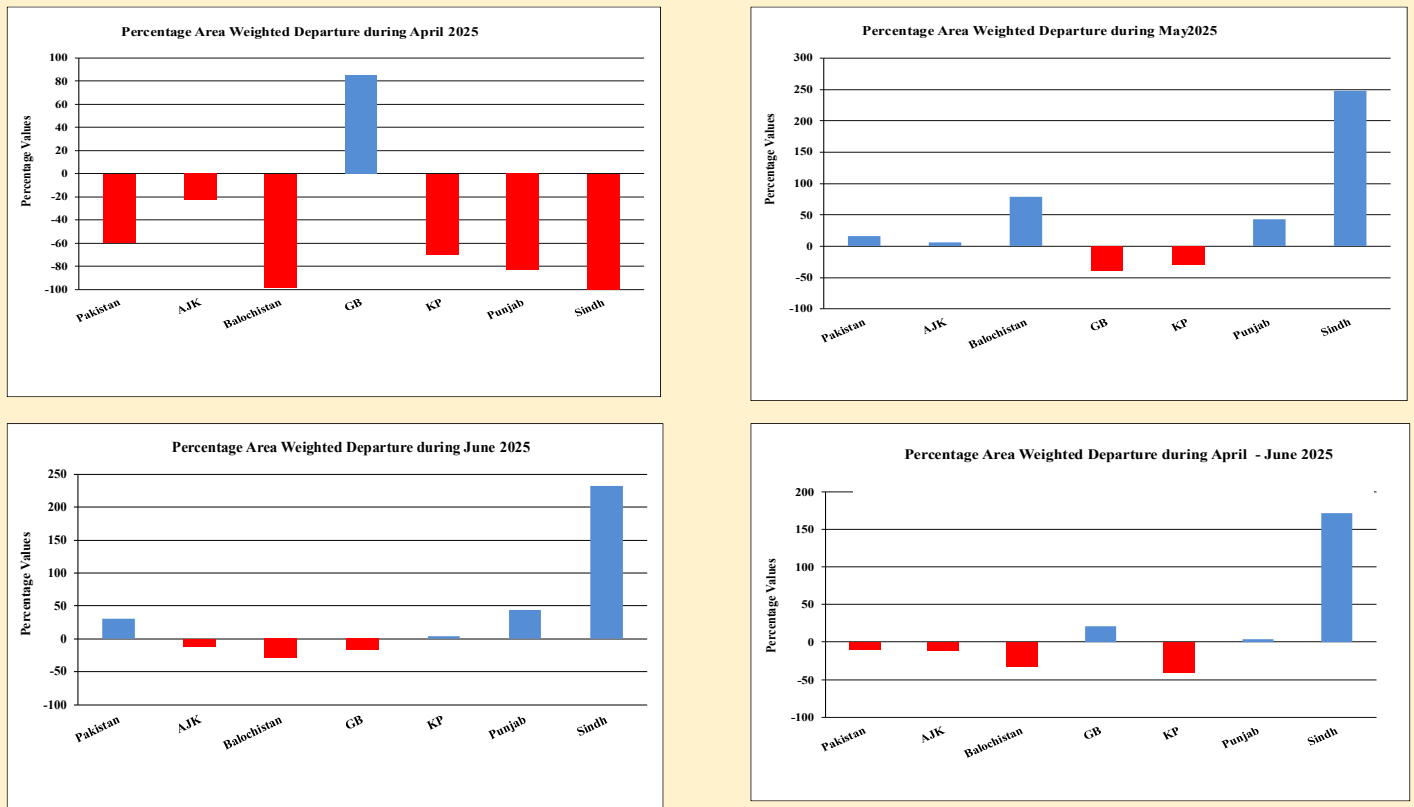


Figure-2: Percentage area weighted departure of rainfall during (April-June) 2025

Spatial distribution of rainfall during the quarter (April-June) is shown in Figure 3. During the quarter rainfall spells were observed throughout the country. Highest amounts were observed in upper KP, upper Punjab, Potohar region, Kashmir and adjoining areas of Gilgit Baltistan.

Overall, below normal country wide rainfall was observed during April-June. Balochistan, KP, GB, central Punjab witnessed below normal rainfall. On the contrary, Potohar region and Sindh received above normal rainfall during the quarter.

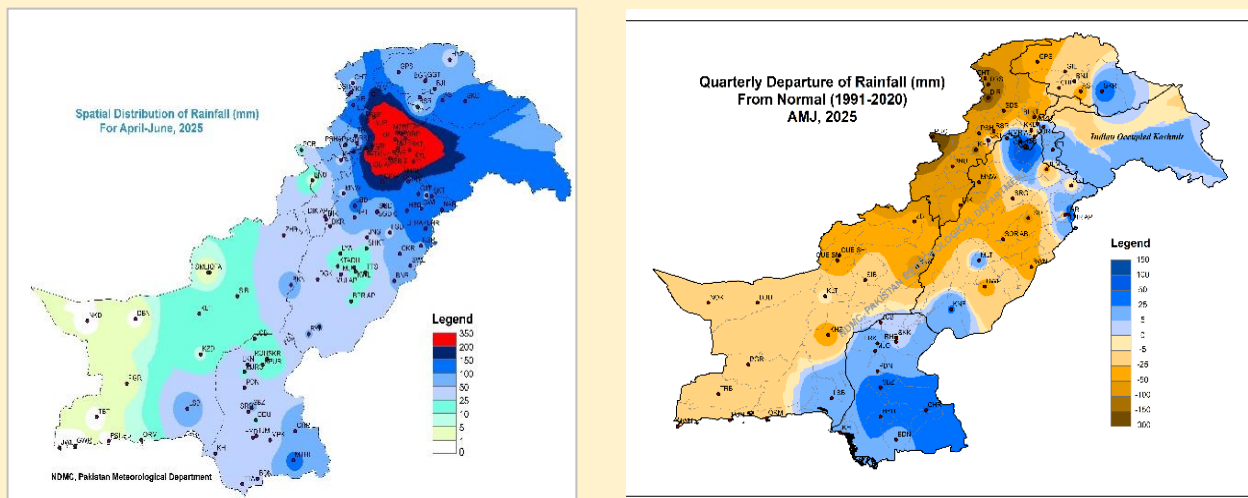


Figure-3: Spatial distribution and departure of rainfall during (April-June) 2025

3.1 PMD Stations with highest rainfall (mm) (April-June) 2025

Rainfall					
S. No	Station	Rainfall (mm)	S. No	Station	Rainfall (mm)
1.	Malamjabba	375.0	11.	Rawalakot	219.4
2.	Murree	373.8	12.	Pattan	201.0
3.	Muzaffarabad Airport	325.2	13.	Saidu Sharif	199.0
4.	Islamabad (Zero point)	319.0	14.	Islamabad, Airport	196.9
5.	Garhi Dopatta	317.2	15.	Lahore, Airport	193.6
6.	Attock	275.4	16.	Mangla	189.9
7.	Kakul	267.0	17.	Chakwal	182.2
8.	Muzaffarabad City	265.2	18.	Kamra Airbase	173.6
9.	Chaklala Airbase	260.1	19.	Kalam	162.8
10.	Kotli	231.4	20.	Balakot	161.0

3.2 The Maximum Length of Dry Spell

The maximum length of dry days spell, calculated from Consecutive Dry Days (CDD) is shown in Figure 4. Highest CDD were recorded in western Balochistan particularly in Turbat (328 Days) while in rest of the areas of the country, the CDD have been terminated due to widespread Monsoon spells over those regions. The length of dry spell gives us an analysis of drought situation arising in any region.

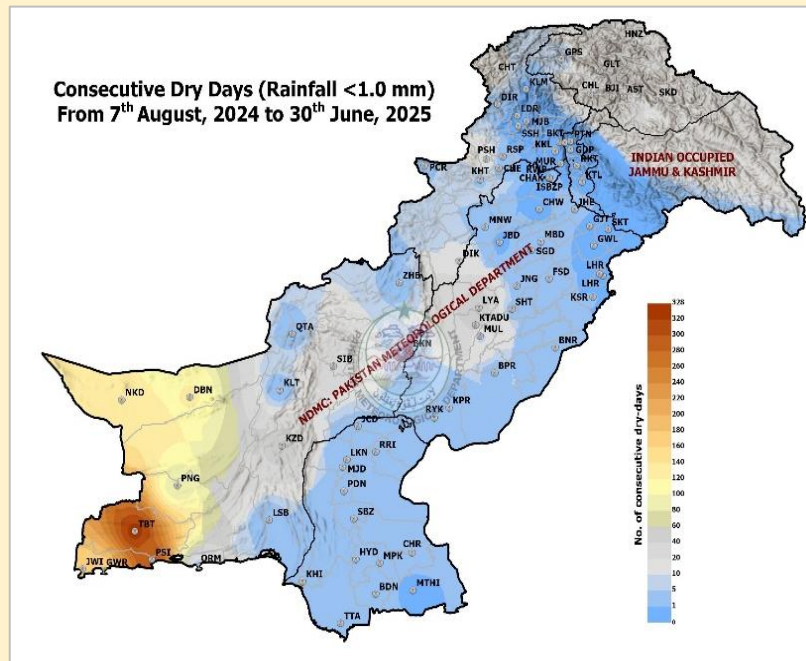


Figure-4: Consecutive Dry Days (CDD) up to 30th June 2025

4. Drought Products

4.1 Drought Monitor

This drought monitor map shown in Figure 5 for the month of June 2025 illustrates the varying degrees of drought severity across the country. The most severe condition, labeled as "Severe Drought", is depicted in dark brown color categorizing drought situation of Turbat. "Mild Drought" conditions are represented in pale yellow and are spread across western Balochistan. Regions not affected by drought are marked as "Normal" and are shown in white color.

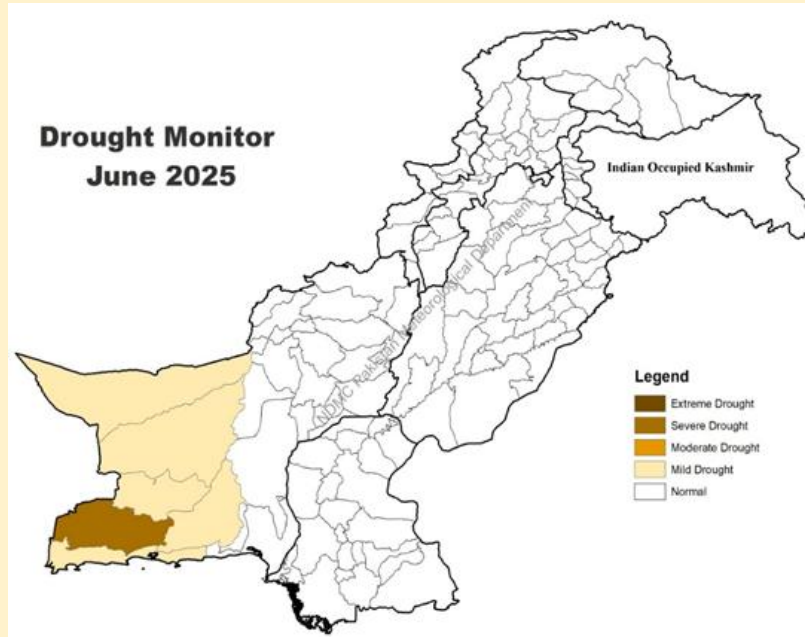
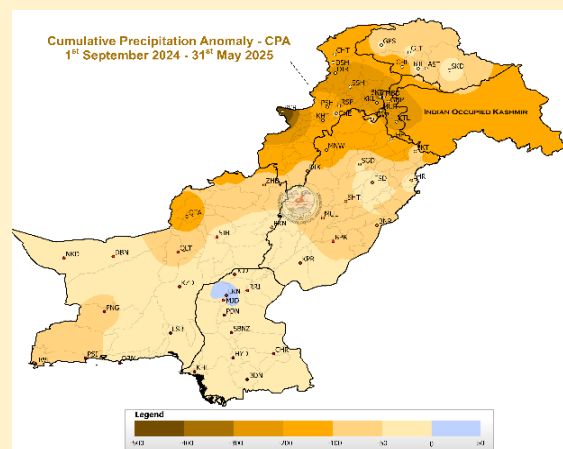
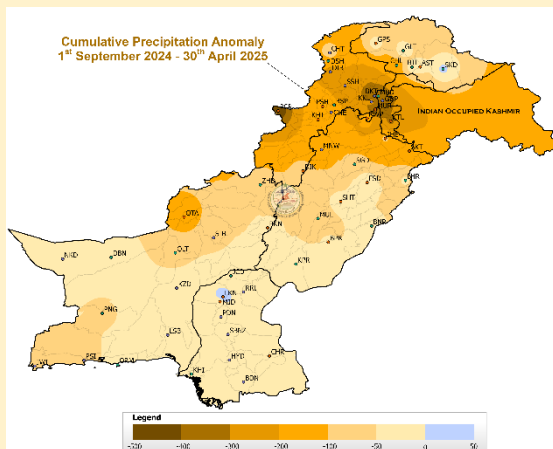


Figure-5: Drought conditions of Pakistan (30th June 2025)

4.2 Cumulative Precipitation Anomaly (CPA)

Cumulative Precipitation Anomaly (CPA) was calculated from 1st Sep, 2024 for each month. Monthly CPA analysis for the month of April, May and June 2025 is shown below in Figure 6. Overall, upper areas of the country and KP received below normal rainfall as shown with negative anomaly. However, in June, due to above normal rainfall spells in Sindh, the deficit has decreased.



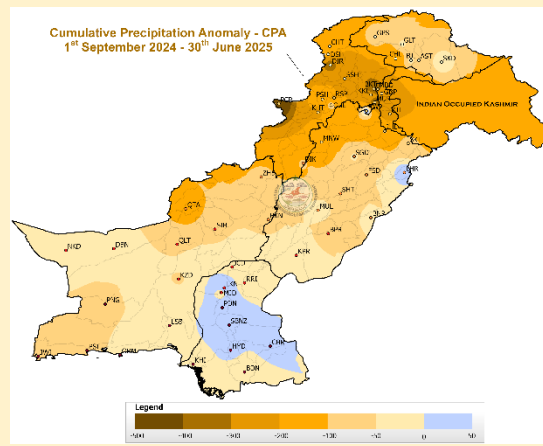


Figure-6: Cumulative Precipitation Anomaly (CPA) during (April-June 2025)

4.3 Soil Moisture Anomaly (SMA)

It was observed that the amount of rainfall varied in different regions of the country which improved the soil moisture conditions in some regions, while due to low rainfall in other parts of the country less soil moisture was observed, as shown in Figure 7. Soil moisture conditions are above normal in Sindh, southern Punjab, GB whereas below normal in Potohar, AJK, upper Punjab, most parts of KP and in Balochistan as well.

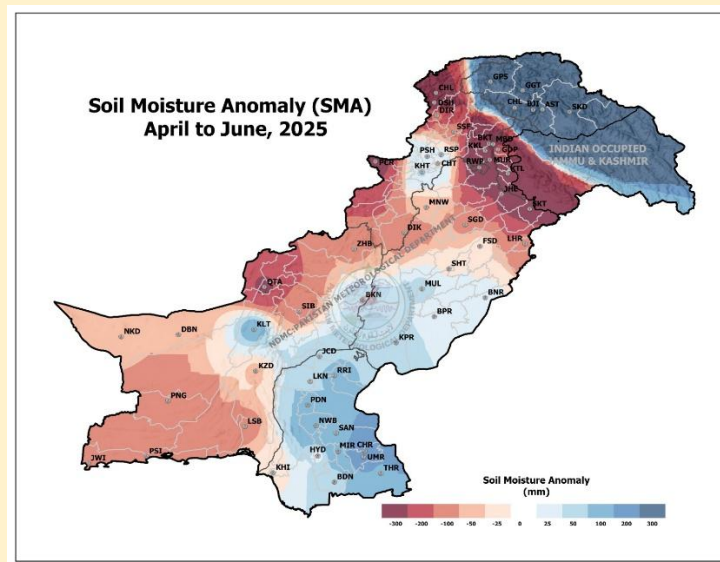


Figure-7: Soil Moisture Anomaly (SMA) during (April-June 2025)

4.4 Water Level of Reservoirs

Pakistan has two major water reservoirs of Tarbela and Mangla. The dead level of Tarbela is 1402 feet with maximum conservation level of 1550 feet, whereas Mangla has a dead level of 1050 feet with a maximum conservation level of 1242 feet.

Monsoon rains, along with the snow melt play an important role in increase/decrease the water levels of these dams. In addition, small dams in various parts of the country may also fill up that helps boost agriculture and improve socio-economic activities in the country.

The percent of average water level of Tarbela and Mangla dams in the month of June was above average but Tarbela shows considerably above values, may be due to the effect of snow-melt, in that reservoir as shown in figure 8.

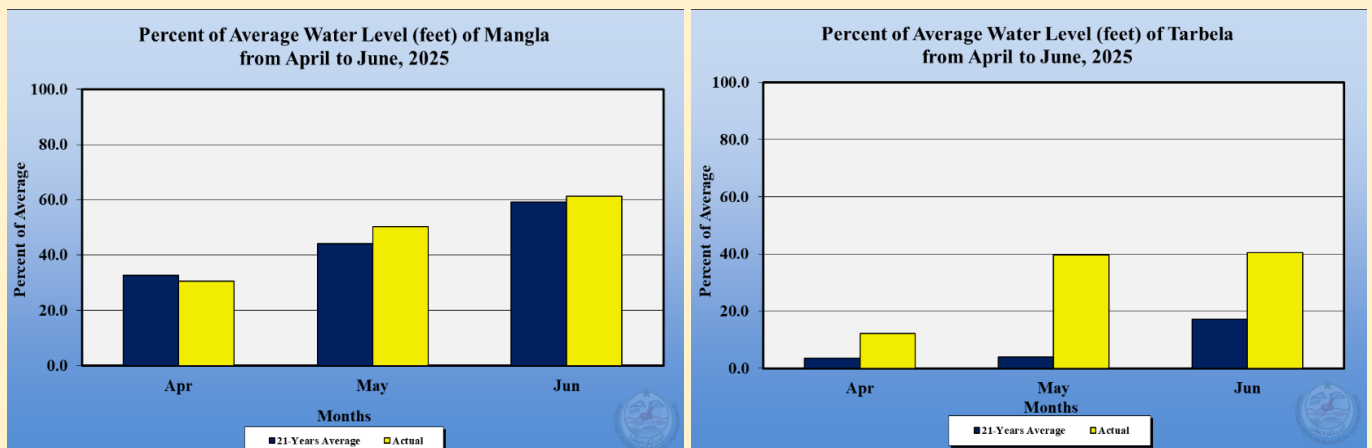


Figure-8: percent of the water level of Mangla and Tarbela during (April-June) 2025

4.5 District-wise impact of drought

Currently mild drought conditions are prevailing in western Balochistan with severe drought in Turbat.

5. Kharif season forecast of Mangla and Tarbela Dams (2025)

The predicted water availability forecast in two major reservoirs of Tarbela and Mangla during the Kharif season (April-Sept) is shown in Figure 9.

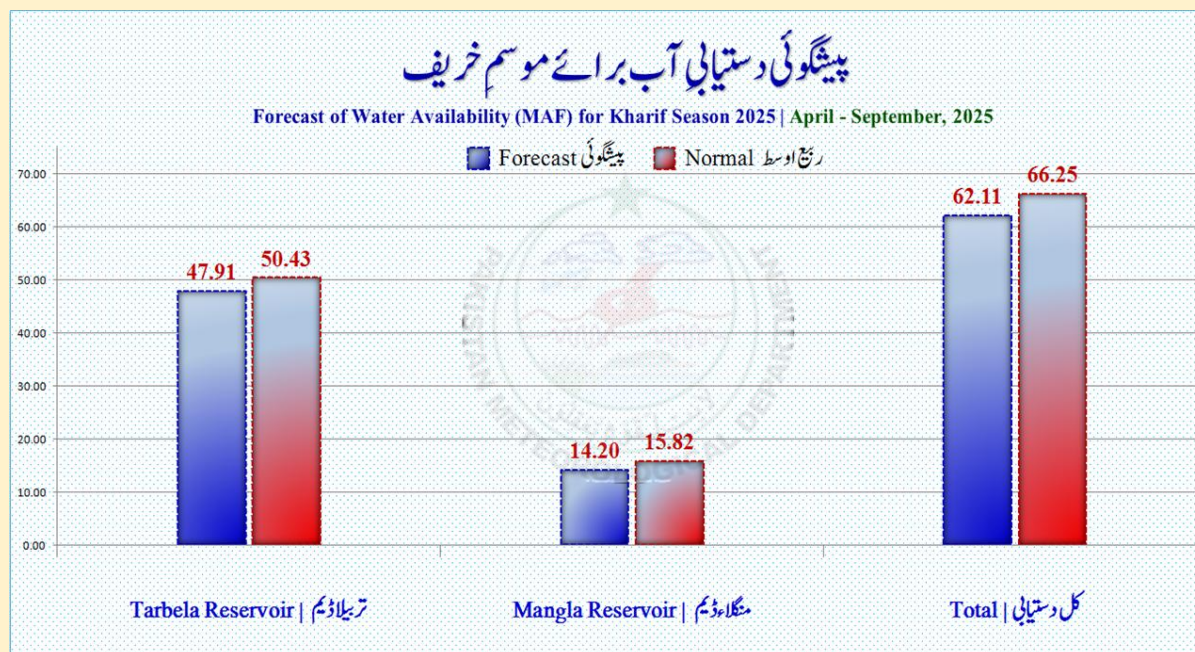


Figure-9: Forecast of water availability in Mangla and Tarbela dams for Kharif season

6. Crop Report: April-June 2025

Punjab

Northeastern regions are expected to receive normal to slightly above-normal rainfall, benefiting cotton and sorghum crops. Cotton will gain from improved moisture and reduced temperature stress; however, high humidity and warm nights in July–August may increase pest pressure. Integrated Pest Management (IPM) and proper drainage are essential. Sorghum in Jhelum will benefit from better pollination and root development due to favorable moisture. Farmers should stay alert for stem borers and fungal diseases after rainfall.

Sindh

Cotton is poised to benefit from expected rainfall and cooler temperatures, which will support crop health. However, elevated humidity and nighttime temperatures may promote pest infestations. Farmers are advised to adopt IPM practices and ensure proper drainage to avoid waterlogging and root diseases.

Khyber Pakhtunkhwa

Rainfall and cooler weather in many parts will support the late sowing of Kharif crops and fodder. In contrast, the mountainous areas may receive below-normal rainfall, requiring moisture conservation. Precautions against flash floods are necessary throughout the season.

Balochistan

Rainfall and cooler conditions are favorable for Kharif sowing and fodder growth. In Usta Muhammad, rice field preparations are in progress, with transplanting set for early July depending on rainfall and soil moisture. Proper puddling and uniform transplanting are critical for strong tillering. Flash flood preparedness especially in hill torrents is recommended.

Gilgit-Baltistan

Anticipated low rainfall and higher temperatures necessitate the use of moisture conservation techniques, efficient irrigation, and reduced tillage to support vegetable and orchard management in drier soil conditions.

Kashmir

Some parts of this region face dry soils and elevated temperatures. Moisture retention, efficient irrigation, and careful tillage will be vital for successful orchard and vegetable farming.

Recommendations

Following are some recommendations to cope with the droughts in Pakistan.

- Pakistan water storage capacity is much less than the normal rainfall of the region. Therefore, it is the need of the hour to build more large and small dams/water storage facilities in catchment areas and low-lying areas to conserve the rainfall water during the rainy season.
- The stored water will help in protecting food security specially to fulfill the water requirements of crops during drought periods in the country.
- Over all, normal conditions are prevailing in the country except western Balochistan where mild to moderate drought conditions are still prevailing.
- NDMC is continuously monitoring drought situations over the country and keeping the stakeholders and general public updated by issuing drought information on weekly, fortnightly, monthly and quarterly basis.

For more information regarding the drought situation in Pakistan, please visit <http://www.ndmc.pmd.gov.pk/index.htm>

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