DISASTERS EARLY WARNING

DEW-2

APRIL | MAY | JUNE

2026

PREPARED BY:
TECHNICAL EARLY WARNING WING
NDMA

DISASTERS EARLY WARNING - DEW 2

April-May-June 2026

Tech Early Warning Wing, NDMA

TABLE OF CONTENTS

DISASTER VULNERABILITY SCAN - PAKISTAN (APRIL - JUNE 2026)

1. Pakistan is entering a period of elevated climatic and systemic risk during April to June 2026. This phase is characterized by above-normal temperatures, variable precipitation patterns, and pre-existing structural vulnerabilities, including water stress, energy constraints, and inflationary pressures.

2. The emerging risk environment is best understood as a compound system in which climate variability interacts with economic and infrastructure limitations, resulting in cascading socio-economic impacts.

3. The most critical risk clusters identified are: -

   a. Heatwave and energy system stress.

   b. Food system instability.

   c. Localized flood risk in vulnerable regions.

CLIMATIC SITUATION ASSESSMENT

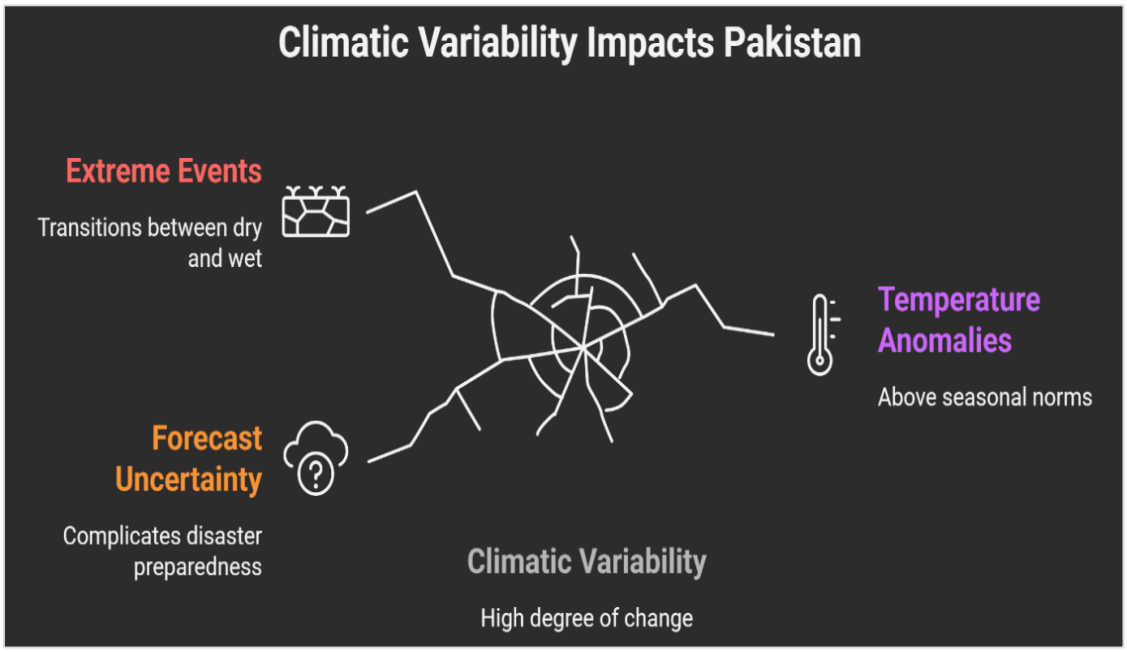


Figure 1 Climatic Variability Impacts Pakistan

(1) **Assessment**. The current pattern reflects a high degree of climatic variability, marked by transitions between dry conditions and short-duration extreme rainfall events, alongside elevated temperatures. This variability complicates disaster preparedness.

CLIMATE SIGNAL ANALYSIS

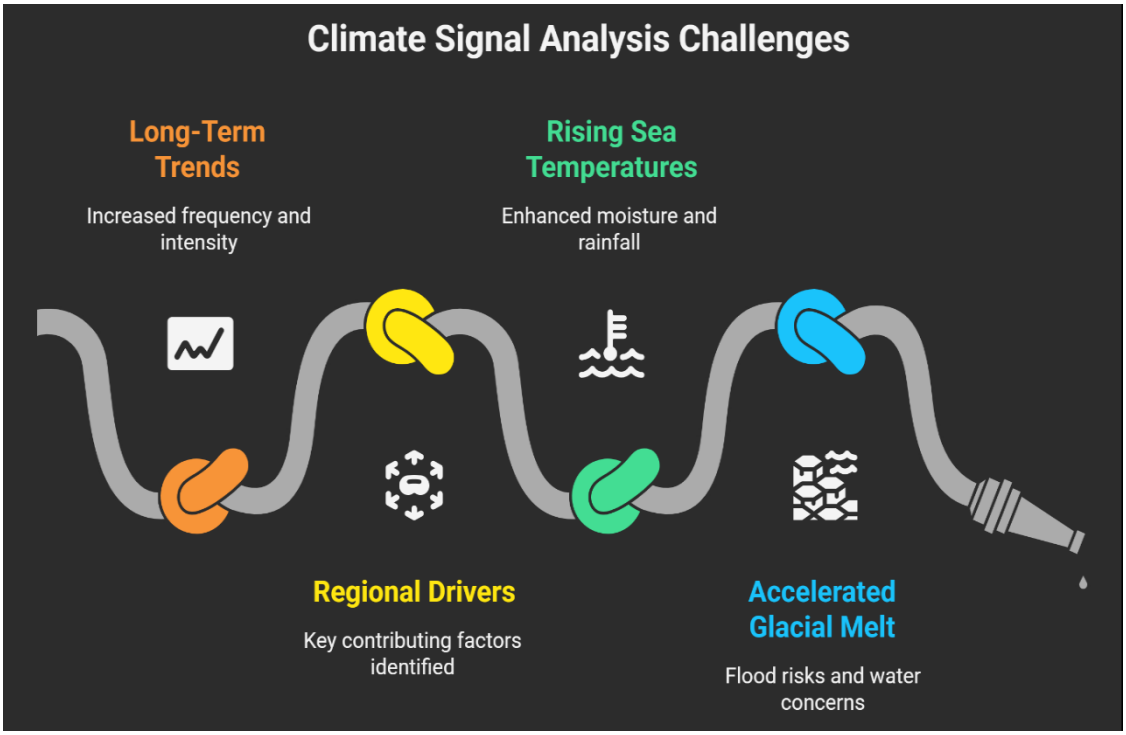


Figure 2 Climate Analysis

(1) Key contributing factors include: -

(a) Rising sea surface temperatures contributing to enhanced atmospheric moisture and increased rainfall intensity.

(b) Accelerated glacial melt in northern regions, contributing to short-term flood risks and long-term water availability concerns.

HAZARD-SPECIFIC RISK ASSESSMENT (NEXT 3 MONTHS)

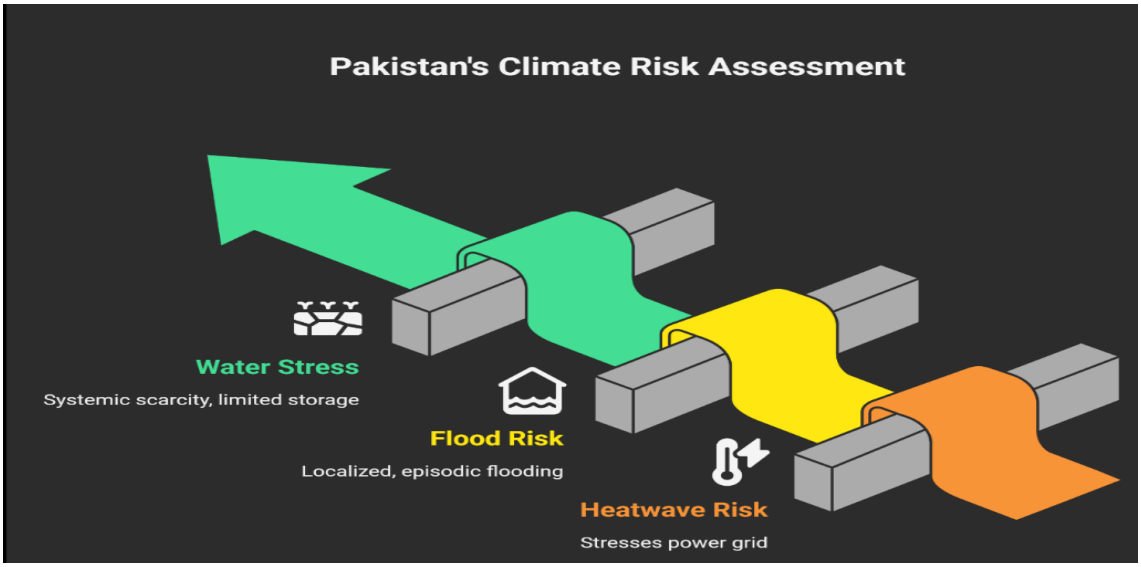


Figure 3 Hazard Specific Risk Assessment

4. **Heatwave Risk - High**. Evidence: -

a. Elevated baseline temperatures.

b. Early onset of seasonal heat conditions.

5. **Impact Pathway**. Increased temperatures are expected to raise electricity demand for cooling, placing stress on the power generation and distribution system. This may lead to supply shortfalls, load shedding, and economic disruption in: -

a. Southern Punjab.

b. Urban centers in Punjab and KP.

c. Sindh, particularly urban centers.

d. Interior Balochistan.

6. **Flood Risk - Moderate to High (Localized).** Evidence: -

a. Observed increase in short-duration high-intensity rainfall events: -

(1) Risk Typology: -

(a) Flash floods in mountainous and northern regions.

(b) Urban flooding in major cities.

(c) Limited risk of large-scale riverine flooding, dependent on sustained rainfall and snowmelt conditions.

b. Assessment. Flood risk is expected to remain spatially concentrated and episodic rather than widespread at this stage.

(1) Water Stress - High (Systemic Risk).

c. Current Situation. Water availability per capita is approaching critical scarcity thresholds. The system remains heavily dependent on seasonal flows and glacial contributions.

d. Key Issue. Despite the occurrence of flood events, limited storage capacity and infrastructure constraints prevent effective water retention, resulting in continued water stress.

7. **Sectoral Vulnerability Assessment**

a. **Agriculture Sector - High Risk.** Threats: -

(1) Heat stress affecting crop growth and maturity.

(2) Untimely rainfall during harvest periods.

(3) Inconsistent water availability.

b. **Implications**: -

(1) Reduced agricultural productivity.

(2) Disruption in supply chains.

(3) Increased food price volatility.

c. **Energy Sector - Critical Risk.** Stress Factors: -

(1) Increased electricity demand due to heat.

(2) Variability in hydropower generation.

(3) Dependence on imported fuels.

d. **Risk Outcome**: -

(1) Power shortages and load shedding.

(2) Increased cost of electricity.

(3) Reduced industrial output.

e. **Infrastructure - Moderate Risk**. Exposure: -

(1) Urban drainage systems.

(2) Transport networks.

(3) Irrigation infrastructure.

(4) Informal settlements.

(5) Key Weaknesses.

f. **Insufficient drainage capacity in major cities**. Limited resilience of peri-urban and low-income settlements.

8. **Socio-Economic Impact Analysis**

a. **Inflationary Pressure - High Risk**. Drivers: -

(1) Disruptions in food production.

(2) Increased energy costs.

(3) Rising transportation expenses.

b. **Outcome**. Broad-based inflation affecting both essential goods and services.

c. **Livelihood Vulnerability – High**. Most Affected Groups: -

(1) Smallholder farmers.

(2) Daily wage earners.

(3) Low-income urban households.

d. **Mechanism**. Rising living costs combined with stagnant or declining incomes reduce purchasing power and increase economic vulnerability.

e. **Energy Poverty – High.** Increased cooling demand, rising electricity tariffs, and supply constraints are likely to exacerbate energy poverty, particularly among low-income households.

f. **Urban Stress – High**. Urban areas are expected to experience: -

(1) Increased heat-related health risks.

(2) Water supply constraints.

(3) Periodic urban flooding.

9. **Compound Risk Dynamics**. Pakistan's risk profile is characterized by interconnected and mutually reinforcing stressors. Key Interactions: -

a. Climate variability and energy demand leading to system stress.

b. Agricultural disruption contributing to food price inflation.

c. Concurrent flood events and water scarcity highlighting structural inefficiencies.

10. **Scenario-Based Risk Outlook**

a. **Best Case Scenario**. Moderate temperatures and stable rainfall patterns result in limited disruption.

b. **Most Likely Scenario**. Heatwaves intensify and localized flooding occurs, leading to increased pressure on energy systems and inflation.

c. **Worst Case Scenario**. Concurrent extreme heat, intense rainfall events lead to crop losses & infrastructure damage.

11. **Institutional and Preparedness Gaps**

a. Key gaps include:

(1) Limited capacity for urban flood management.

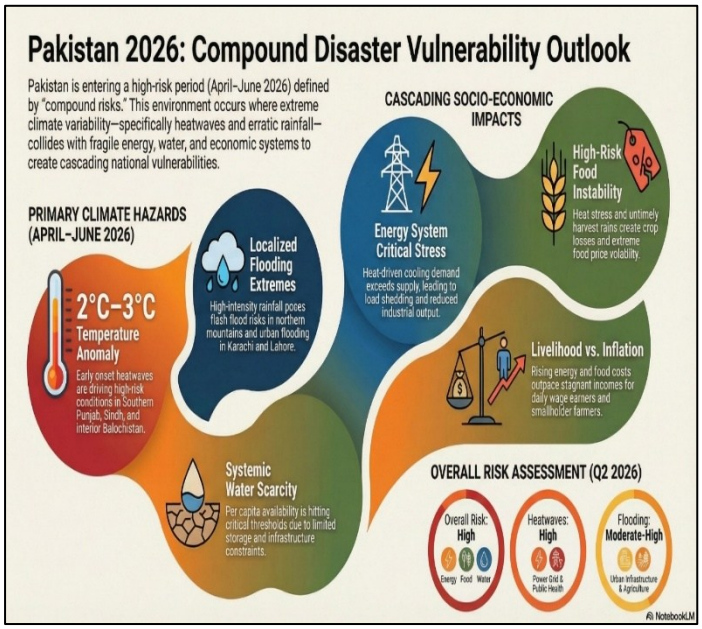
(2) Insufficient water storage and conservation infrastructure.

(3) High sensitivity of the energy system to demand fluctuations.

(4) Gaps in localized early warning dissemination and response.

12. **Strategic Risk Conclusion**. Pakistan is entering a short-term period of elevated disaster risk driven primarily by climate variability. The principal concern is not a single hazard but the interaction of multiple stressors across sectors.

13. **Final Assessment**



Overall Risk Level	**High**
Primary Trigger	**Heatwave escalation, localized flooding**
Most Vulnerable Systems	**Energy, food, and water**
Most Exposed Populations	**Low-income urban and rural communities**

Figure 4 Overall Vulnerability Outlook

GLOBAL CLIMATE PICTURE

1. The climate outlook for April–May–June (AMJ) 2026 is developed from the prevailing large-scale ocean–atmosphere conditions that influence regional weather patterns over Pakistan, integrated with observed temperature and precipitation anomaly maps.

a. **El Niño–Southern Oscillation (ENSO)**. The ENSO is currently in a neutral phase (with a weak La Nina signal still present in mid-March). It is expected to remain neutral through April–May and transition to a positive phase (emerging El Niño) by the end of the season. Probabilities: ENSO-neutral 55% through May–July, with El Niño becoming likely (62%) from June–August onward.

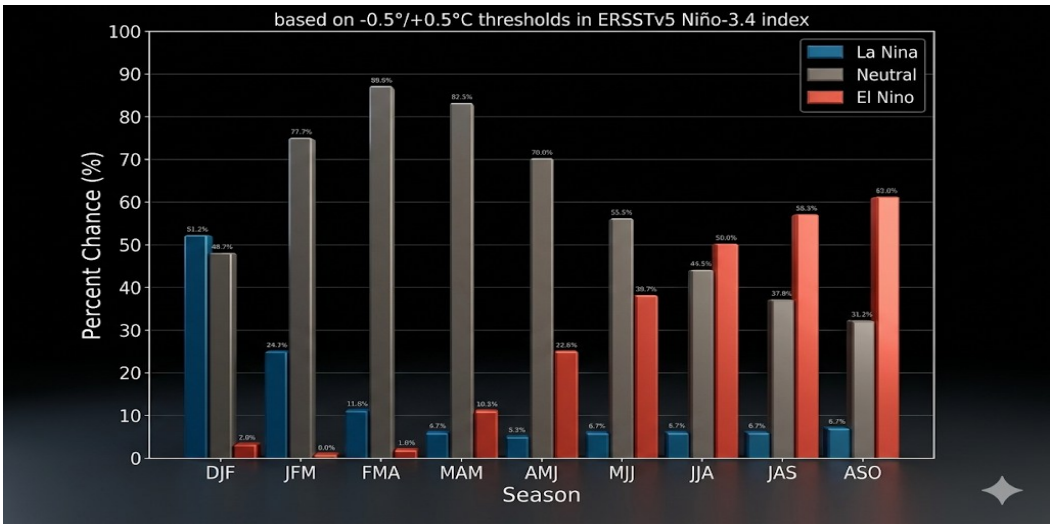


Figure 5 La Nina / El Nino - Probabilities

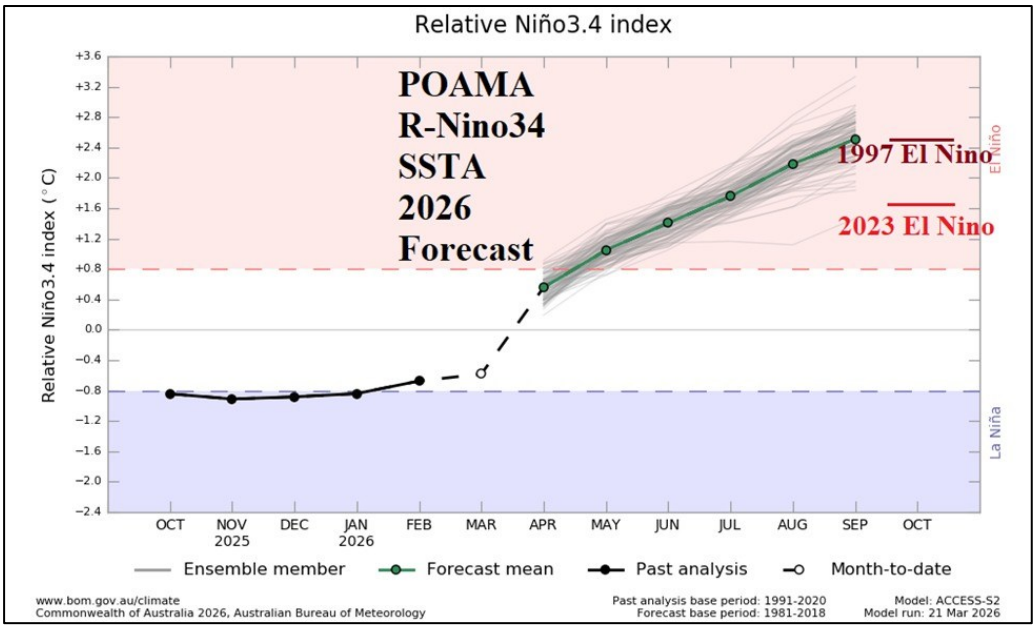


Figure 6 Relative Nino 3.4 Index

b. **Indian Ocean Dipole (IOD)**. The IOD is currently neutral and is forecast to remain in the neutral phase throughout AMJ 2026.

c. With both ENSO and IOD largely neutral during the core of the season (transitioning only at the end), large-scale oceanic forcing is expected to remain weak. Weather patterns over Pakistan will therefore be driven primarily by: -

(1) Pre-monsoon heating over the subcontinent.

(2) Regional atmospheric circulation and westerly disturbances (early spring).

(3) Convective instability and thunderstorm activity (May–June).

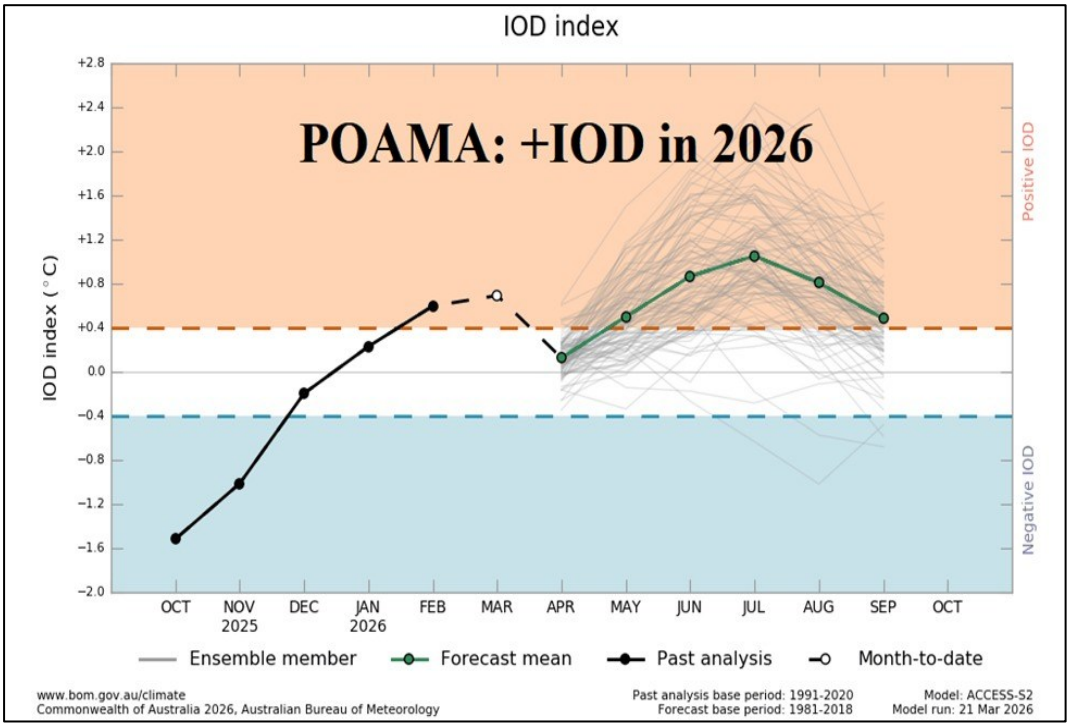


Figure 7 Monthly IOD Index

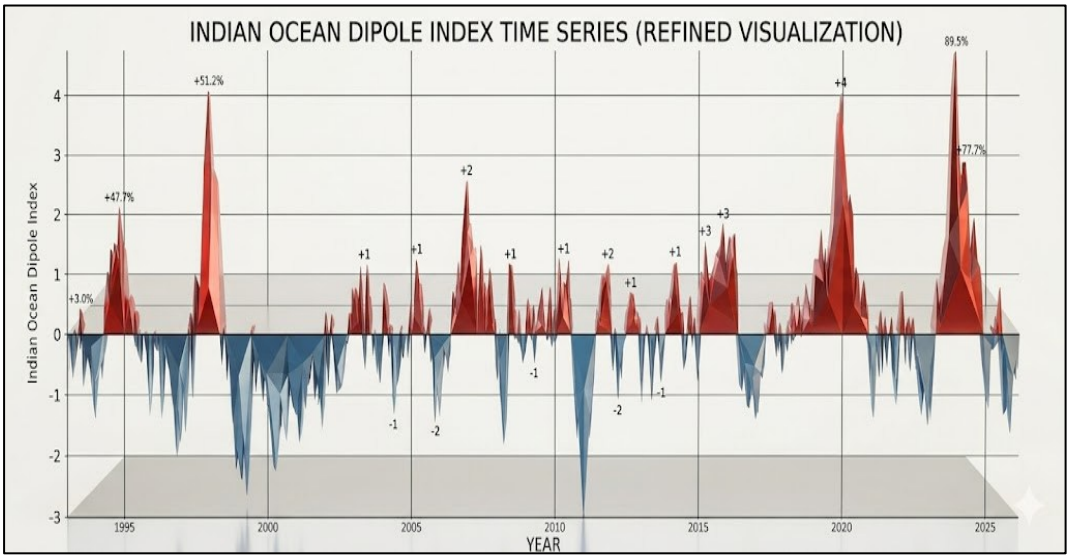


Figure 8 IOD Index

NATIONAL METEOROLOGICAL OUTLOOK

1. **Driving Factors**. The seasonal outlook integrates outputs from eleven global seasonal prediction models (SEAS5, GloSea, CFSv2, CPS2, System 8, GCFS, ACCESS-S, CanSIPS, BCC-CSM, IRI, and Copernicus C3S) consolidated through a Multi-Model Ensemble (MME) framework, alongside the provided temperature and precipitation anomaly maps.

2. The April–May–June (AMJ) 2026 season is anticipated to bring near-normal to marginally above-normal rainfall across the country, with greater probability of increased precipitation (**10 to 30 mm or more**) in April–May influenced by westerly disturbances. June shows a drier tilt. Mean temperatures are forecast to remain above normal across Pakistan, with maximum positive anomalies over northern regions Gilgit-Baltistan, Kashmir, northern KP (**+0.5°C to >+5°C**) and southeastern Pakistan (Sindh). Anomaly maps align closely, showing strong positive temperature anomalies (Figure 1 April 2026 Temperature & Precipitation Anomaly) especially in northern and north-western areas, and shifting precipitation patterns from wetter north in April–May to drier conditions in June over central/southern regions.

   a. **April 2026.** April rainfall in Pakistan shows strong interannual variability driven mainly by western disturbances, with the 1991–2020 climatology indicating high rainfall in the northern belt (KP, GB, northern Punjab, AJK) and very dry conditions in the south (Sindh, Balochistan). Over recent years, April 2021 and 2023 were generally drier—especially in Balochistan and southern regions—while April 2022 stood out as an exceptionally wet year nationwide. Forecasts suggested near-normal conditions for 2024 and drier conditions in 2025, particularly in northern Pakistan. However, April 2026 is currently emerging as a wetter-than-normal month, with strong positive anomalies concentrated in northern Pakistan, especially around the Islamabad–Rawalpindi–Peshawar corridor, indicating improved water availability but also a potential for localized flood risks if intense rainfall persists.

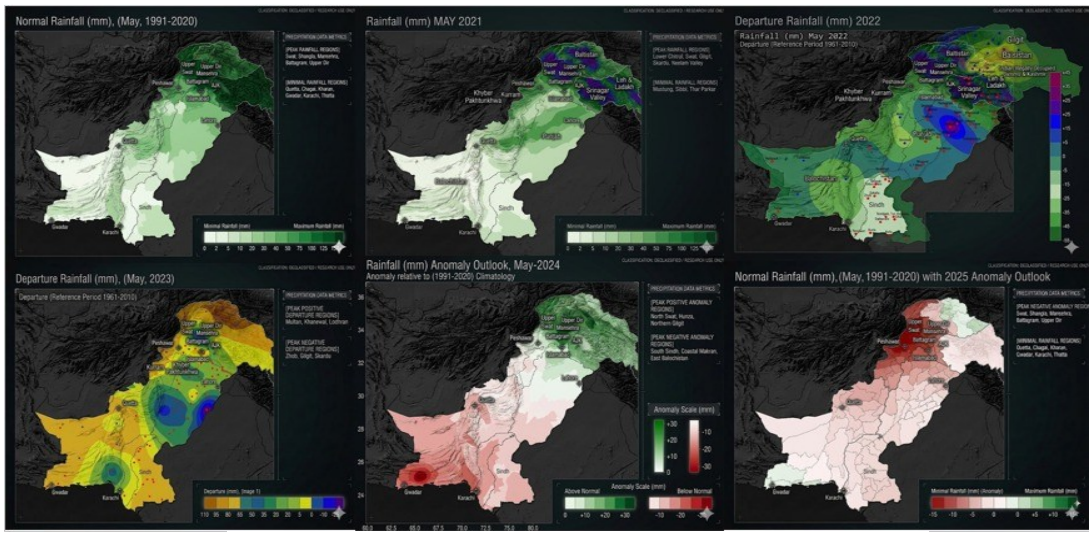


Figure 9 Precipitation Anomaly April 1991-2025

b. April temperature patterns in Pakistan show strong spatial and year-to-year variability, with a typical north–south gradient (cooler north, hotter south) but increasing signs of warming in recent years. While April 2021 and 2023 displayed mixed conditions with regional contrasts (cooler south or cooler north/center), April 2022 marked a clear warm phase, especially over Punjab. Forecasts for 2024 and 2025 consistently indicated above-normal temperatures nationwide. The current situation in April 2026 confirms this trend, with pronounced warming in northern Pakistan and near-to-above normal conditions elsewhere. This "warm spring" pattern, especially when combined with above-normal rainfall, supports water availability and crop growth but also increases risks of accelerated snowmelt, higher evapotranspiration, and potential hydrological hazards in northern regions.

Ser	Year	Overall Anomaly	Northern Pakistan (KP/GB/Punjab)	Southern Pakistan (Sindh/Balochistan)
(1)	Climatology (1991–2020)	Wet north, dry south	High rainfall (75–150+ mm)	Very low (<10 mm)
(2)	2021	Mixed, dry	Patchy	Strong deficit
(3)	2022	Strongly wet	Above normal	Above normal
(4)	2023	Strongly dry	Below normal	Below normal
(5)	2024	Near normal	Slightly above	Neutral
(6)	2025	Below normal	Below normal	Slightly below
(7)	2026	Above normal	Strongly above	Neutral to slightly above

Temp Anomaly - April 1991-2025

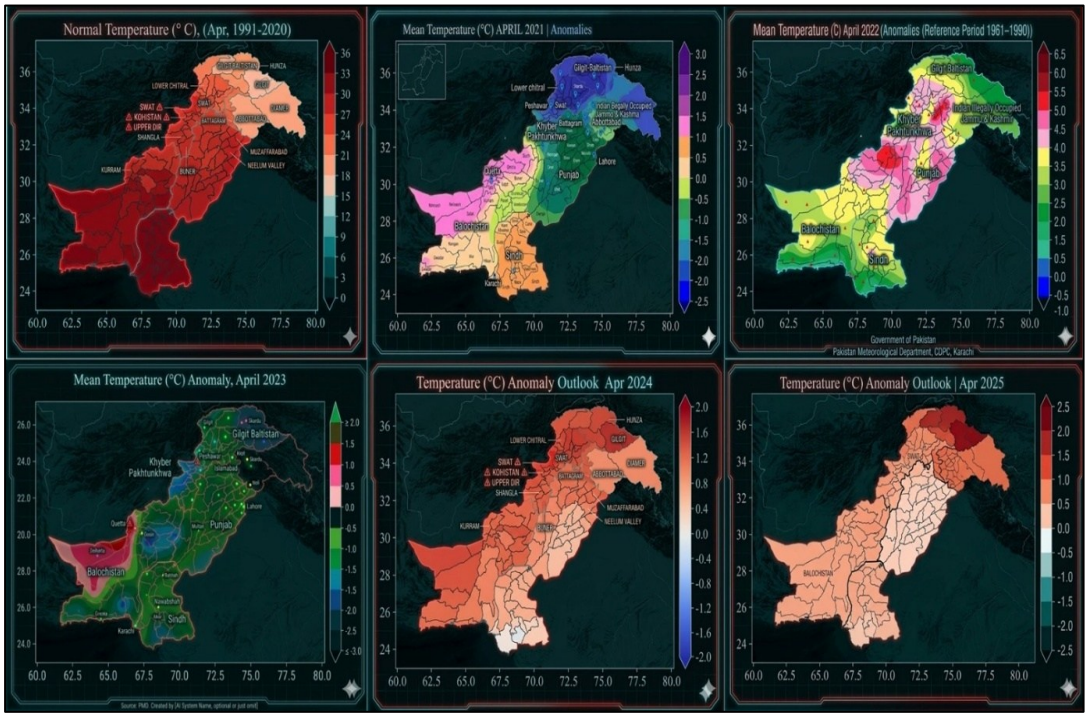


Figure 9 Temp Anomaly April 1991-2025

Temp Anomaly April 1991-2026

Year	Overall Anomaly	Northern Pakistan (KP/GB/N. Punjab incl. Rawalpindi)	Central/Southern Pakistan (Punjab/Sindh/Balochistan)	Key Remark
2021	Mixed (North +, South –)	Above normal	Below normal	Cooler south, warmer north
2022	Above normal	Mixed to above	Strongly above (Punjab focus)	Warm central belt
2023	Variable (South +, N/C –)	Below normal	Above normal (south)	Cooler north/center
2024 (Outlook)	Above normal	Above	Above	General warming
2025 (Outlook)	Strongly above	Strongly above	Above	Strong warming signal
2026 (Current)	Above normal	Strongly above	Near to above normal	Ongoing warm spring

c. Rainfall across the country in 2026 is expected to remain near-normal to slightly above-normal overall, with wetter conditions prevailing during the first half of the month, followed by a reduction in rainfall activity in the latter half of the month. Temperatures are projected to be above normal in the northern regions and near normal in the south, with anomalies ranging from +0.5°C to +4°C, and the highest deviations likely in the north. Convective activity is expected to be more active initially, gradually weakening toward the end of the month.

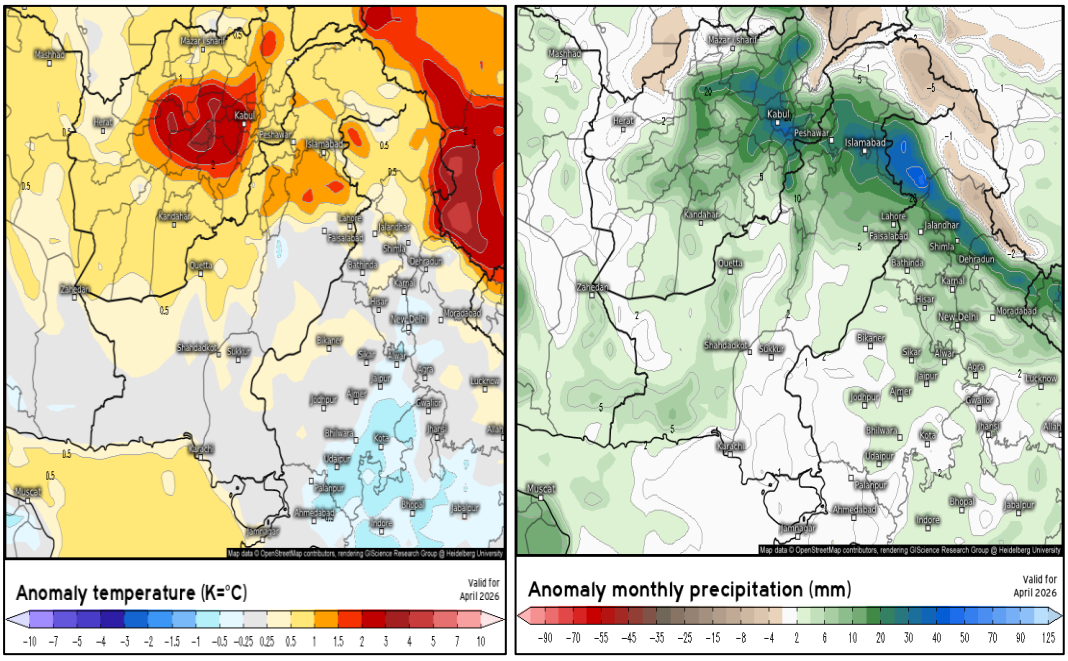


Figure 10: April 2026 Temperature & Precipitation

d. **May 2026**. In recent years, May 2021 and 2023 were notably dry with widespread deficits, while May 2022 stood out as an exceptionally wet month with strong positive anomalies across the country, even extending into typically arid regions. Forecasts indicated near-normal conditions in 2024 and drier conditions in 2025, particularly in northern Pakistan. However, May 2026 is currently showing a return to wetter-than-normal conditions. Suggesting improved water availability, enhanced soil moisture, and favorable conditions for agriculture, though with a slight risk of localized flooding in northern and hilly areas if rainfall intensifies.

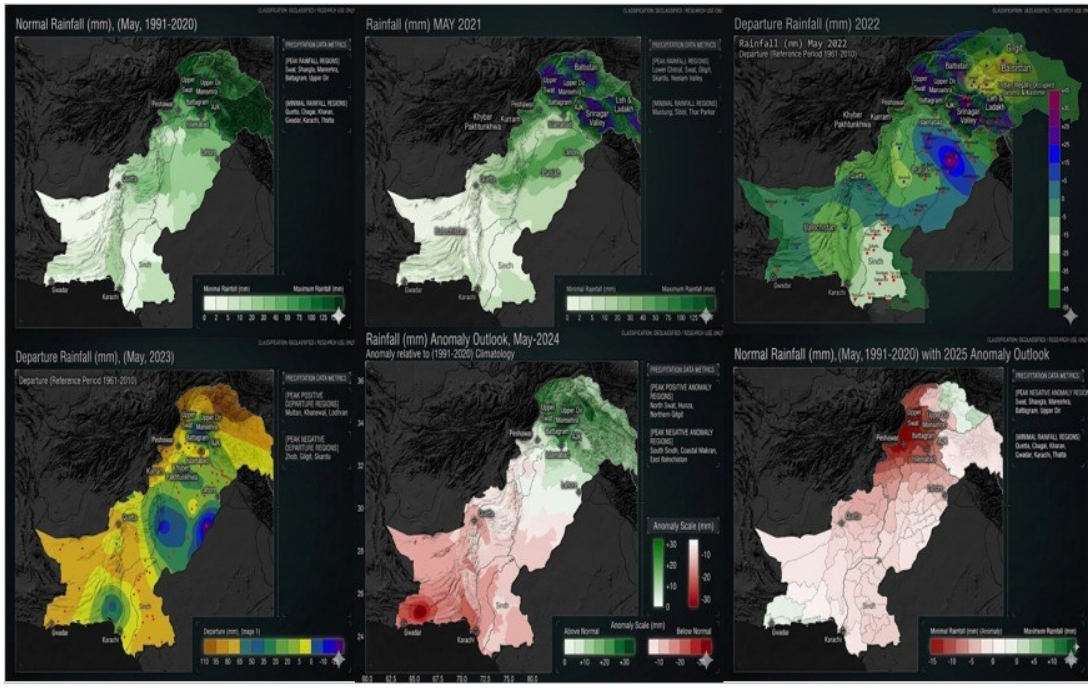


Figure 11 Precipitation Anomaly May 1991-2025

Precipitation Anomaly May 1991-2026

Year	Overall Anomaly	Northern Pakistan (KP/GB/N. Punjab incl. Rawalpindi)	Central/Southern Pakistan (Punjab/Sindh/Balochistan)	Key Remark
2021	Below normal	Below normal	Strongly below	Dry WD season
2022	Strongly above	Very strongly above	Above normal	Wettest year
2023	Below normal	Mostly below	Below normal	Weak WD activity
2024	Near normal - slight above	Slightly above	Neutral	Average conditions
2025	Below normal	Below normal	Neutral to slight below	Drier north
2026	Above normal	Above	Neutral to slight above	Wet pattern returning

e. May temperatures in Pakistan show strong variability but an overall shift toward warmer conditions in recent and forecast years. While May 2021 stood out as unusually cool, May 2022 experienced significant warming across central and southern regions, and May 2023 displayed a mixed pattern with cooler north/center and warmer south. Outlooks for 2024 and 2025 consistently indicated above-normal temperatures nationwide. The current outlook for May 2026 continues this trend, with strong warming in northern Pakistan and near-to-above normal conditions elsewhere. This sustained warming, particularly when combined with wetter conditions in the north, supports water availability but increases risks of accelerated snowmelt, higher evapotranspiration, and heat stress.

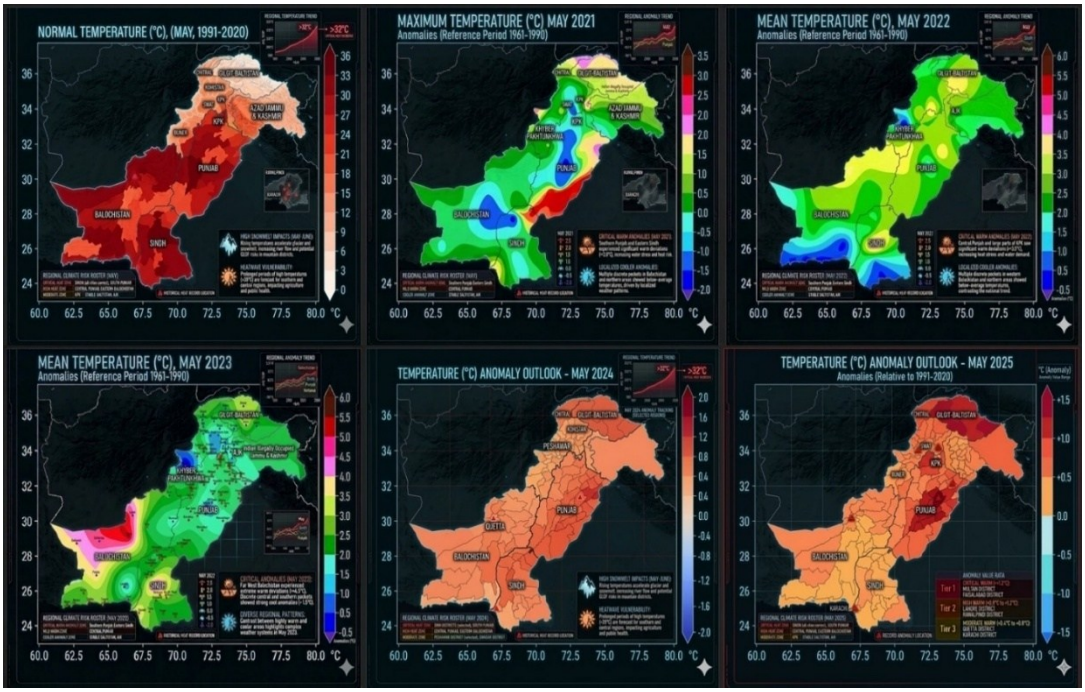


Figure 12 Temp Anomaly May 1991-2025

Temp Anomaly May 1991-2026

Year	Overall Anomaly	North Pak KP/GB/N.Punjab incl. Rawalpindi)	Central/Southern Pakistan (Punjab/Sindh/Balochistan)	Key Remark / Impact
2021	Below normal (Cool May)	Mixed to slightly below	Strongly below (cooler days)	Reduced heat stress
2022	Above normal	Mixed	Strongly above (Punjab/Sindh focus)	Hot central belt
2023	Variable (South)	Below normal	Above normal (south)	North cool, south warm
2024	Above normal	Above	Above	General warming
2025	Strongly above	Strongly above	Above	High heat risk
2026	Above normal	Strongly above (north focus)	Near to above normal	Warm north

f. Near-normal rainfall with pockets of above-normal activity in the north and west (strong positive anomalies in northern KP/GB/AJK). Temperatures above normal will increase surface heating and convective instability, leading to localized thunderstorms and possible hailstorms.

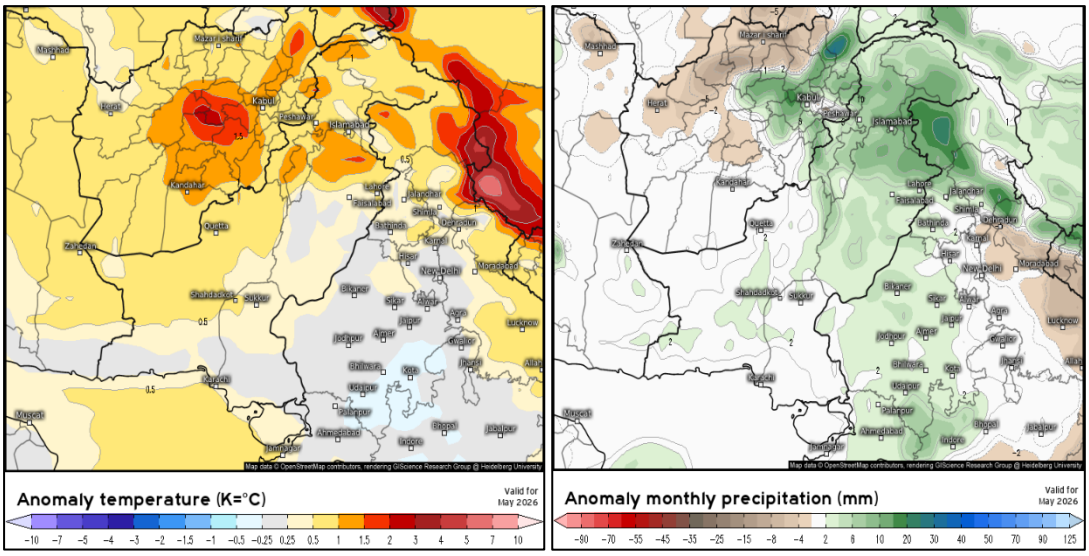
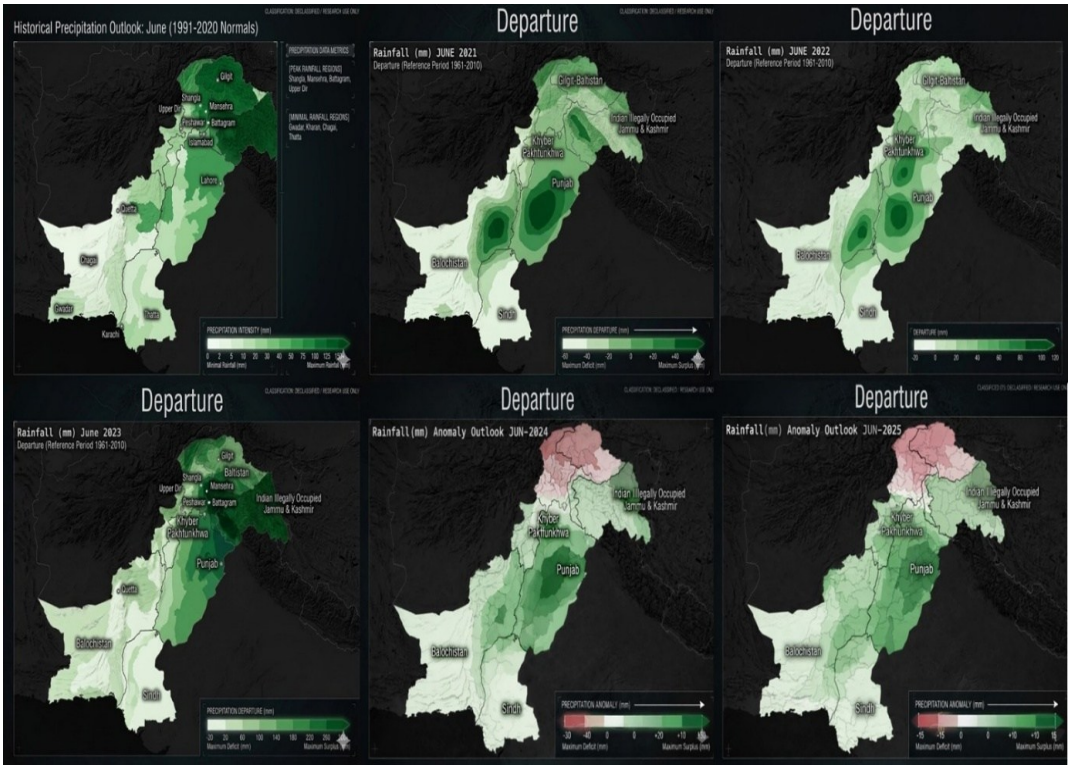


Figure 14: May 2026 Temperature & Precipitation Anomaly

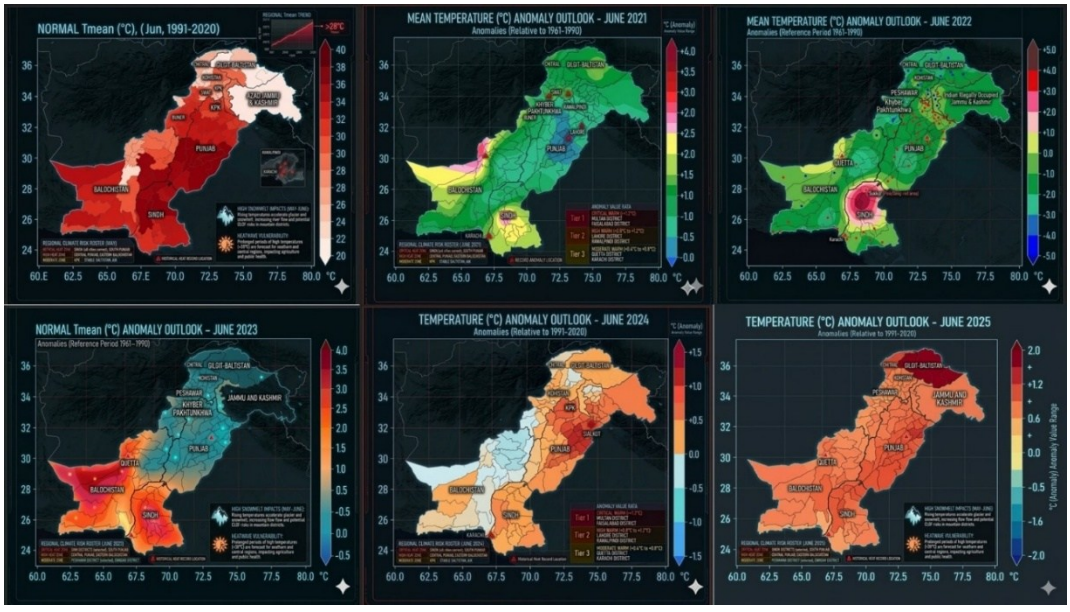
g. **June 2026**. Historical analysis shows June 2021 as exceptionally wet due to an early and strong monsoon, while June 2023 was extremely dry delayed onset, with 2022 remaining mixed and 2024 representing a near-normal, balanced case. However, June 2026 is anticipated to show normal to below normal rainfall.



Temp Patterns June 2021-2026

Year	Overall Anomaly / Status	Northern Pakistan (KP/GB/N. Punjab incl. Rawalpindi)	Central/Southern Pakistan (Punjab/Sindh/Baloc histan)	Key Remark
2021	Strongly above	Very strongly above	Strongly above	Early & strong monsoon
2022	Below normal	Mixed / slight above	Below normal	Weak transition
2023	Strongly below	Mostly below	Strongly below	Delayed monsoon
2024	Near normal	Near normal / slight above	Near normal	Balanced onset
2025	Mixed	Below normal	Above normal	North–south contrast
2026	Normal to below normal	Normal to below normal	Normal to below normal	Normal to below normal

h. June temperature patterns in Pakistan, show strong variability but an increasing tendency toward warmer conditions in recent and forecast years. June 2021 was notably cooler due to an early and active monsoon suppressing temperatures, while June 2022 remained near normal and June 2023 exhibited strong warming in southern regions alongside cooler conditions in the north. Outlooks for 2024 and 2025 consistently indicated above-normal temperatures nationwide. The current outlook for June 2026 continues this warming trend, with pronounced positive anomalies in northern Pakistan and near-to-above normal conditions elsewhere. This suggests elevated heat stress and accelerated snowmelt prior to monsoon onset, with potential implications for water resources, agriculture, and early-season weather hazards.



Year	Overall Anomaly	Northern Pakistan (KP/GB/N. Punjab incl. Rawalpindi)	Central/Southern Pakistan (Punjab/Sindh/Balochistan)	Key Remark / Impact
2021	Below normal	Below normal	Strongly below	Cool due to early monsoon
2022	Near normal / slight +	Near normal	Slightly above (south)	Balanced conditions
2023	Above normal (south-heavy)	Below normal	Strongly above (south)	Hot south, cooler north
2024	Above normal	Above	Above	General warming
2025	Above normal	Strongly above	Above	Strong warming signal
2026	Above normal	Strongly above (north focus)	Near to above normal	Strong north warming

i. Rainfall is expected to be near-normal to below-normal in June 2026, especially over northern and central regions, with deficits of 10 to 30 mm in central and southern areas. Reduced rainfall combined with rising temperatures creates favorable conditions for heatwaves and forest fires, particularly heat waves in urban centers. Temperatures are projected to remain above normal, with persistent heat stress and strong positive anomalies over the northern and eastern regions.

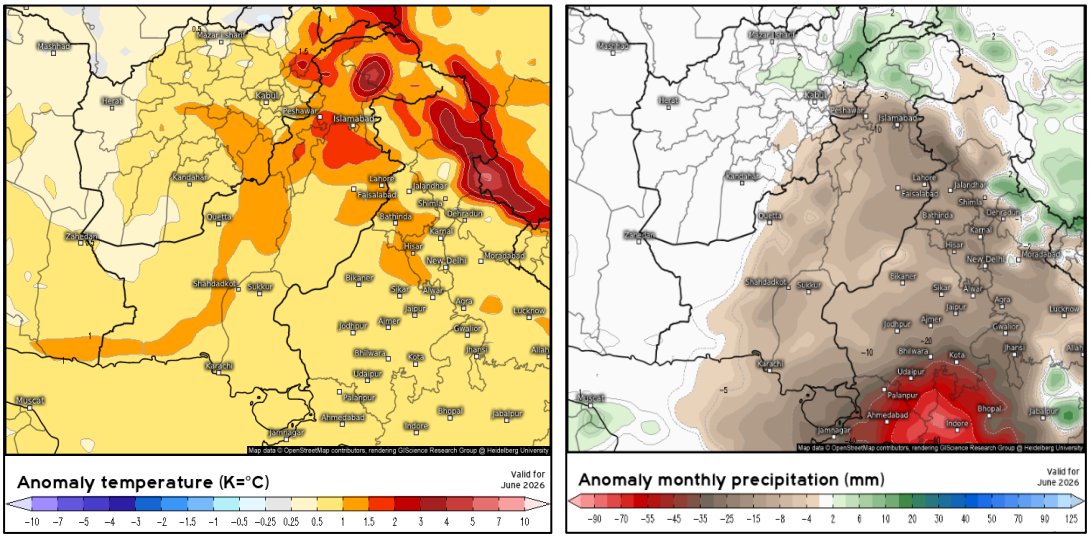


Figure 15: June 2026 Temperature and Precipitation Anomaly

PROVINCE-WISE METEOROLOGICAL OUTLOOK

1. **Punjab – Temperature Outlook** The seasonal outlook (April–May–June 2026) suggests that Punjab is likely to experience generally above-average temperatures, with a brief period of relatively cooler conditions in early April followed by a gradual intensification of heat toward early summer. During April, northern districts such as Rawalpindi, Islamabad, Jhelum, Gujrat, and Sargodha are expected to witness comparatively stronger warming, while central areas including Lahore and Faisalabad may observe modest positive anomalies, and southern districts such as Multan, Bahawalpur, and Dera Ghazi Khan are likely to remain closer to normal. This spatial pattern is expected to persist into May, accompanied by a steady and progressive rise in temperatures. By June, warming is projected to become more pronounced across the province, particularly in northern and central regions, with southern Punjab also experiencing moderately elevated conditions. Overall, the outlook indicates a gradual and sustained seasonal warming trend, with potential implications for heat wave management and water availability.

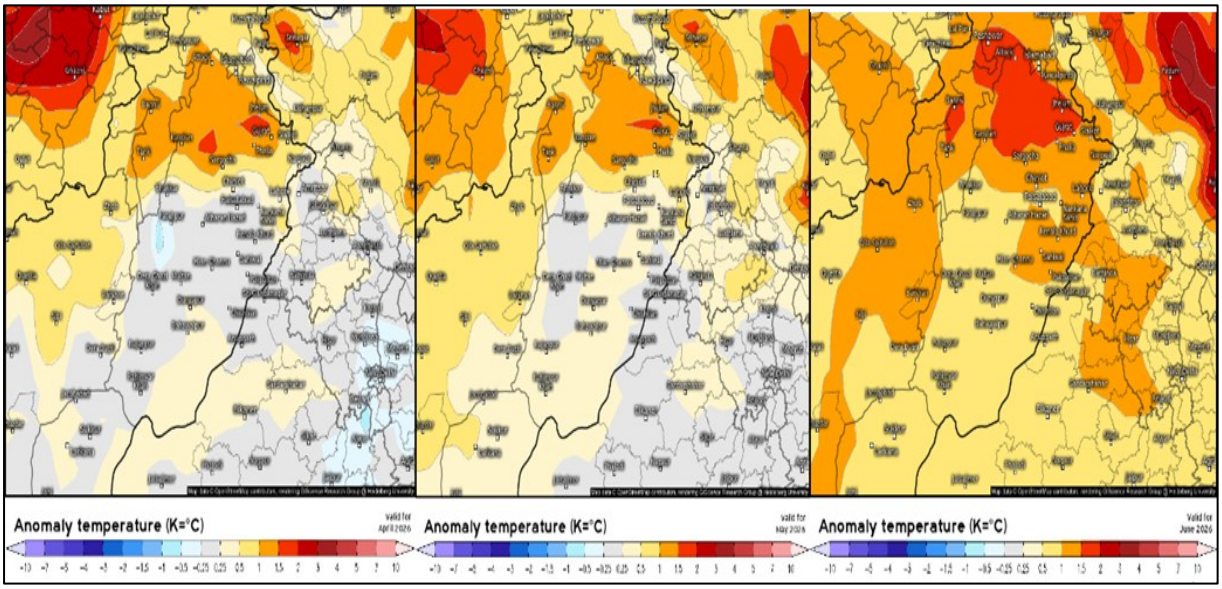


Figure 13 Punjab Temp Outlook Apr-May-Jun 2026

2. **Punjab - Precipitation Outlook**. Punjab is expected to experience a wetter-than-normal condition followed by a drier early summer in 2026. In April and May, northern and north-eastern districts such as Rawalpindi, Islamabad, Jhelum, Gujrat, and Sialkot are likely to receive near normal to above-average rainfall, while central districts including Lahore, Faisalabad, and Sargodha may experience moderate increases and southern areas such as Multan, Bahawalpur, and Dera Ghazi Khan remain closer to normal with a slight wet tendency. By June, however, a clear shift toward below-average precipitation is anticipated across most of the province. Overall, the outlook suggests favorable moisture conditions during April–May followed by emerging dryness in June.

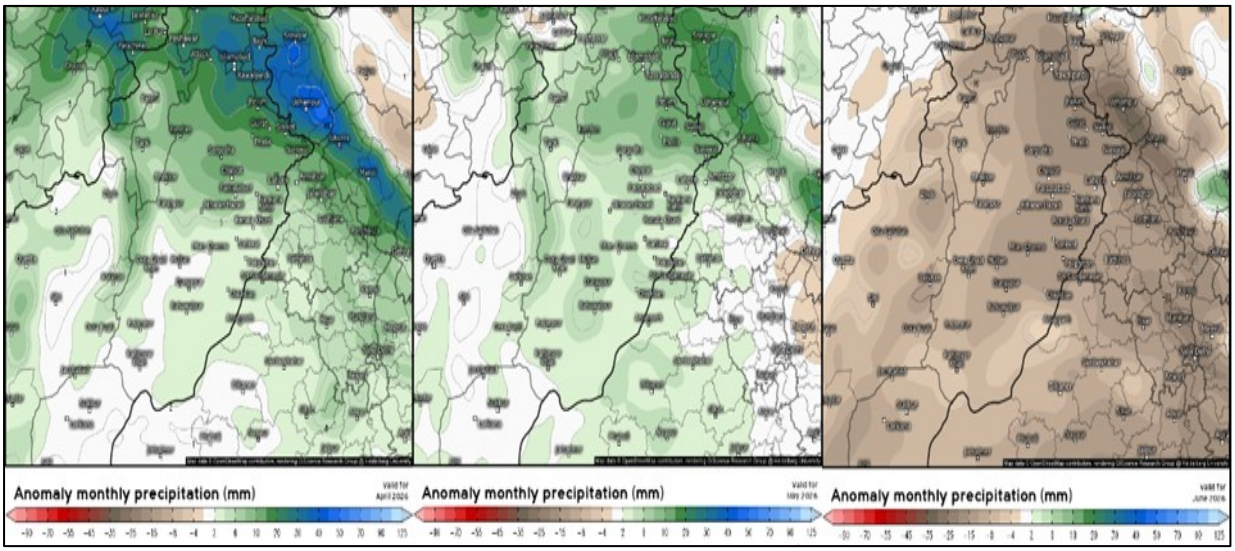


Figure 14 Punjab Precipitation Outlook Apr-May-Jun 2026

3. **Sindh - Temperature Outlook**. Sindh is expected to experience slightly above-average temperatures from April to June 2026, with anomalies gradually strengthening as the season progresses. In April, slightly warmer conditions are anticipated mainly in the southern coastal areas (Karachi, Thatta, Badin), while central and northern districts are likely to remain close to average. May is projected to follow a "warm north and south, near-normal center" pattern, with modest warming in northern and southern districts and central Sindh remaining near normal. By June, warming is expected to become more widespread, with the strongest anomalies in the northwestern districts, and moderate warming across central and southern areas. Overall, the outlook indicates a gradual increase in heat intensity, particularly in June, which may have implications for heat management, energy demand, and water and agricultural resources. While actual temperatures are expected to reach typical pre-monsoon highs, the season is generally anticipated to be warmer than historical averages.

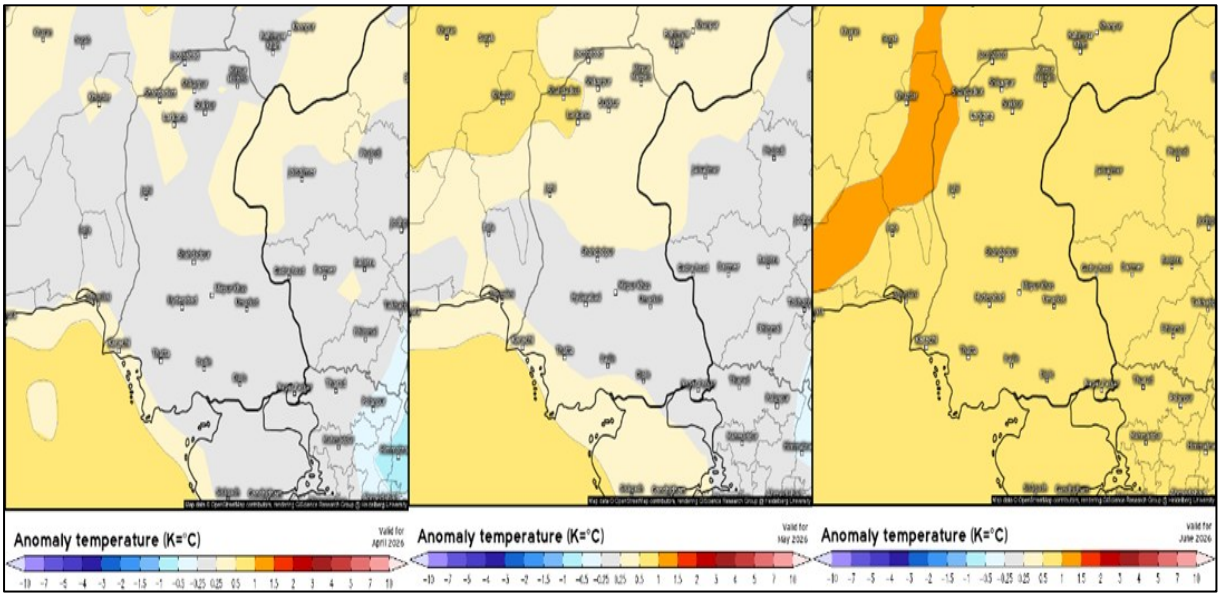


Figure 15 Sindh Temp Outlook Apr-May-Jun 2026

4. **Sindh - Precipitation Outlook**. Sindh is likely to experience near-normal to slightly above-average rainfall in April and May 2026, particularly in northern districts, while central and southern areas, including the coastal belt, remain close to normal. In June, the province is expected to shift to below-average precipitation, with moderate deficits across most districts and more pronounced drying in the southeast, including the Thar Desert fringe. Overall, the pre-monsoon period may see marginally wetter conditions in early spring, beneficial for soil moisture and early Kharif sowing, followed by drier conditions in June, which could heighten heat stress and pressure on water resources ahead of the main monsoon season.

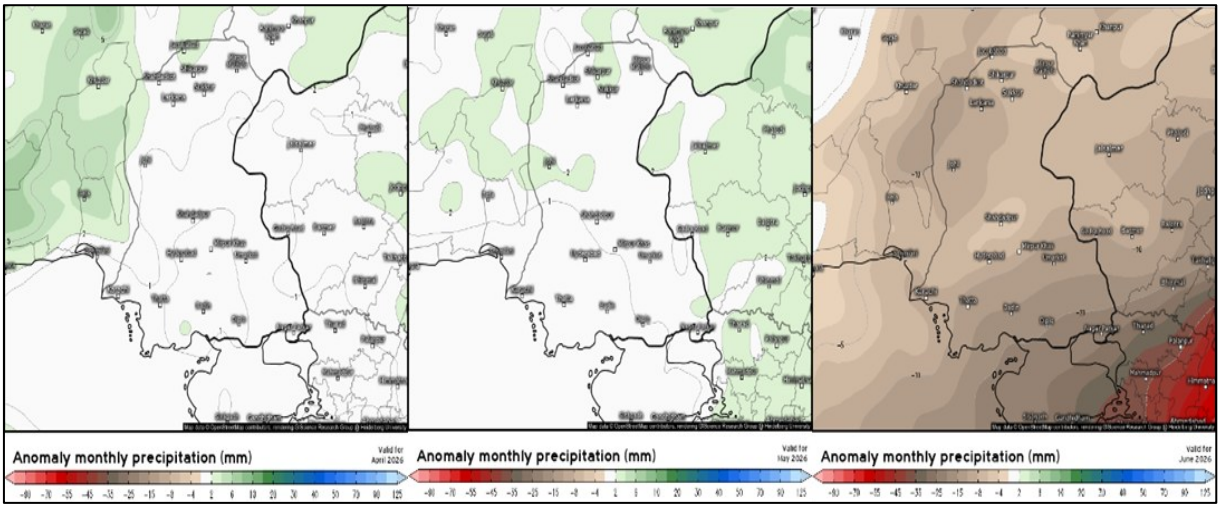


Figure 16 Sindh Precipitation Outlook Apr-May-Jun 2026

5. **Khyber Pakhtunkhwa (KPK) - Temperature Outlook**. Khyber Pakhtunkhwa (KPK) is expected to experience consistently above-average temperatures from April to June 2026, with anomalies intensifying into June. In April, strong warming is forecast across western, southwestern, and southern plains (Peshawar, Bannu, Tank), while northern mountainous areas see moderate increases. May continues this trend, with plains remaining notably warmer and northern elevations experiencing mild to moderate positive anomalies. By June, widespread warming is projected across the province, including northern mountains, with anomalies in many districts, raising the potential for heat stress, higher cooling demand, and accelerated snowmelt in upland areas. Overall, the outlook suggests an earlier and more intense onset of summer-like heat, particularly in plains and western districts, with higher daytime and nighttime temperatures, while pre-monsoon rainfall patterns are not captured in this forecast.

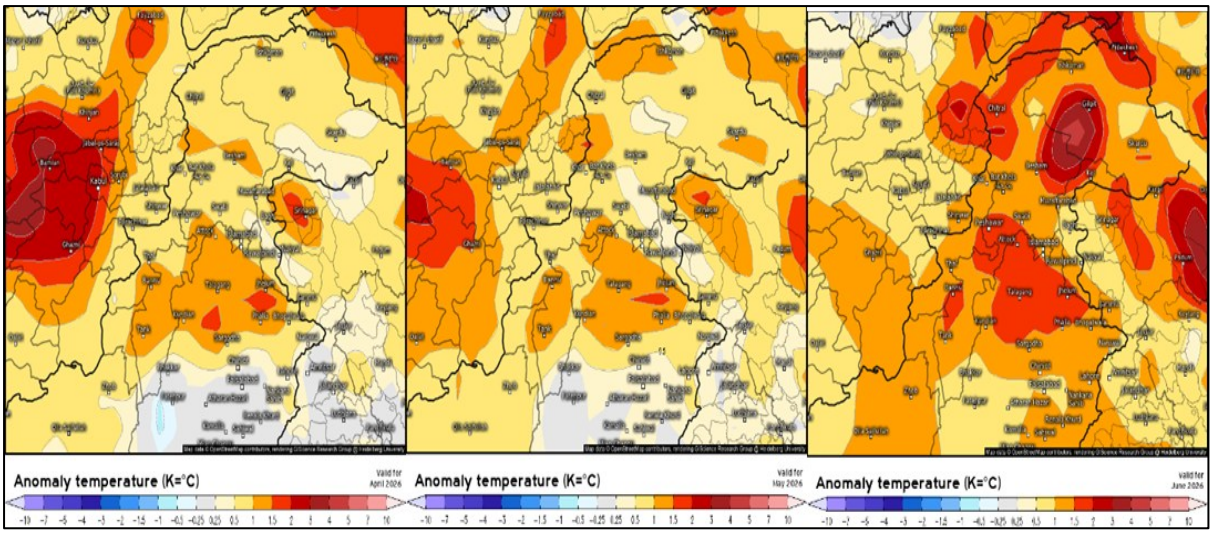


Figure 17 KPK Temp Outlook Apr-May-Jun 2026

6. **Khyber Pakhtunkhwa (KPK) - Precipitation Outlook**. In addition, the province is likely to experience wetter-than-average conditions in April and May**,** particularly across northern mountainous districts and western border areas, with positive precipitation anomalies supporting rabi crop harvesting and early Kharif sowing. Central and southern plains (Peshawar, Bannu, Tank, D.I. Khan) also see modestly higher rainfall, while isolated pockets in the north may experience heavier showers, with some risk of localized flooding or landslides. In June, the province shifts to below-average precipitation in the central and southern lowlands, whereas northern mountains remain slightly wetter. Overall, the outlook suggests an early-season moisture influx followed by drier conditions which combined with the strong warming trend, may increase heat stress, irrigation demand, and wildfire risk in the drier districts.

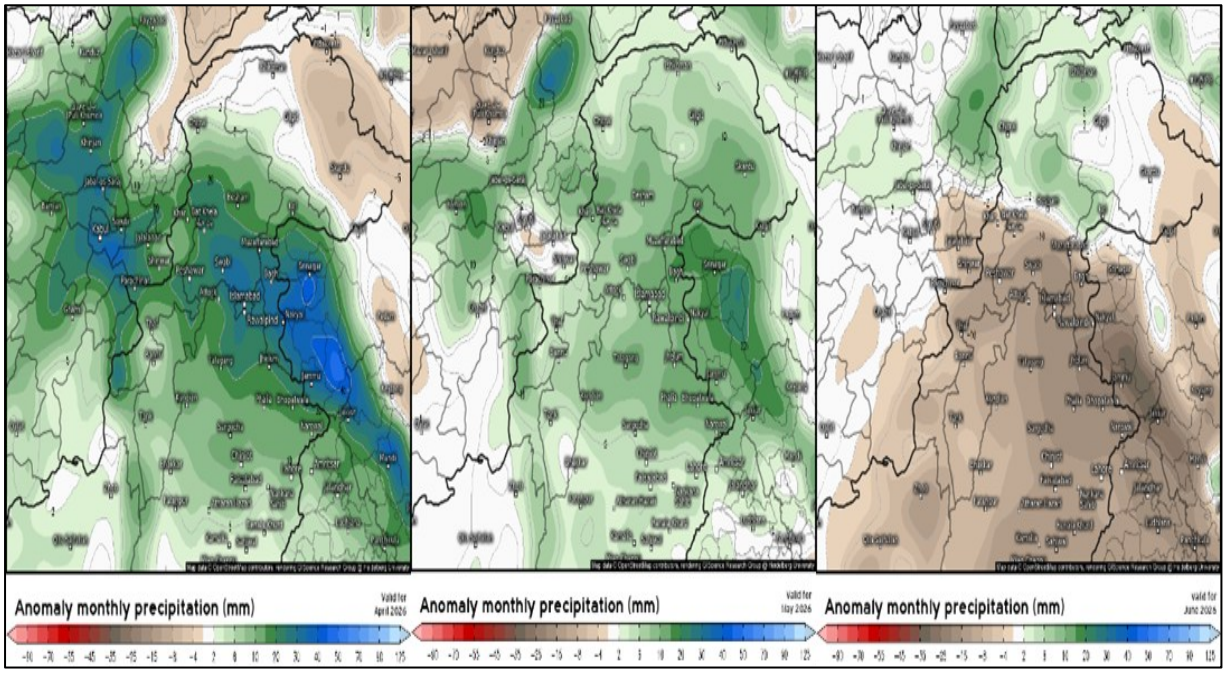


Figure 18 KPK Precipitation Outlook Apr-May-Jun 2026

7. **Balochistan - Temperature Outlook.** Balochistan is expected to experience consistently above-average temperatures from April to June 2026, with anomalies strengthening over time. In April, mild warming is anticipated in northern and northeastern districts, while central, southern, and western areas remain near normal. May will experience a province-wide shift to above-average temperatures, with the strongest warming in northern and eastern highlands. By June, widespread warming intensifies across central, eastern, and southern coastal regions, while western deserts experience more moderate anomalies. Overall, the outlook suggests a gradual heat buildup, particularly in June, with potential implications for heat stress, livestock and agricultural productivity, cooling demand, and water resources in the already arid and semi-arid regions.

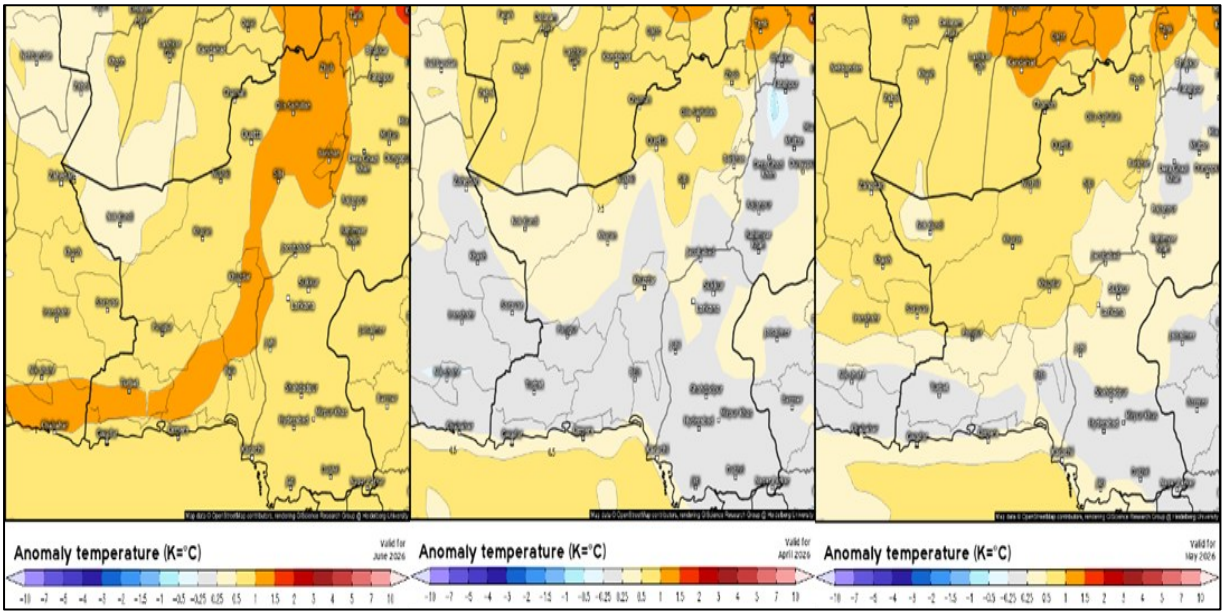


Figure 19 Balochistan Temp Outlook Apr-May-Jun 2026

8. **Balochistan - Precipitation Outlook**. The province is likely to experience slightly wetter-than-average conditions in April, particularly in northern and northeastern districts, supporting early Kharif sowing, pasture growth, and limited soil moisture recharge. In May, precipitation is expected to return to near-normal levels across most districts, while June shows a weak drying tendency, especially in eastern fringes, with central, western, and coastal areas remaining close to climatology. Overall, the outlook suggests modest early-season moisture followed by predominantly dry conditions, which, when combined with the above-average temperature signal, may increase heat stress, evaporation, and water demand for livestock and rain-fed agriculture, while no major flood risk is anticipated.

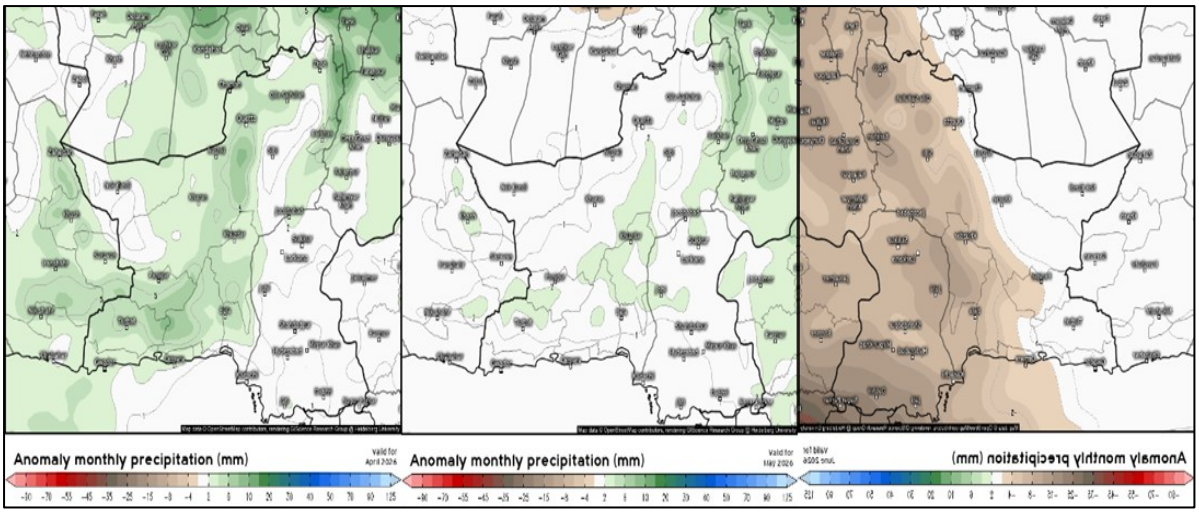


Figure 20 Balochistan Precipitation Outlook Apr-May-Jun 2026

9. **Gilgit-Baltistan (GB) Azad Jammu & Kashmir (AJK) - Temperature Outlook**

Gilgit-Baltistan and AJK are likely to experience consistently above-average temperatures from April to June 2026, with anomalies intensifying over time. In April, warming is most pronounced in AJK and eastern high-altitude zones, while central GB shows milder increases. May continues this pattern, with eastern AJK and northeastern sectors remaining significantly warmer and central GB near normal to slightly above average. By June, widespread strong warming is expected across the region, particularly in the Gilgit–Chilas–Skardu corridor, with AJK and eastern valleys also notably hotter than climatology. Overall, the outlook suggests earlier and more intense heat, which may accelerate snow and glacier melt, increase heat stress in valleys, elevate cooling demand, and pose potential challenges for high-altitude agriculture, water resources, and river flows.

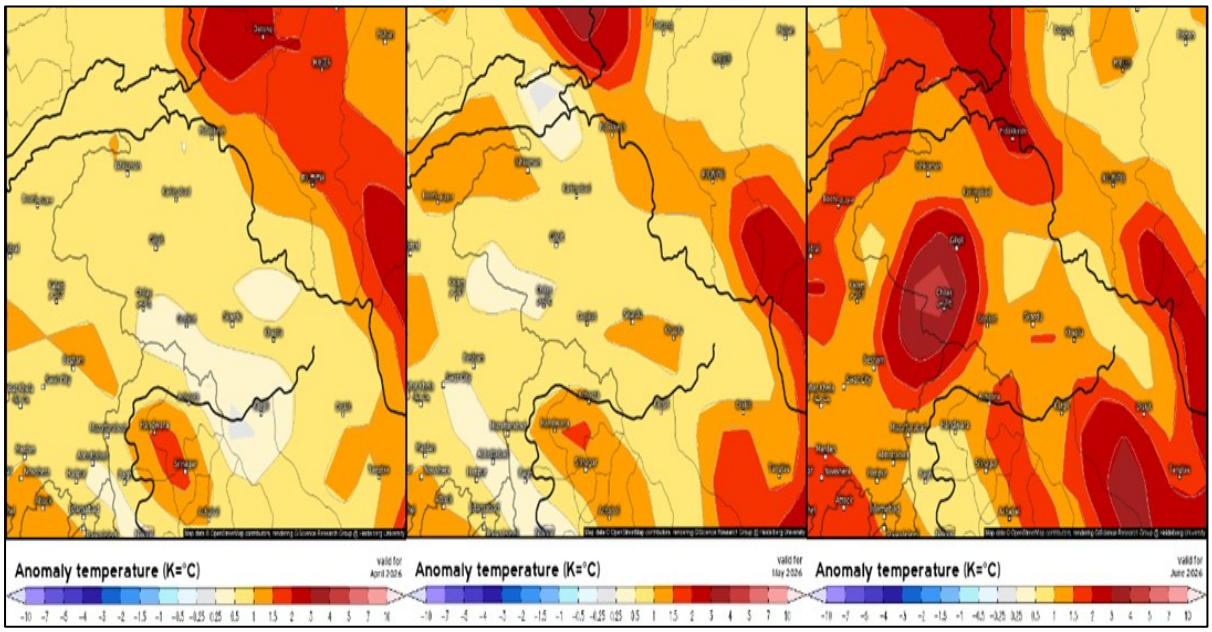


Figure 21 GB & AJK Temp Outlook Apr-May-Jun 2026

10. **<u>Gilgit-Baltistan (GB) Azad Jammu & Kashmir (AJK) - Precipitation Outlook</u>.**

Both regions are likely to experience wetter-than-average conditions in April and May, particularly across southern AJK and the western slopes (Srinagar–Muzaffarabad–Swat), while central and northern GB show more modest increases. By June, precipitation is expected to shift toward near-normal or slightly drier conditions, especially in southern AJK whereas northern GB retains small positive anomalies. Overall, the early-season wetness, coinciding with above-average temperatures, may support snowpack recharge, spring agriculture, and hydropower generation, but could also elevate flood and landslide risk in steep valleys. The subsequent June drying, combined with warming, highlights potential soil moisture deficits and increased irrigation demand in the lower valleys.

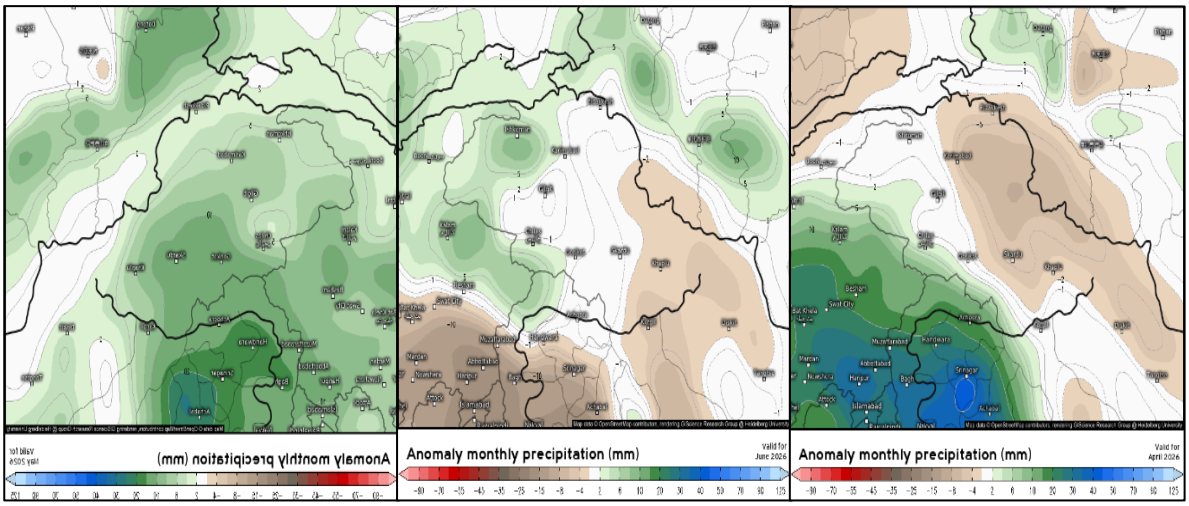


Figure 22 GB & AJK Precipitation Outlook Apr-May-Jun 2026

HEATWAVE

1. A heatwave is defined as a prolonged period of abnormally high temperatures, often accompanied by low rainfall, clear skies and persistent hot winds. In Pakistan, heatwaves occur in two forms: -

   a. Dry heatwaves under high-pressure systems (April–June).

   b. Humid heatwaves that elevate the Heat Index during the pre-monsoon period. Urban Heat Island effects in major cities further intensify impacts.

2. The landscape of heatwaves in Pakistan has transitioned from seasonal anomalies to a structural climatic feature. As of early 2026, data indicates a profound "thermal expansion" where the duration, frequency, and geographic footprint of extreme heat are recalibrating the nation's risk profile. It is anticipated that persistently above-normal temperatures across most of Pakistan, strongest in northern and north-western regions. Combined with variable rainfall (wetter north early, drier central/south in June), this creates conditions for gradual heat build-up, moderated initially by intermittent precipitation but intensifying later.

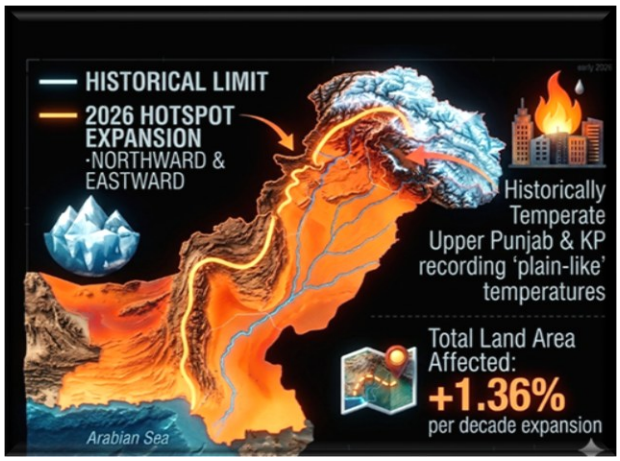


Figure 23 Heatwave Pakistan Outlook

3. **Comparative Analysis (2023-26)**. From 2023 to 2025, Pakistan transitioned from erratic dry heat and flooding to record-breaking thermal peaks with a +1.1°C mean deviation. The 2026 outlook indicates a "Gradual Build-up" pattern, where early rainfall provides temporary moderation before a high-intensity thermal onset. Unlike previous years, the 2026 June peak is characterized by extreme humidity and a North/NW concentration, significantly elevating the "feels-like" temperature.

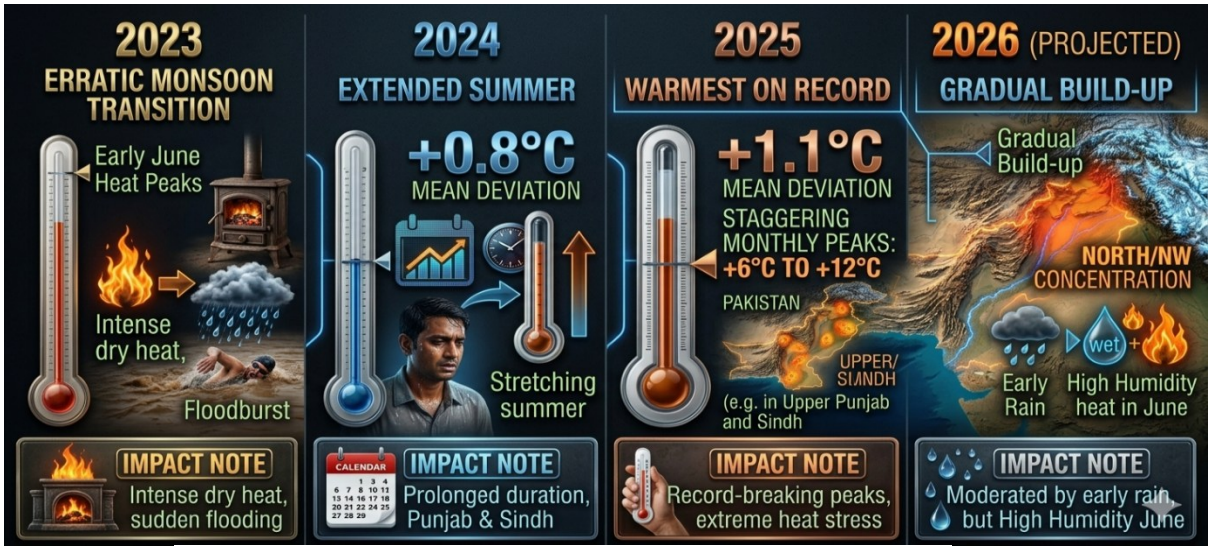


Figure 24 Heatwave Comparative Analysis 2023-2026

4. **Heatwave Thresholds**. Historically, the Pakistan followed the WMO standard which is the "5-5-5" Rule: A heatwave was declared when the daily maximum temperature exceeded the 30-year average maximum by 5°C for at least five consecutive days. In many regions, simple fixed thresholds were used (e.g., temperatures consistently above 40°C in the plains or 45°C for extreme alerts). Now, under the current National Heatwave Management Plan, the criteria have become "Impact-Based" and region-specific for example if a city's temperature exceeds its own 95th percentile for 3+ days, an alert is triggered. In coastal and pre-monsoon periods, "Apparent Temperature" is used. A heatwave can be declared even at lower absolute temperatures (e.g., 38°C) if high humidity pushes the Heat Index above 45°C.

a. **April 2026**. Frequent western disturbances are expected to keep the likelihood of a heatwave low across the plains of Punjab, KP and Sindh. However, toward the end of April, localized heat stress may develop in urban areas due to microclimatic conditions and the Urban Heat Island effect. Cities such as Lahore, Faisalabad, Multan, Bahawalpur, Sukkur, Kambar Shahdadkot, Dadu, Jamshoro, and Jacobabad may experience relatively higher temperatures.

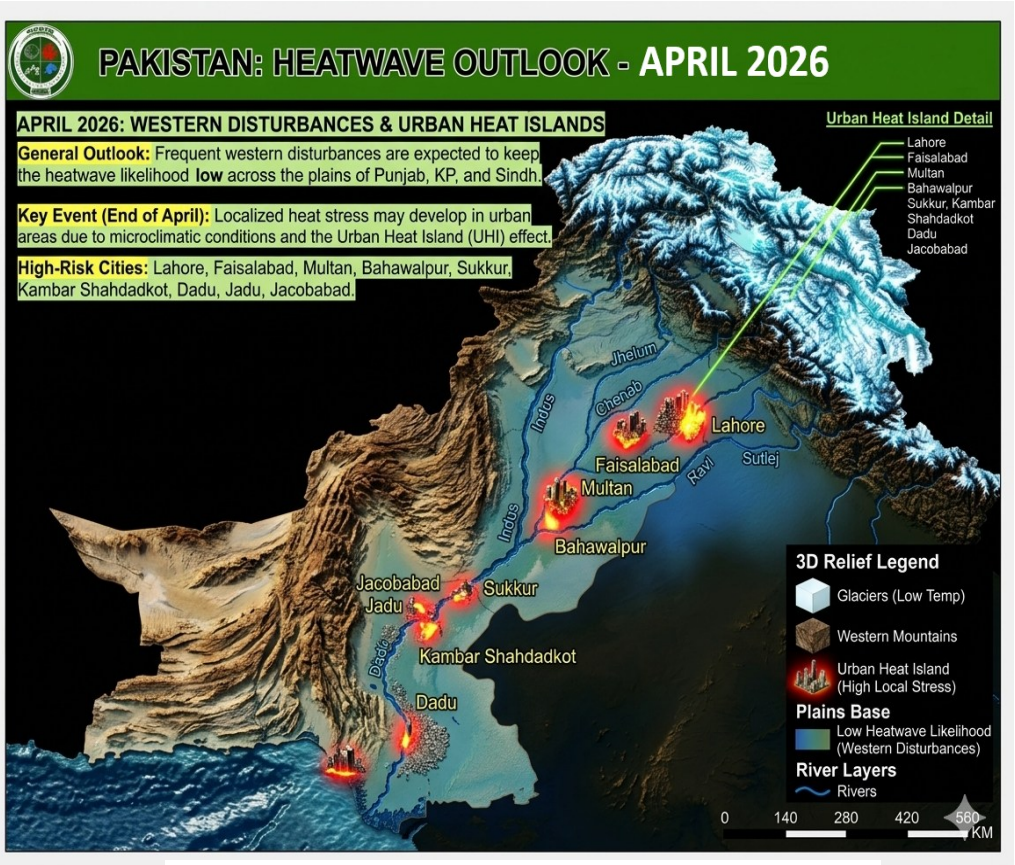


Figure 25 Heatwave Projection April 202626

b. **May 2026**. A gradual increase in temperatures across the plains may contribute to warmer conditions, with the possibility of moderate heat stress over parts of Punjab, KP, and Sindh. Urban centers including Lahore, Multan, Bahawalnagar, D.G. Khan, Bahawalpur, Dadu, Ghotki, Gujranwala, Jacobabad, Jhang,

Larkana, Rahim Yar Khan, and Sukkur could experience relatively higher temperatures due to localized microclimatic influences such as the Urban Heat Island effect. Nevertheless, the overall intensity and extent of warming are likely to remain subject to short-term atmospheric variations and may not be uniformly pronounced across all areas.

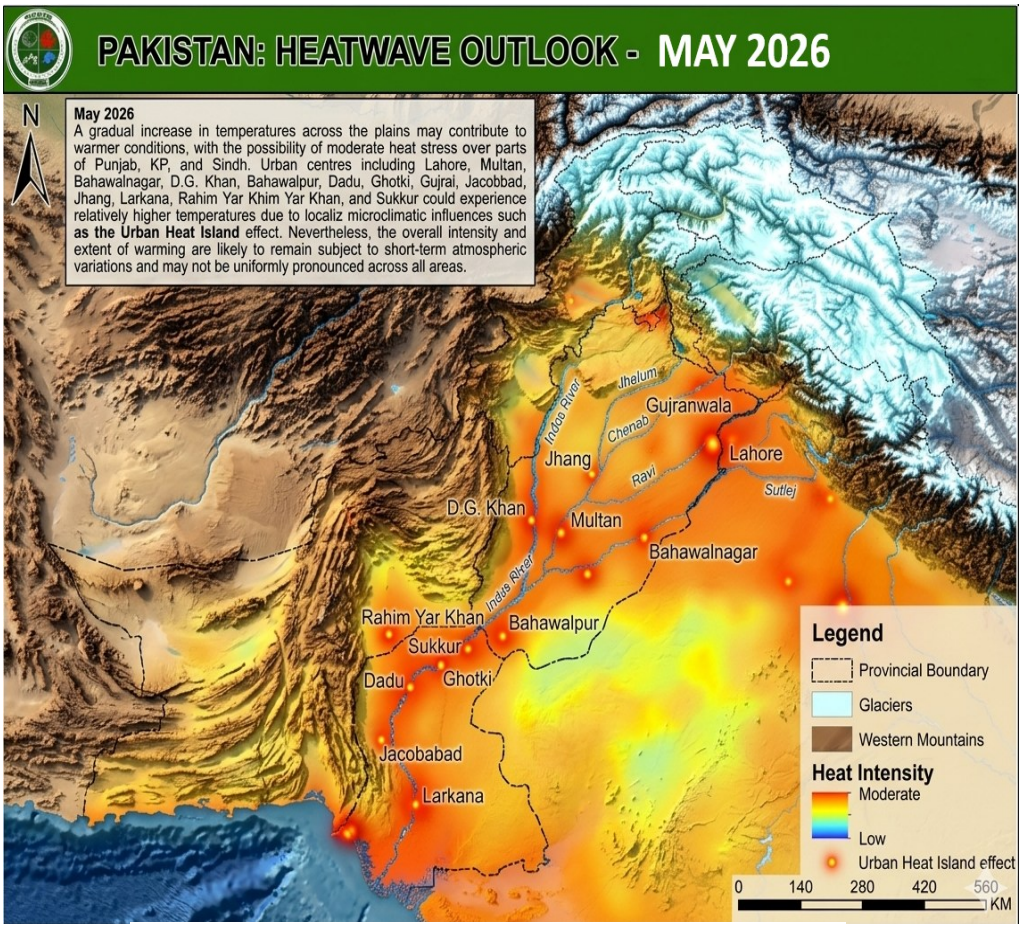


Figure 26 Heatwave Projection May 2026

c. **<u>June 2026</u>**. Elevated temperature conditions are expected to persist until mid-June across Sindh, southern Punjab, and parts of Balochistan. Late-June convective activity may bring temporary relief; however, hot and humid conditions are likely to sustain high heat index values, compounded by precipitation deficits.

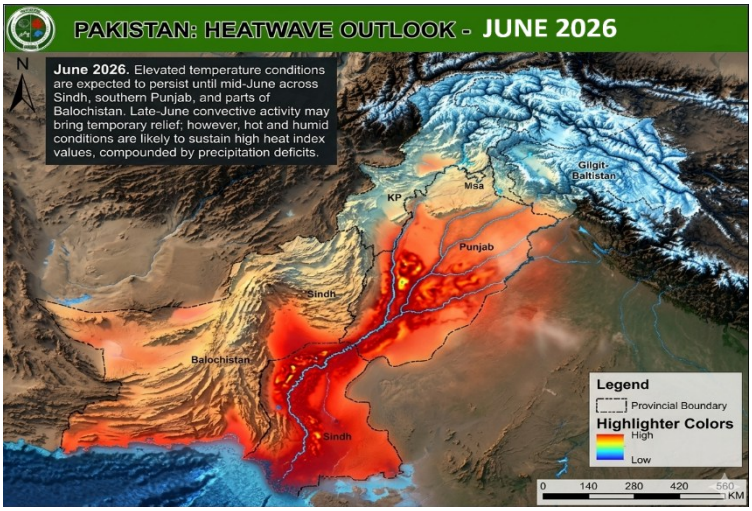


Figure 27 Heatwave Projection June 2026

CASCADING DISASTERS AND IMPACTS

1. In Pakistan, the intersection of shifting heatwave patterns and the 2026 climate outlook creates a high-risk environment for food security. The "phenological squeeze", where rising temperatures shorten the natural growth cycle, is now a primary driver of yield gaps in the country. While heat affects all stages, the physiological impact is most devastating during reproductive phases: -

a. **Grain Filling (Wheat)**. This is the **most vulnerable** stage for Pakistan's Rabi crop. High temperatures in late March and April (now extending into 2026) cause "terminal heat stress," leading to shriveled grains and reduced kernel weight.

b. **Flowering/Anthesis (Rice & Cotton)**. During May and June, extreme heat leads to pollen sterility. In cotton, it causes "boll shedding," where the plant drops its fruit to survive the thermal load.

c. **Germination (Maize)**. High soil temperatures in June can lead to poor seedling emergence, resulting in thin crop stands and lower overall biomass. When heatwaves coincide with water scarcity, as projected for central and southern Pakistan in June 2026, the impact is not additive, it is multiplicative.

d. **Yield Loss**. Combined stress can lead to a 20% to 30% reduction in yield for cereal crops in the affected areas.

e. **Irrigation Demand**. Increased evaporation rates during a heatwave can raise irrigation requirements by 15% to 25% just to maintain the same soil moisture levels.

f. **Specific High-Risk Districts**. South Punjab: Multan, Khanewal, Bahawalpur, and Rahim Yar Khan (Cotton/Wheat belt). Sindh: Sukkur, Ghotki, Jacobabad, and Larkana (Rice/Wheat belt). KP: D.I. Khan (Maize and Sugarcane) and parts of Balochistan.

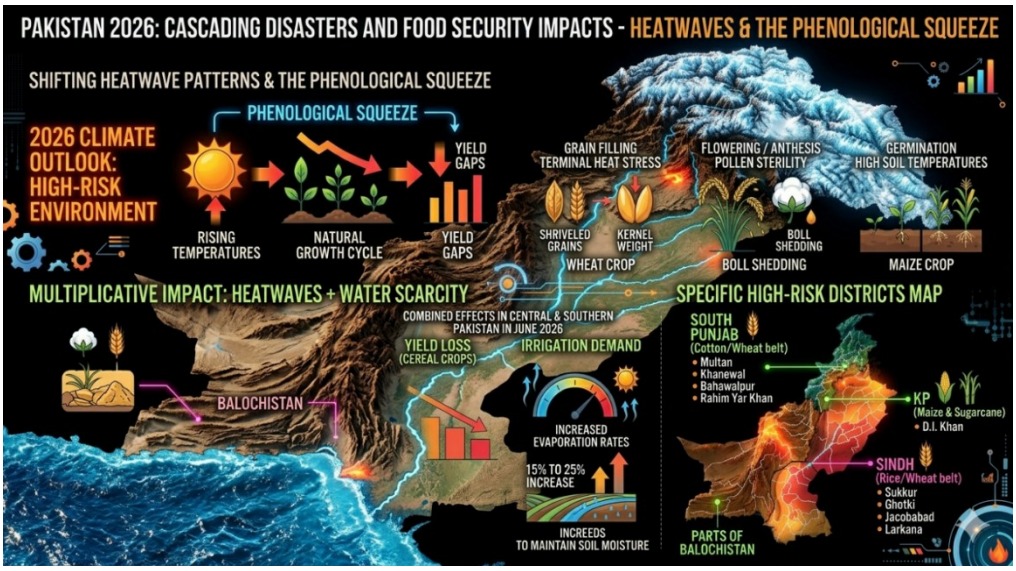


Figure 28 Cascading Disasters & Impacts

g. **Elements/Areas at risk**

Ser	Element/Feature	Count	Detail
(1)	Tehsil	416	Punjab, Sindh, Bln, KPK
(2)	UCs	5,508	Punjab, Sindh, Bln, KPK
(3)	Schools	51,505	Punjab, Sindh, Bln, KPK

FOREST FIRES

1. The spring and pre-monsoon period (April–June 2026) is expected to begin with relatively dry conditions and gradually increasing temperatures across most parts of Pakistan. Rainfall during April and May is projected to remain normal to above normal, while convective activity is expected to increase during late May and June, potentially producing localized thunderstorms, hailstorms, and short-duration heavy rainfall events. Temperatures across the country are expected to remain above normal, with heatwave conditions possible in southern Punjab and Sindh during May and June. The combination of high temperatures, low relative humidity, and dry vegetation may significantly increase forest fire risk in northern Pakistan, particularly across Khyber Pakhtunkhwa, the *Potohar* region, and Azad Jammu & Kashmir.

2. During the spring and pre-monsoon season, forest fire risk across Pakistan particularly in Khyber Pakhtunkhwa, the *Potohar* Plateau, and Azad Jammu & Kashmir (AJ&K) is expected to increase due to rising temperatures, declining relative humidity, and the drying of forest litter and vegetation fuels. The combination of elevated temperatures, low moisture content in vegetation, and occasional gusty winds creates favorable conditions for the ignition and rapid spread of wildfires, especially in forested mountainous regions.

a. **April 2026 - Onset of Fire Season and Risk Expansion**. During April, gradually increasing temperatures and decreasing humidity begin to dry forest litter, grasses, and small vegetation. These fine fuels become highly combustible, increasing the likelihood of fire ignition and initial spread. Wind activity during the pre-monsoon period may further facilitate surface fire propagation across forest floors and dry grasslands. As a result, forest fire risk is expected to expand geographically, particularly across northern KP and the Potohar region. Vulnerable districts are Abbottabad, Mansehra, Islamabad, Shangla, Buner, Attock, Chakwal, Jhelum, Kushab, Haripur, Mianwali, Musa Khel, Lower Dir, Swat.

Figure 29 Forest Fire Risk Index April 2026

b. **<u>May 2026 - Peak Forest Fire Risk</u>**. May is expected to represent the peak of the forest fire season due to the combined effect of maximum pre-monsoon temperatures, minimal relative humidity, and stronger winds. During this period, fuel moisture content reaches its lowest levels, significantly increasing the probability of both fire ignition and rapid-fire spread. Dry forest litter, pine needles, shrubs, and grasses can ignite easily and allow fires to spread quickly across steep mountainous terrain, making suppression efforts more difficult. The forest fire risk is also expected to expand eastward into Azad Jammu & Kashmir, reflecting the broader regional warming and drying pattern. Vulnerable districts are Abbottabad, Mansehra, Islamabad, Shangla, Buner, Attock, Chakwal, Jhelum, Kushab, Haripur, Musakhel, Lower Dir, Swat, Battagram, Sudhnoti, Bagh, Poonch, Kotli, Malakand, Kohistan, Barkhan, Loralai.

Figure 30 Forest Fire Risk Index April 2026

c. **<u>June - Persistent High Risk</u>**. During June, extreme temperatures may continue, sustaining forest fire risk in core forested zones of Khyber Pakhtunkhwa and AJK. However, localized thunderstorms and early monsoon incursions may gradually increase atmospheric moisture in some areas. These conditions may partially reduce fire risk in certain districts, although the risk will remain elevated in regions where dry fuels persist or where rainfall remains limited. Vulnerable districts are Abbottabad, Mansehra, Islamabad, Shangla, Buner, Attock, Chakwal, Jhelum, Kushab, Haripur, Musakhel, Lower Dir, Swat, Battagram, Sudhnoti, Bagh, Poonch, Kotli, Dir, Malakand, Kohistan, Barkhan, Loralai

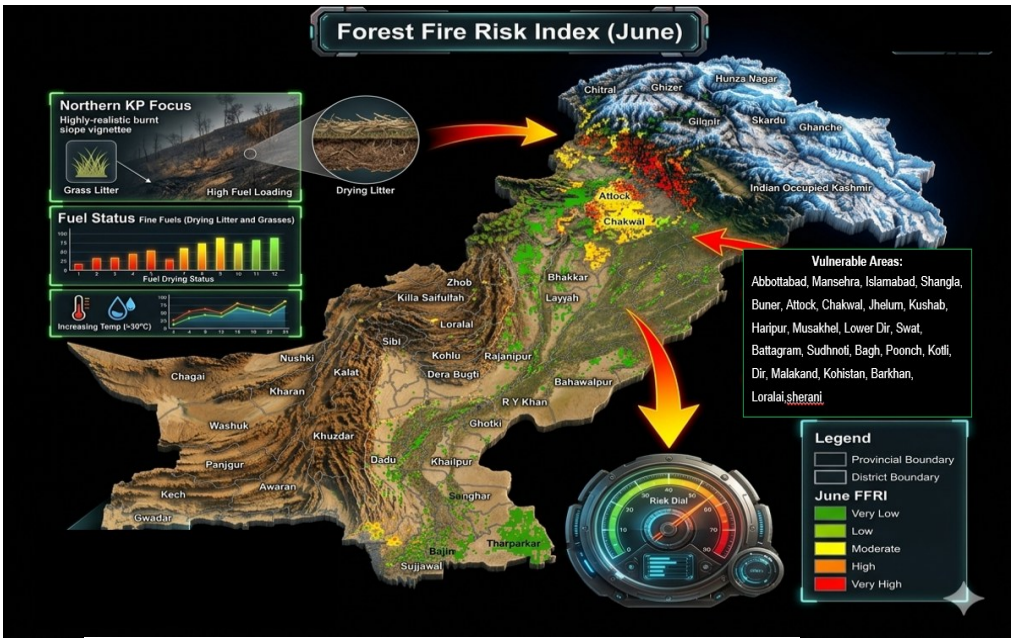


Figure 31 Forest Fire Risk Index June 2026

d. **<u>Pakistan Forest Fire Comparative Analysis (2022-2026)</u>**. This section provides a comparative overview of forest fire patterns in Pakistan from 2022 to 2026, highlighting variations in onset, intensity, spread, and key drivers across the years. It shows that fire activity remained moderate and localized in 2022 and 2024, increased in 2023 due to above-normal temperatures and early heatwaves, and reached its most severe and widespread level in 2025 under extreme heat, prolonged dryness, and low relative humidity. For 2026, the outlook indicates a delayed onset with moderate to high fire activity, with the main risk concentrated in May and June rather than earlier in the season. The map emphasizes major fire-prone regions including KP, Kohistan, Swat, Mansehra, Abbottabad, AJK, Shangla, Dir, Malakand, Potohar, and parts of Balochistan, while the chart visually compares average fire intensity with the widespread index over time. Overall, the graphic suggests that meteorological conditions, especially temperature anomalies, rainfall deficits, and fuel moisture, play a decisive role in determining the scale and severity of wildfire seasons in Pakistan.

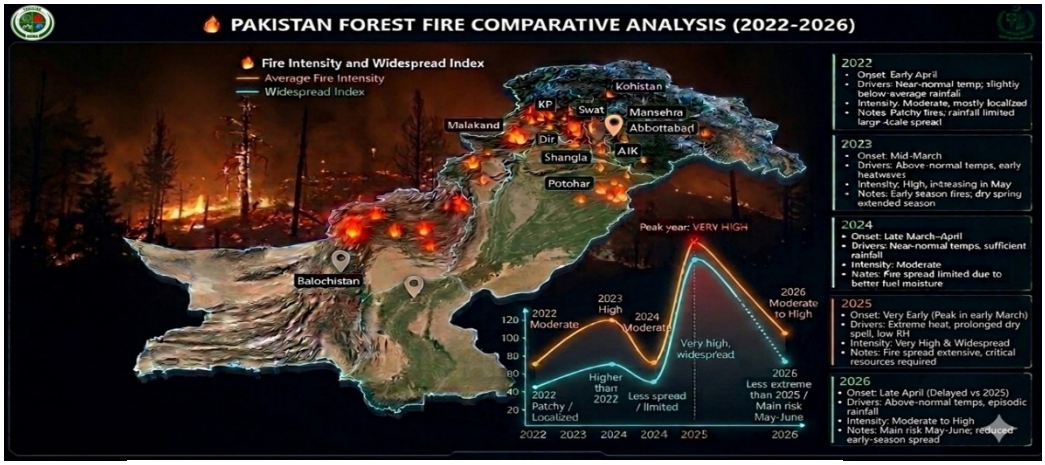


Figure 32 Pakistan Forest Fire Comparative Analysis

e. **Forest Fire Risk Exposure Assessment**. Forest fire exposure in the selected districts varies according to forest type, vegetation characteristics, and historical fire patterns. The total forested area in the study region is dominated by **Chir pine forests**, followed by moist temperate forests, subtropical scrub, tropical thorn, and dry temperate/juniper forests.

f. **Forest Type – Area – Fire Risk**

Forest Type	Dominant Districts	Estimated Total Area (ha)	% of Forest	Fire Risk % (Historical)	Area at Fire Risk (ha)
Chir Pine Forest	Abbottabad, Mansehra, Swat, Dir, Malakand, Buner, Shangla, Haripur, Islamabad	600,000	45%	20–30%	120,000 – 180,000
Moist Temperate Forest	Swat, Kohistan, Battagram, AJK (Bagh, Poonch, Sudhnoti)	300,000	22%	10–15%	30,000 – 45,000
Subtropical Broadleaf / Scrub	Attock, Chakwal, Jhelum, Khushab	200,000	15%	8–12%	16,000 – 24,000
Tropical Thorn Forest	Attock, Chakwal, Khushab, Musakhel	150,000	11%	5–10%	7,500 – 15,000
Dry Temperate / Juniper	Musakhel, Barkhan, Loralai	80,000	7%	8–12%	6,400 – 9,600

g. **District-Level Exposure**

Risk Class	Districts	Dominant Forest	Estimated % Area at Risk
🔴 **Very High**	Abbottabad, Mansehra, Swat, Dir, Malakand, Buner, Shangla	Chir Pine	20–30%
🟠 **High**	Kohistan, Battagram, Bagh, Poonch, Sudhnoti, Kotli	Mixed Conifer	10–20%

🟠 **Moderate–High**	Islamabad, Haripur, Attock, Chakwal, Jhelum, Khushab	Scrub + Pine mix	8–15%
🟡 **Moderate**	Musakhel, Barkhan, Loralai	Thorn / Juniper	5–12%

Exposure Analyses

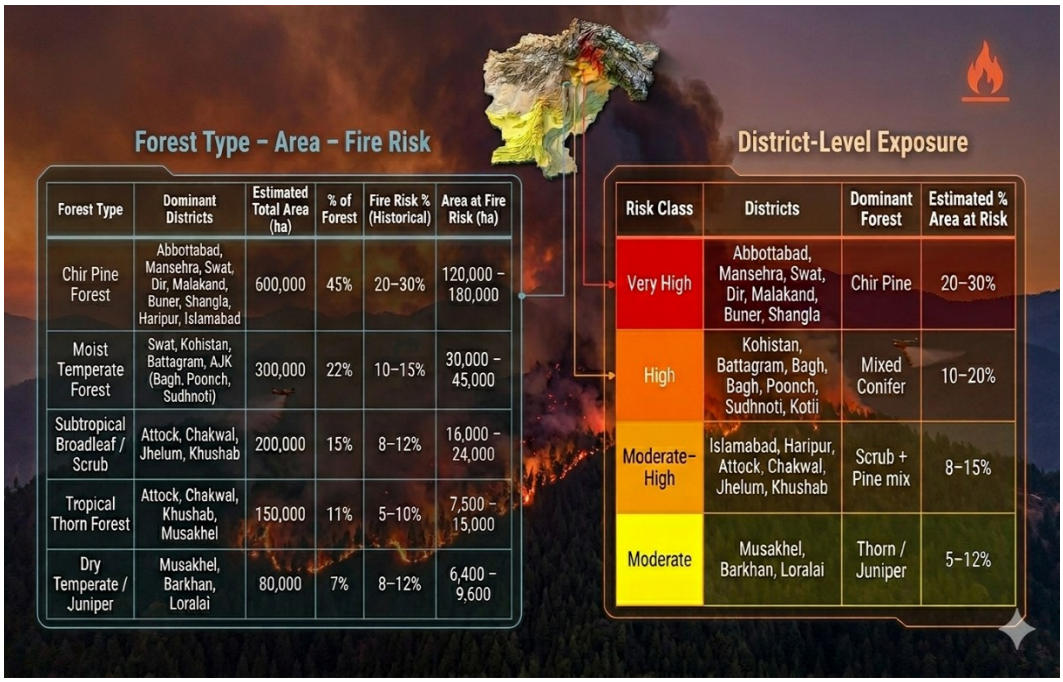


Figure 33 Exposure Analysis

LANDSLIDES

1. Analysis indicates a landslide susceptibility from April to June, primarily driven by increasing pre-monsoon precipitation, rising temperatures, and snowmelt processes in high-altitude areas. Early warning indicators suggest that slope instability intensifies toward June, when early monsoon rainfall begins to affect northern Pakistan. The Upper Dir–Swat–Kohistan corridor in KP, Neelum Valley in AJK, and several districts of Gilgit-Baltistan emerge as the most vulnerable areas during the assessment period.

2. Below is a seasonal landslide early warning assessment for the months of April, May, and June 2026 across the mountainous regions of Khyber Pakhtunkhwa, Azad Jammu & Kashmir, and Gilgit-Baltistan. These regions are characterized by steep terrain, complex geological formations, and high rainfall variability, which collectively increase the susceptibility to landslides.

3. **Rainfall and Temperature as Landslide Triggering Factors**: -

   a. Rainfall and temperature are two of the most important environmental triggers influencing landslide occurrence in mountainous regions of Pakistan.

   b. Increased rainfall contributes to landslides by raising soil moisture content and pore-water pressure within slopes, which reduces the shear strength of soil and rock materials. When rainfall intensity or duration exceeds the infiltration capacity of the slope, slope materials become saturated, increasing the likelihood of slope failure. Temperature also plays a critical indirect role in landslide initiation. During spring and early summer, rising temperatures accelerate snowmelt in high-altitude regions of KP, AJK, and GB. The resulting meltwater infiltrates slopes and contributes to increase in groundwater pressure. When combined with rainfall events, this process significantly enhances slope instability. The combined effects of rainfall accumulation, snowmelt, and temperature rise are therefore key drivers of landslide activity during the April–June transition period, especially in the Himalayan and Karakoram Mountain ranges.

4. **Landslide Early Warning Overview - April.** During April, low to moderate landslide susceptibility is observed across parts of upper Khyber Pakhtunkhwa, including Kohistan, Upper Dir, Lower Chitral, Swat, Buner, Mansehra, Battagram, Shangla, Kurram, Abbottabad, and Haripur. Similar conditions are identified in Gilgit-Baltistan, particularly in Astore, Diamer, Gilgit, Tangir, and Darel. Localized susceptibility clusters are observed in Upper Dir, Swat, Kohistan, and parts of Azad Jammu & Kashmir, including Neelum Valley, Muzaffarabad, and Bagh.

Landslide Early Warning Overview - April

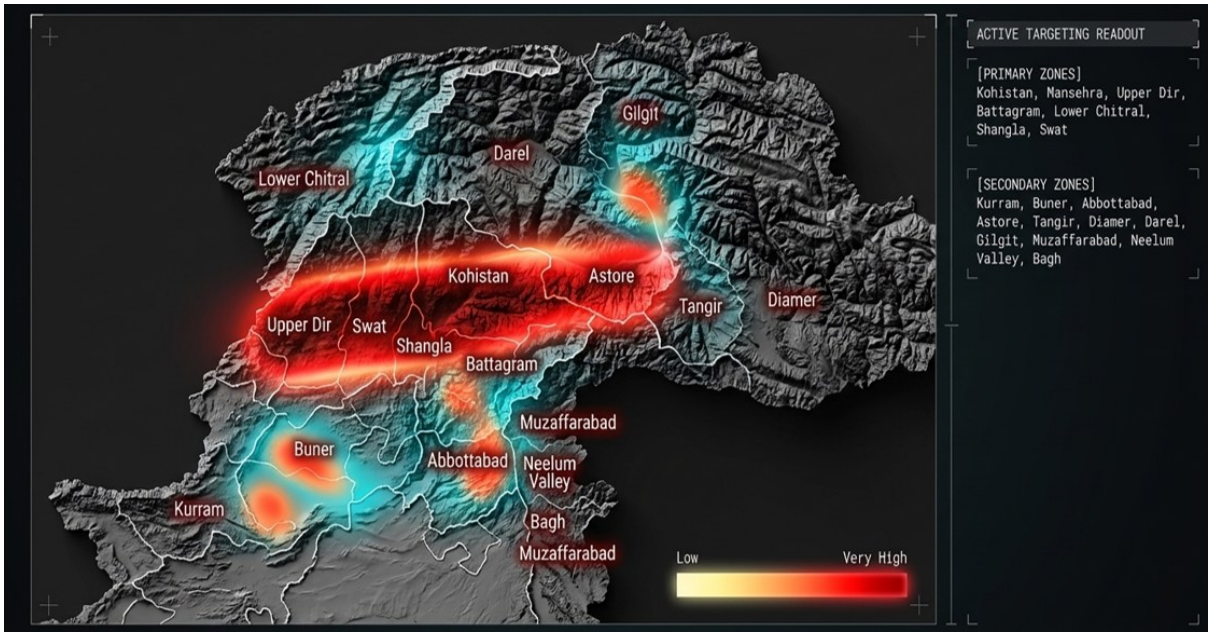


Figure 34 Landslide Susceptible Areas April 2026

5. **Landslide Early Warning Overview – May**. In May, the spatial distribution of landslide susceptibility becomes more concentrated in northern mountainous regions, particularly in Chitral (Upper and Lower), Upper Dir, and Swat in KP, and in parts of Gupis-Yasin and Shigar districts in Gilgit-Baltistan. Although the overall affected area becomes slightly more localized compared to April, landslide intensity increases in specific hotspots. These patterns indicate growing slope instability due to the combined effects of cumulative rainfall, ongoing snowmelt, and increasing soil saturation levels. The presence of concentrated susceptibility clusters suggests the development of early slope failure conditions in high-elevation valleys and along steep terrain corridors.

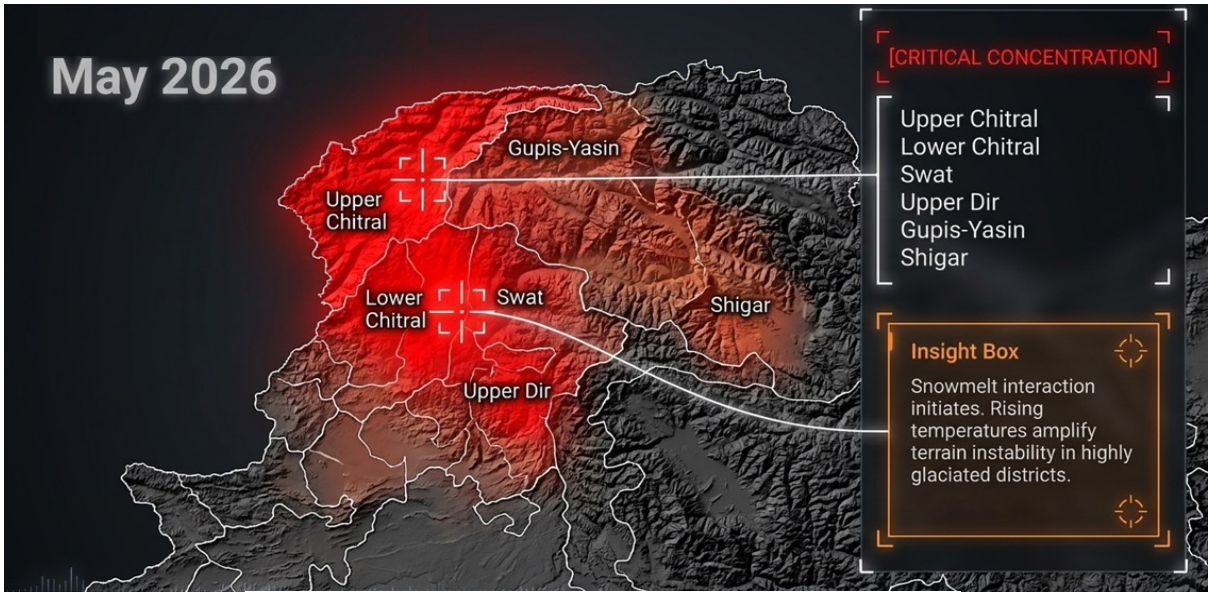


Figure 35 Landslide Susceptible Areas May 2026

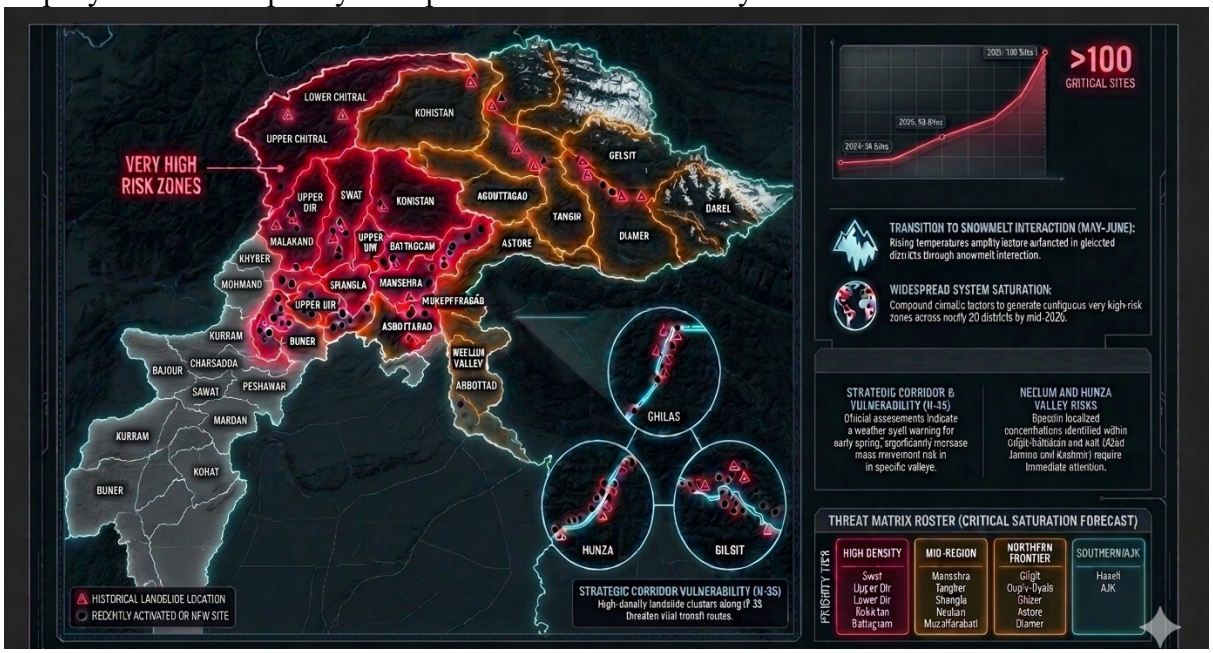
6. **Landslide Early Warning Overview – June**. June demonstrates a significant escalation in landslide warning levels across the mountainous regions of northern Pakistan. High-density susceptibility clusters appear prominently across Swat, Upper Dir, Lower Dir, Shangla, Upper and Lower Kohistan, Battagram, Mansehra, and Torghar in KP. In AJK, elevated landslide risk is observed in Neelum Valley, Muzaffarabad, Haveli, and Bagh. Similar high-risk patterns are evident in Diamer, Astore, Ghizer, Gupis-Yasin, and Gilgit districts of Gilgit-Baltistan. This escalation corresponds with the onset of early monsoon rainfall combined with increased antecedent soil moisture, resulting in higher slope saturation and reduced slope stability. As a result, June represents the peak landslide susceptibility period within the April–June assessment period.

Figure 36 Landslide Susceptible Areas June 2026

7. **Comparative Analyses**. The observed escalation from the 2024–2025 baseline to the current 2026 situation is driven by compounding geophysical and climatic processes that systematically reduce slope stability within the very high hazard zones. Above-normal temperatures, with anomalies reaching up to 3+°C, in key valleys such as Gilgit and Chilas, have accelerated snow and glacial melt at mid-to-high altitudes. This increased meltwater infiltration raises pore-water pressure, decreases effective shear strength, and destabilizes both historical and previously marginal slopes. Concurrently, intensified precipitation events-exceeding long-term averages-further saturate the fractured bedrock, creating conditions for rapid shallow and deep-seated failures.

8. In tectonically active corridors like Chipurson Valley (Hunza region), recent seismic events have generated persistent rock-mass fractures and loosened glacial-adjacent terrain, priming these areas for reactivation. The spatial comparison on the map clearly illustrates this progression: pink triangular markers represent legacy sites that have not stabilized under

sustained hydrological stress, while the bright black dots denote newly activated or progressively weakened slopes. The net result is a marked increase in critical unstable sites-now exceeding 100+-concentrated along the strategic N-35 corridor and within the most vulnerable valleys (Hunza, Gilgit, Diamer/Chilas, Neelum, Ghizer/Gahkuch, Nagar, Astore, and Skardu). This dynamic reflects a clear shift from episodic to intensifying landslide risk, where climate-induced melt and rainfall interact with pre-existing seismic weakening to amplify both the frequency and spatial extent of instability.



9. During April, landslide susceptibility remains relatively dispersed and moderate, reflecting early spring environmental conditions with limited slope saturation. Initial snowmelt and scattered rainfall contribute to localized instability in parts of KP, AJK, and GB. In May, the spatial pattern of landslide susceptibility concentrated within specific mountainous districts, particularly in northern KP and parts of Gilgit-Baltistan. The combination of increasing rainfall and sustained snowmelt begins to elevate slope failure risk in these regions. By June, landslide susceptibility expands significantly and becomes both spatially extensive and more intense, particularly across the Swat–Dir–Kohistan corridor in KP, Neelum Valley in AJK, and several districts of Gilgit-Baltistan. This shift corresponds with early monsoon rainfall and higher soil saturation levels, which increase the likelihood of slope failure. Overall, the comparative analysis highlights a seasonal transition from moderate spring instability to elevated early monsoon landslide risk, emphasizing the need for strengthened early warning and preparedness measures prior to the onset of peak rainfall.

Exposure - Land slide Hazard

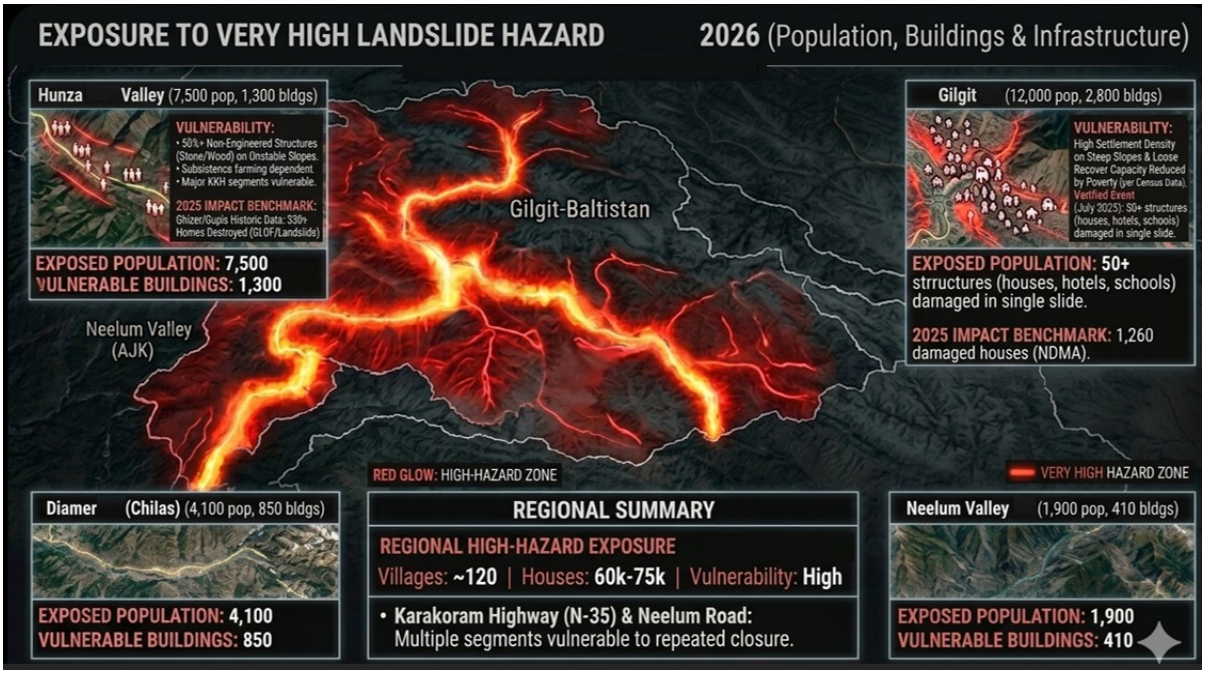


Figure 37 Landslide Exposure 2026

Region	Exposed Population	Vulnerable Buildings	Key Vulnerability Highlights
Hunza Valley	7,500	1,300	50%+ non-engineered stone/wood structures on steep slopes; subsistence farming; major KKH segments
Gilgit	12,000	2,800	High settlement density on loose slopes; poverty reduces recovery capacity
Diamer (Chilas)	4,100	850	Dense riverbank communities along KKH
Neelum Valley	1,900	410	Scattered villages along riverbank and road alignments

10. The exposure pattern within the very high hazard zones reflects a concentrated overlap of dense human settlement, critical infrastructure, and fragile non-engineered construction directly atop the most unstable terrain. In Hunza Valley, approximately 7,500 residents and 1,300 buildings lie within the red-glow hazard corridors, where over 50 % of structures are stone-and-wood constructions on steep, unstable slopes directly adjacent to major KKH segments. Gilgit shows even higher exposure, with 12,000 people and 2,800 buildings at risk, driven by high settlement density on loose slopes and reduced community recovery capacity due to prevailing poverty. Diamer (Chilas) records 4,100 exposed residents and 850 buildings, while Neelum Valley contributes an additional 1,900 people and 410 structures, all situated along riverbank and road alignments repeatedly affected by mass movement.

11. These figures are validated by 2025 impact records, including 330+ homes destroyed in Ghizer/Gupis events and over 50 structures (houses, hotels, schools) damaged in a single July 2025 landslide in Diamer. Regionally, this translates to roughly 120 villages, 60,000–75,000 houses, and multiple segments of the Karakoram Highway (N-35) and Neelum Road facing repeated closure. The spatial concentration of exposure along the glowing red hazard corridors demonstrates a clear geo-physical reality: population and infrastructure have expanded into the exact zones where slope instability is highest, creating a high-consequence risk environment where any reactivation of historical or new failures will produce immediate and cascading impacts on lives, livelihoods, and strategic connectivity.

SNOW, AVALANCHES AND GLACIAL LAKES OUTBURST FLOOD (GLOF)

Figure 38 Seasonal Snowmelt Roadmap

1. From April to June 2026, northern Pakistan is expected to experience a rapid transition from late-winter snow conditions, brought on by the influence of multiple successive western disturbances, to increased snow melt due to rising temperatures in spring and early summer. These rising temperatures across the Karakoram, Himalaya and Hindu Kush ranges will accelerate the depletion of seasonal snow cover and increase meltwater contributions to major river systems such as the Indus and the Chenab.

2. This period of rising temperatures is also characterized by increasing snowpack instability and a corresponding expansion in the extent of glacial lakes across Gilgit-Baltistan (GB) and upper Khyber Pakhtunkhwa (KPK). Collectively, these evolving conditions are expected to elevate the likelihood of avalanches during early spring and also increase the risk of Glacial Lake Outburst Floods (GLOFs) as summer approaches.

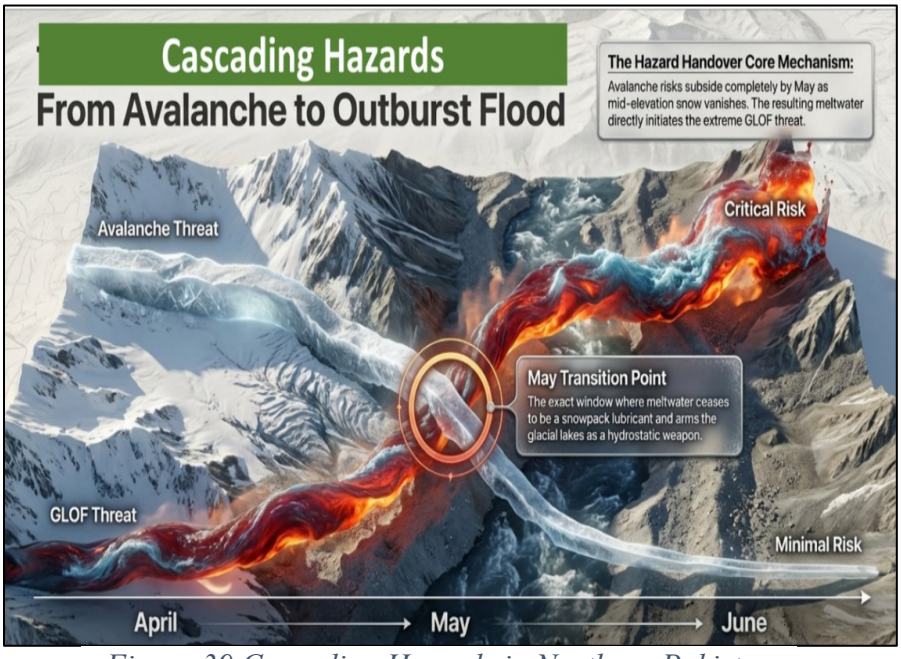


Figure 39 Cascading Hazards in Northern Pakistan

3. **April 2026**. Snow cover across northern Pakistan begins to retreat significantly from mid-elevation valleys while remaining persistent over high-altitude zones of Gilgit-Baltistan, upper Khyber Pakhtunkhwa and Azad Jammu and Kashmir. Areas such as Hunza, Nagar, Ghizer, Skardu, Astore, Chitral and their surroundings are expected to retain considerable snowpack at higher elevations, although valley floors and mid-slopes gradually become snow-free. This transition reflects the influence of increasing spring temperatures combined with occasional Western Disturbances bringing intermittent snowfall and rainfall.

During this period, the snowpack becomes more sensitive to temperature fluctuations, particularly during warm daytime conditions followed by night time cooling. Such variations weaken snow layer bonding and increase the likelihood of wet snow avalanches and slope failures in steep mountainous terrain. Meltwater runoff also begins to increase in glaciated catchments, marking the early stage of seasonal hydrological response.

a. **High Snow Extent**

(1) Extensive and dense snow cover across Gilgit-Baltistan (GB), upper Khyber Pakhtunkhwa (KP), and parts of AJK.

(2) Snow extends into mid-elevation valleys, indicating: -

(a) Late seasonal snow persistence.

(b) Lower-than-normal melting rates.

(3) Suggests colder winter + delayed spring warming.

b. **Moderate Snow Decline**

(1) Noticeable reduction in snow cover, especially:

(a) Lower elevations

(b) Southern slopes

(2) Snow is more confined to higher altitudes and glacier zones, Indicates:

(a) Earlier onset of melting

(b) Slight warming trend

c. **Re-Expansion / Anomalous Snow Increase**

(1) Significant increase in snow-covered area compared to 2025

(2) Snow coverage is:

(a) More continuous.

(b) Expanded into upper valleys and ridgelines.

(3) Likely linked to: -

(a) Repeated Western Disturbances.

(b) Late-season snowfall events (March–April).

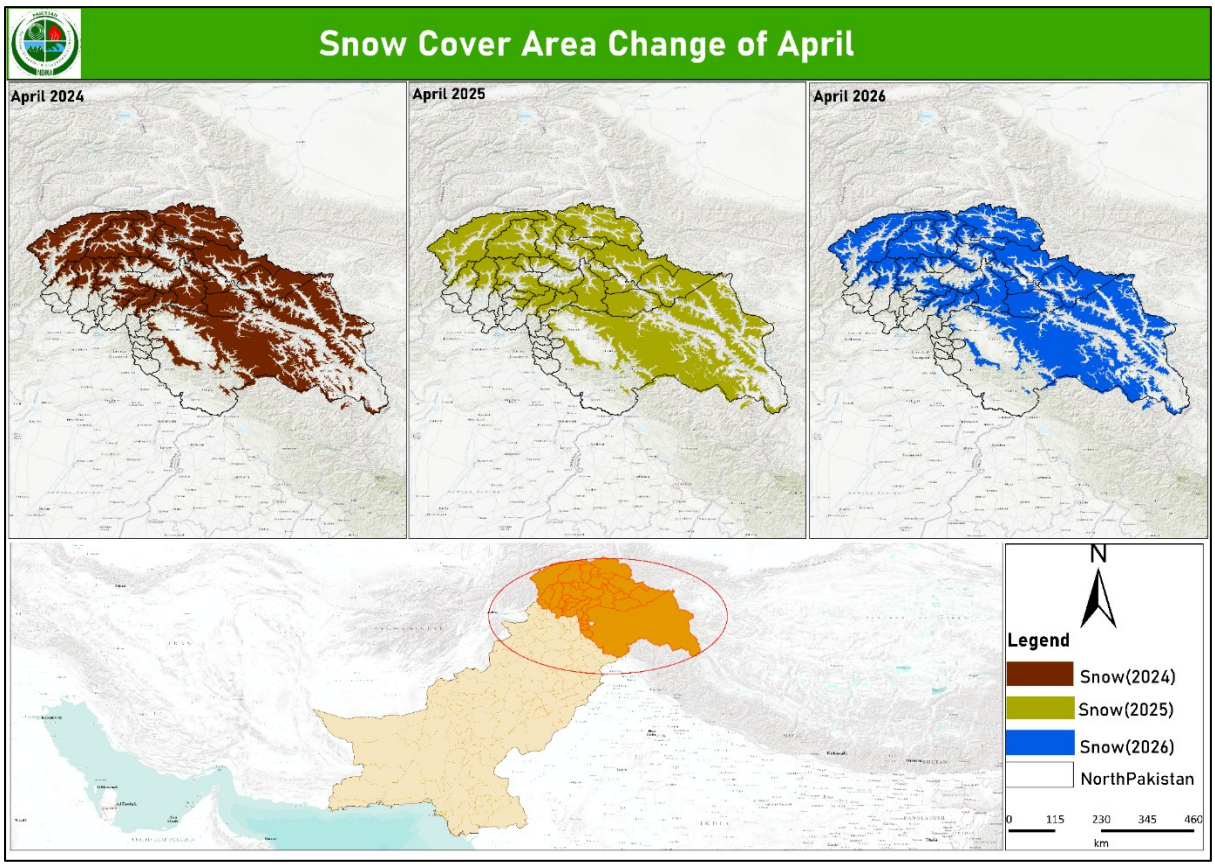


Figure 40 Comparison of Snowcover April 2024-26

Parameter	2024	2025	2026
Snow Extent	Very High	Moderate	High
Snow Stability	Stable	Moderate	Potentially unstable
Elevation Spread	Low → High	Mostly High	Mid → High
Melt Timing	Delayed	Early	Likely rapid (due to fresh snow)

4. **May 2026**. By May 2026, a substantial reduction in seasonal snow cover is expected across much of northern Pakistan. Snow becomes largely confined to high elevations of the Karakoram, Himalaya, and Hindu Kush Mountain ranges, while most mid-altitude districts experience near-complete snow depletion. Accelerated melting during this month contributes to increasing discharge in the upper Indus River and its tributaries.

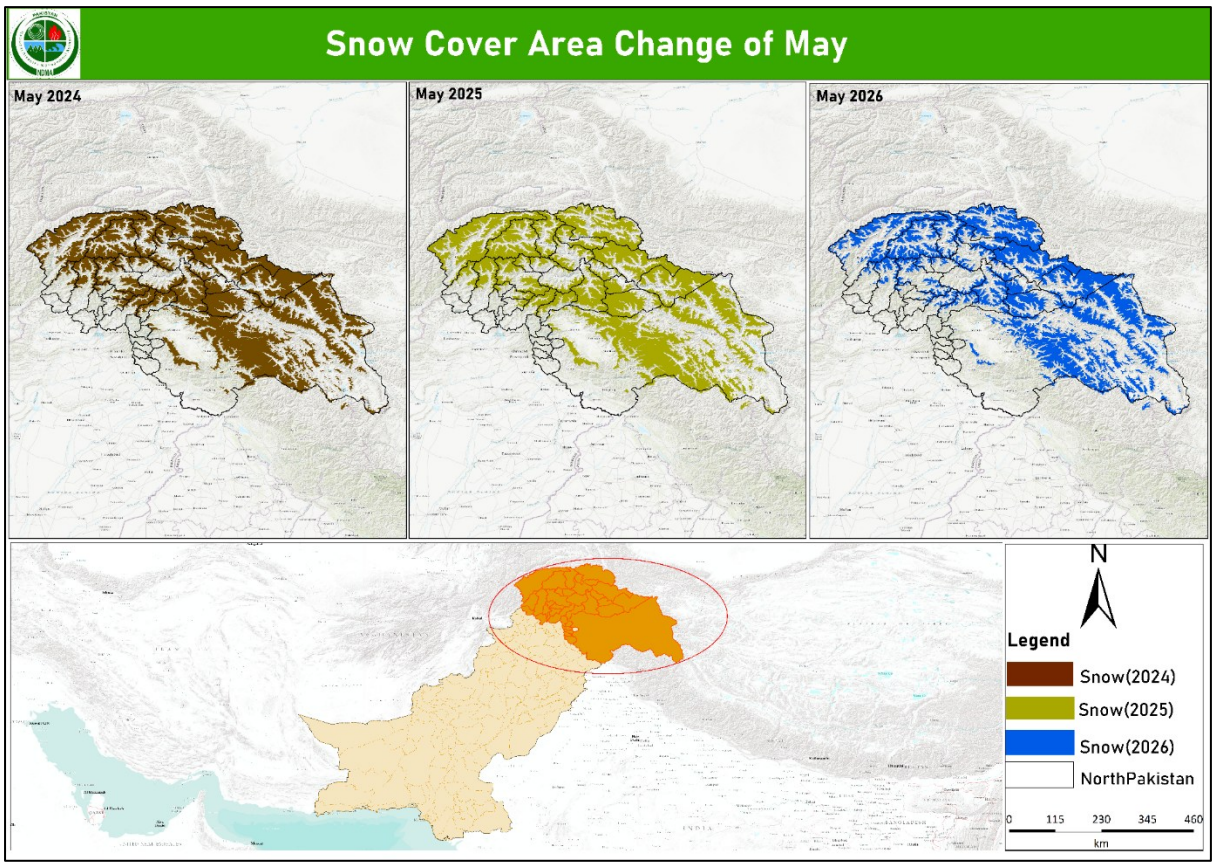


Figure 41 Comparison of Snow cover May 2024-26

5. The combination of higher temperatures and rapid snowmelt continues to influence hydrological conditions across glacierized basins. Warming conditions also initiate the gradual expansion of glacial lakes in glacierized valleys such as Hunza, Shigar, Gupis-Yasin, Chitral and Upper Dir. These lakes accumulate meltwater and may pose potential GLOF hazards if natural ice or moraine dams weaken. During May, the likelihood of avalanche activity remains very low due to the significant depletion of seasonal snow cover across most slopes.

a. **Persistent Snow Cover**

(1) Snow remains extensive across high-altitude zones of Gilgit-Baltistan (GB) and upper KP.

(2) Noticeable retreat from lower elevations, but still strong presence along glacier corridors and ridgelines indicates: -

(a) Gradual and controlled melting

(b) Sustained snowpack from winter

b. **Accelerated Snow Loss**

(1) Significant decline in snow cover compared to 2024: -

(a) Snow largely restricted to very high elevations

(b) Fragmentation visible across slopes suggests earlier and faster melting cycle and possible temperature rise during April–May

c. **High Snow Retention / Delayed Melt**

(1) Substantial snow presence persists even into May:

(a) Expanded coverage across mid-to-high elevations.

(b) Denser and more continuous snowpack likely due to Late-season snowfall (March–April) and cooler-than-normal early spring

Parameter	2024	2025	2026
Snow Persistence	High	Low	Very High
Elevation Spread	Mid → High	Mostly High	Mid → High
Melt Progression	Gradual	Rapid/Early	Delayed
Snow Continuity	Strong	Fragmented	Dense

6. **June 2026**. In June 2026, snow cover becomes largely restricted to the highest elevations of the Karakoram and Himalayan ranges. Most seasonal snow at mid and lower elevations has melted, contributing significant meltwater to the Indus basin river system. Persistent high temperatures during early summer accelerate glacier melt and increase water accumulation within proglacial and supraglacial lakes.

This period marks a transition toward heightened GLOF risk in glacierized valleys of Gilgit-Baltistan and northern Khyber Pakhtunkhwa. Rapid melting, combined with occasional intense rainfall or ice collapse, can destabilize moraine-dammed lakes and trigger sudden outburst floods. Such events can generate destructive flash floods in downstream communities and damage infrastructure including roads, bridges, and hydropower facilities. Areas located along glacial streams and narrow mountain valleys remain particularly vulnerable during this early summer melt season.

a. **Residual Snow at High Altitudes**

(1) Snow cover is significantly reduced compared to May: -

(a) Confined to very high elevations and glacier accumulation zones

(b) Minimal presence in valleys and mid-slopes, indicates normal seasonal melt progression and stable transition into peak melt season.

b. **Minimal Snow Persistence**

(1) Snow cover is extremely limited: -

(a) Only small patches in highest peaks.

(b) Highly fragmented distribution reflects accelerated melting and warmer spring conditions

c. **Residual but Notable Snow Retention**

(1) Slightly greater snow presence than 2025, but still limited.

(2) Overall, concentrated along glacier ridgelines and upper basins; indicates delayed melt from May carrying into June and continued contribution to runoff

Parameter	2024	2025	2026
Snow Extent	Low	Very Low	Low–Moderate
Elevation Range	Very High	Extremely High Only	High
Snow Continuity	Patchy	Fragmented	Slightly more coherent
Melt Status	Near Completion	Completed Early	Ongoing Rapid Melt

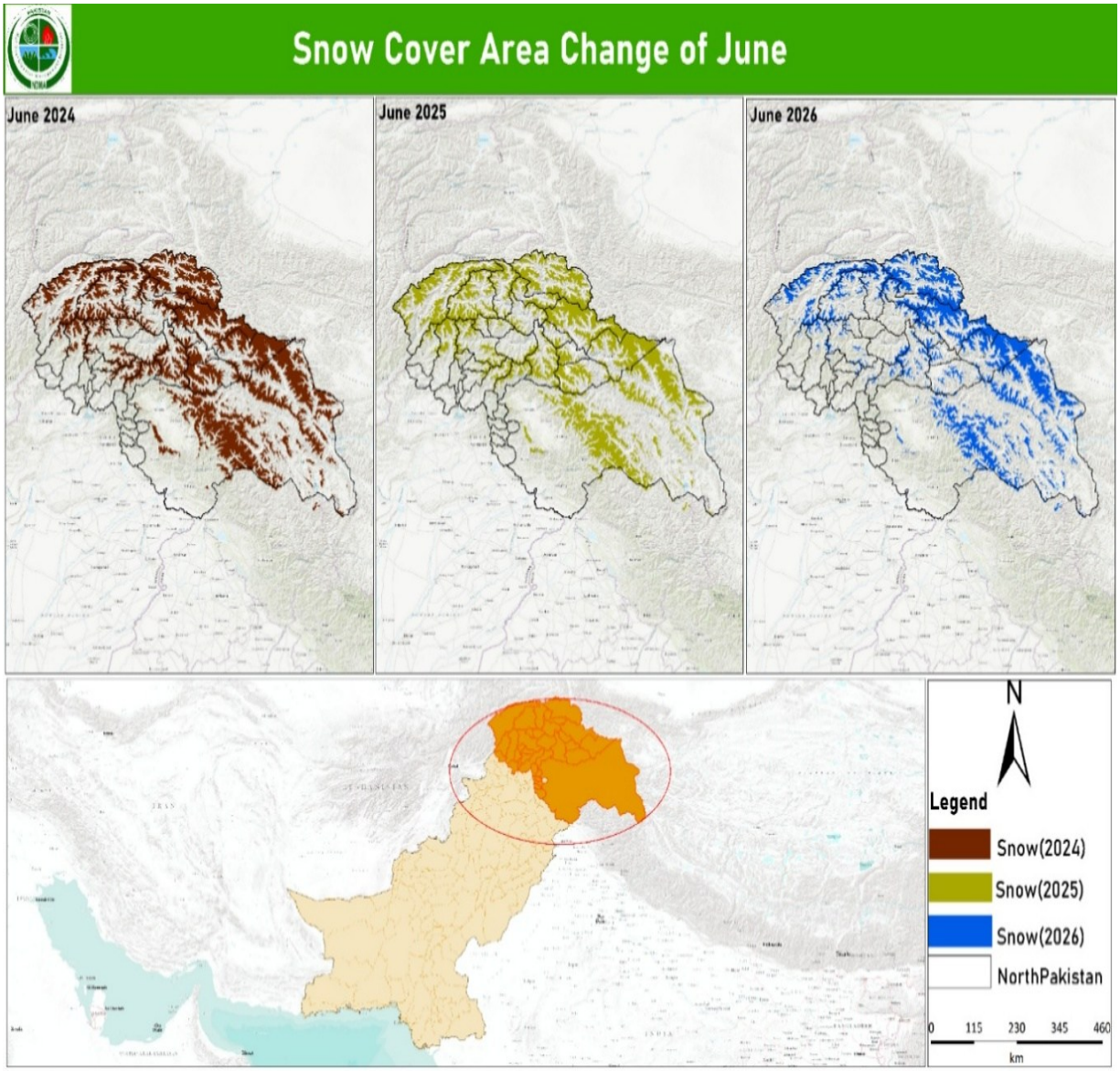


Figure 42 Comparison of Snow cover June 2024-26

7. **Avalanche Vulnerability 2026**. During early spring, particularly in April, the 0gradual warming of temperatures begins to weaken the stability of the winter snowpack across the mountainous regions of northern Pakistan. As melting progresses, water infiltration within the snow layers reduces cohesion and accelerates the melting of seasonal snow across steep slopes and high-altitude passes.

Figure 43 Vulnerability Scan Avalanches

8. However, by late spring and the onset of summer, particularly during May and June, most seasonal snow cover significantly diminishes across mid-altitude regions, leaving snow largely confined to the highest elevations of the Karakoram, Himalaya, and Hindu Kush ranges. Consequently, the likelihood of avalanche activity during these months remains very low due to the substantial depletion of the seasonal snowpack. The areas of Northern Pakistan that are vulnerable to avalanche are shown in the avalanche vulnerability map.

The comparison shows the vulnerable avalanche site the the hyear 2026 and the updated sited for the year 2026 based on the avalanche type i.e. slab, powder/slab, and powder avalanche.

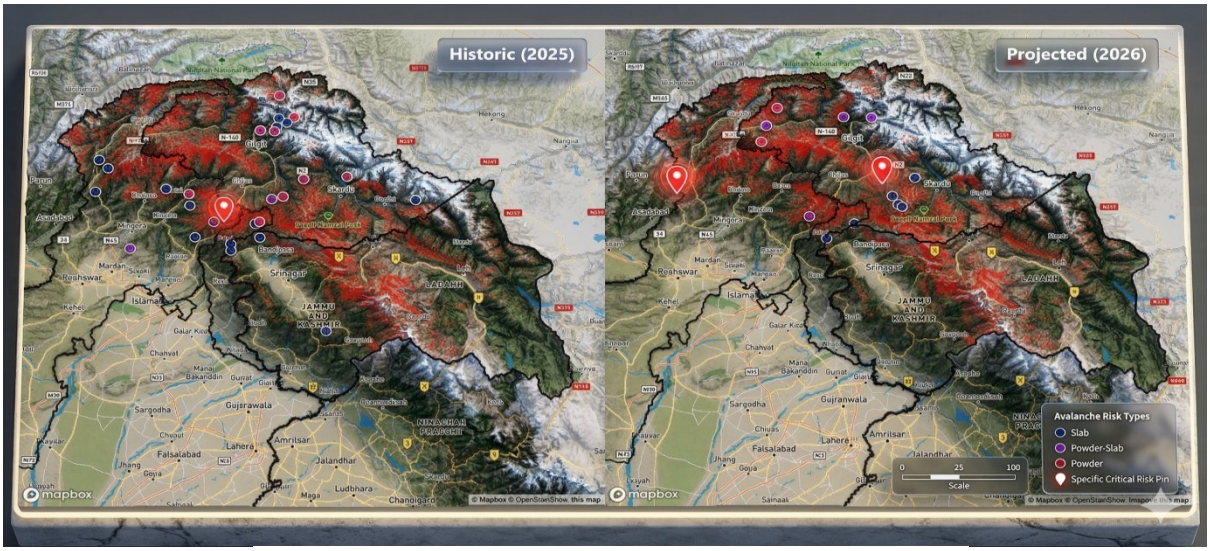


Figure 44 Avalanche Comparison 2025-26

9. **GLOF Vulnerability 2026**. As temperatures continue to rise during May and June, the rate of glacier and residual snow melt across the high mountain regions of northern Pakistan increases considerably. Prolonged periods of above-average temperatures enhance surface ablation on glaciers, resulting in a substantial increase in meltwater production. This meltwater accumulates within depressions along glacier surfaces and in proglacial zones, contributing to the gradual expansion and deepening of existing glacial lakes. Many of these lakes are naturally impounded by moraine ridges, ice dams, or a combination of loose glacial sediments and buried ice, are inherently unstable; susceptible to failure under changing environmental conditions.

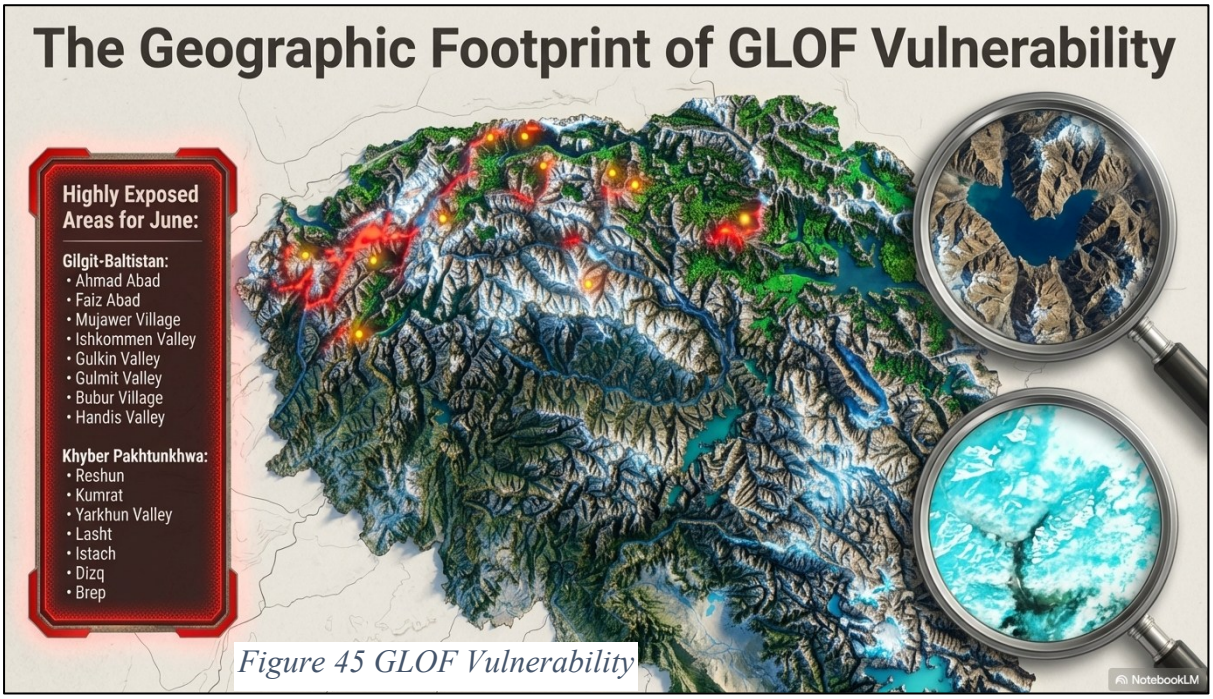


Figure 45 GLOF Vulnerability

10. As meltwater inflow continues to rise, hydrostatic pressure within these lakes increases, which may weaken the structural integrity of moraine dams or trigger erosion along the outlet channels. External factors such as intense rainfall, rapid glacier melt, ice calving, slope failures, or internal piping within moraine structures can further destabilize these natural barriers. When such containment structures fail or are overtopped, large volumes of stored water may be released suddenly in the form of Glacial Lake Outburst Floods (GLOFs).

Figure 46 Vulnerability Path

11. These sudden outburst floods can travel rapidly downstream through narrow mountain valleys, carrying large quantities of water, debris, sediment, and boulders. The resulting high-energy flood waves can cause severe damage to downstream communities, including the destruction of houses, bridges, irrigation channels, hydropower installations, and road networks. Agricultural lands and livestock in valley bottoms are particularly vulnerable to inundation and sediment deposition. In the context of northern Pakistan, glacierized basins such as Hunza, Ghizer, Gupis-Yasin, Shigar, Skardu, and Upper Chitral remain particularly susceptible to such hazards due to the high concentration of glaciers and glacial lakes in these regions. Continuous monitoring of glacial lakes and early warning mechanisms therefore remain critical for reducing potential risks associated with GLOF events during the late spring and early summer months. Most Vulnerable glacial lakes of Pakistan are shown in the vulnerable glacial lakes Map below.

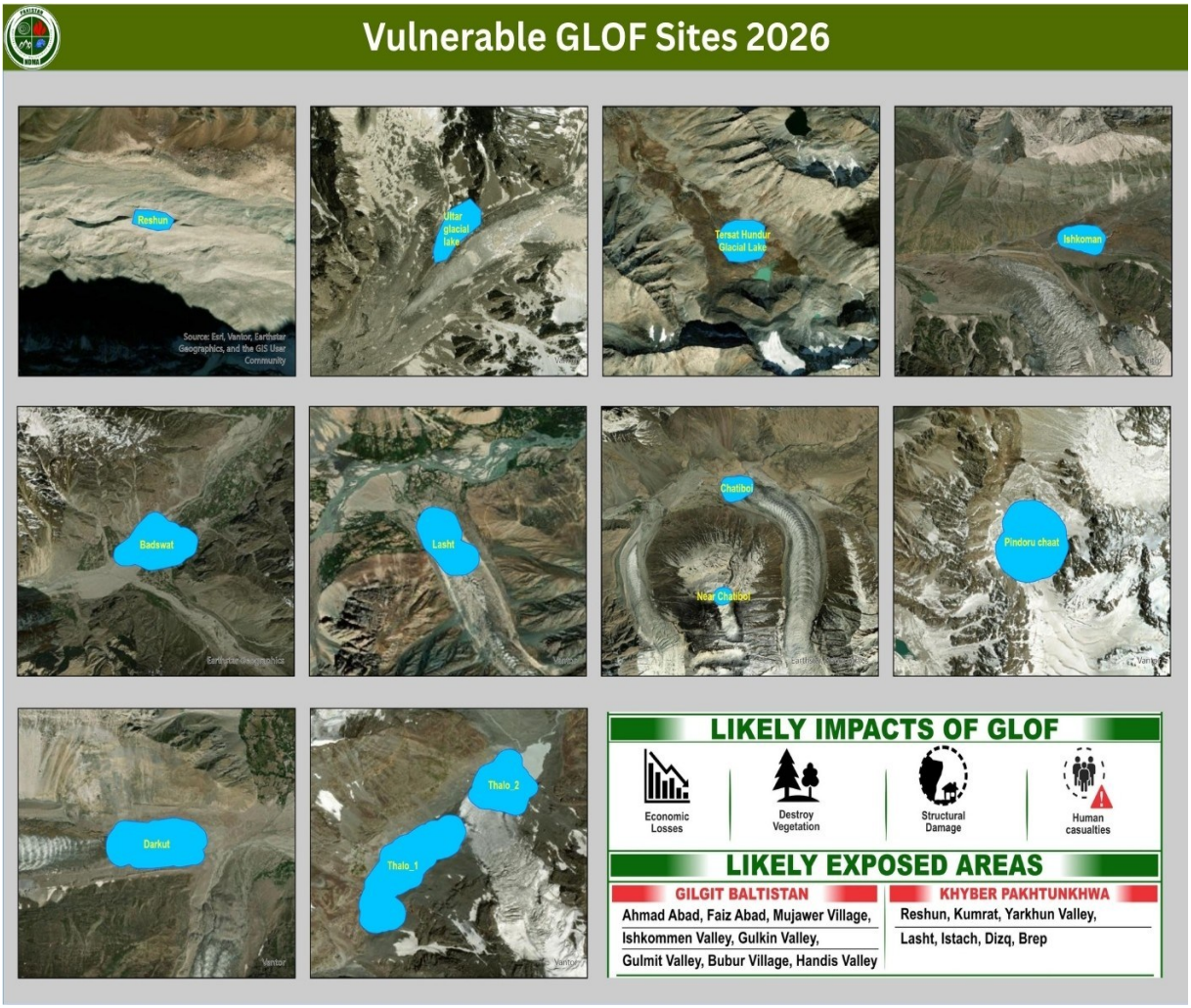


Figure 47 GLOF Hotspots 2026

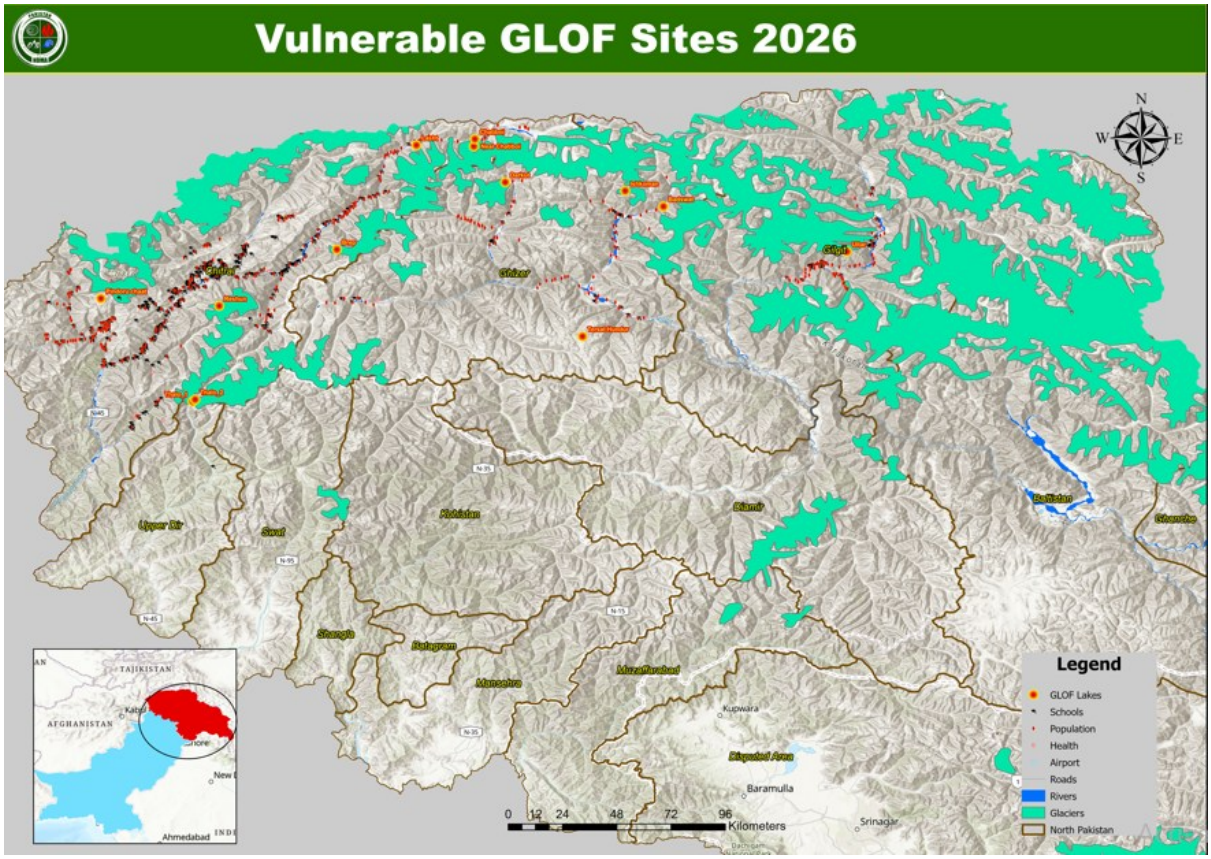


Figure 48 GLOF Sites 2026

12. **Projected Impacts**

a. **Glacial Lake Outburst Floods (GLOFs)**. High exposure exists in GB and Chitral where communities, roads, and agriculture lie downstream of unstable glacial lakes. Rapid snowmelt in 2026 can accelerate lake expansion, increasing outburst probability. Critical infrastructure like KKH and hydropower sites are particularly at risk.

b. **Flash Floods (Snowmelt-Induced)**. Settlements located in narrow valleys and along glacial streams face high exposure to sudden discharge surges. In 2026, delayed snowmelt may trigger intense and synchronized runoff, increasing flash flood likelihood. Tourism routes and local road networks are highly vulnerable.

c. **Riverine Flooding (Indus Basin).** Exposure extends from northern valleys to downstream Indus plains due to cumulative snowmelt contributions. Major settlements, agricultural lands, and water infrastructure face danger during peak discharge periods. 2026 conditions may amplify flood peaks due to delayed melt.

d. **Mudflows & Debris Flows**. Communities built on alluvial fans and near steep slopes are highly exposed to debris-laden flows triggered by snowmelt. Roads and irrigation systems are frequently disrupted by sediment movement like Kohistan, Hunza, and Chitral are particularly vulnerable.

e. **Landslides.** Slope instability increases significantly due to snowmelt infiltration and soil saturation. Settlements, highways (especially KKH), and power infrastructure are highly exposed to blockage and damage. Prolonged snow presence in 2026 raises the likelihood of large-scale slope failures.

f. **Avalanches**. Exposure is localized but critical in high-altitude communities and transport corridors. Avalanches primarily threaten lives, livestock, and road accessibility during late winter and early spring. Residual risk may persist in higher elevations during May.

g. **Population Exposure**. Large populations in GB, upper KP, and AJK reside in hazard-prone valleys with limited evacuation capacity. Remote locations and poor accessibility increase vulnerability to sudden hazard, women, children, and elderly are particularly at risk.

h. **Infrastructure Exposure**. Critical infrastructure including KKH, bridges, hydropower plants, and communication lines are highly exposed to multi-hazard impacts. Disruptions can isolate entire regions for extended periods. Snowmelt-driven hazards in 2026 increase stress on these systems.

i. **Economic Exposure**. Agriculture, tourism, and trade are highly sensitive to snowmelt-related hazards. Floods and landslides can cause crop losses, disrupt tourism flows, and block trade routes. Economic losses are expected to increase under high melt scenarios like 2026.

j. **Overall Exposure Outlook (2026)**. Exposure is expected to peak due to delayed yet rapid snowmelt causing multi-hazard conditions. Interconnected risks (floods, GLOFs, landslides) can trigger cascading impacts across sectors. Northern Pakistan remains highly exposed to climate-driven cryospheric hazards.

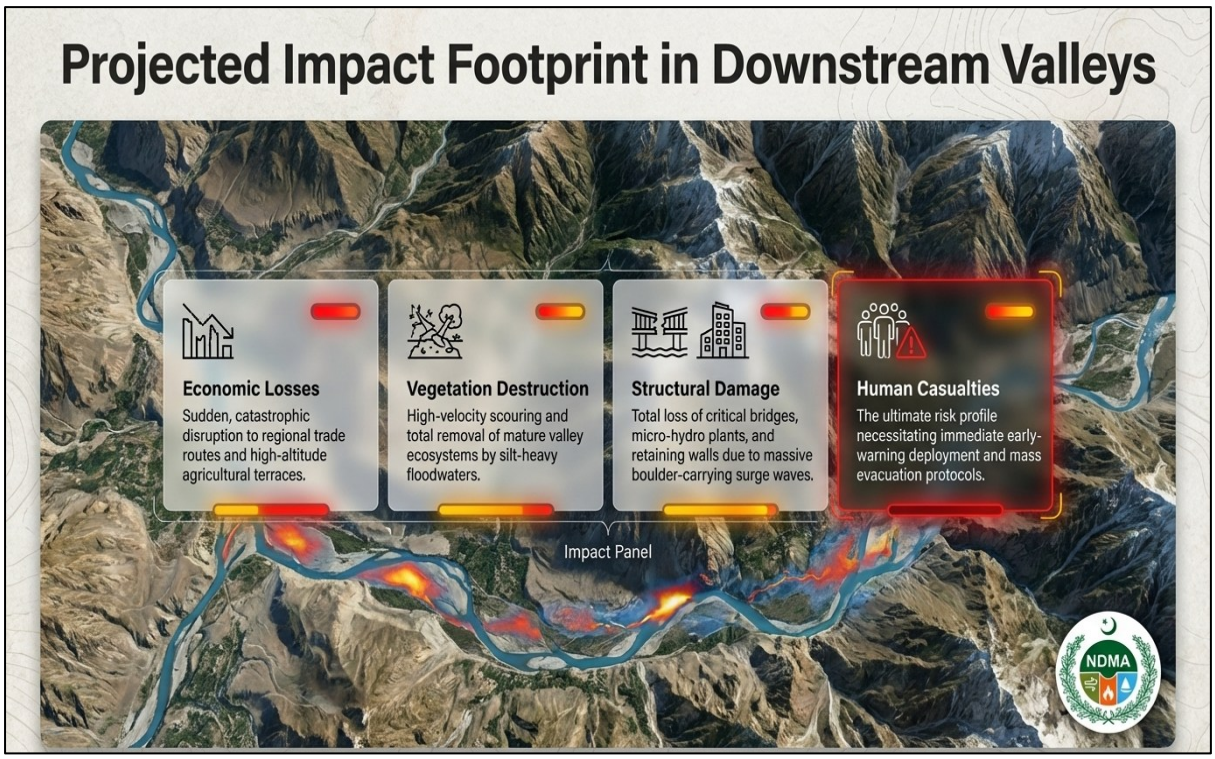


Figure 49 Projected Impact Footprint Downstream Valleys

Figure 50 Exposure Elements 1

Figure 51 Exposure Elements 2

Figure 52 Exposure Elements 3

Figure 53 Exposure Elements 3

Figure 54 Exposure Elements 4

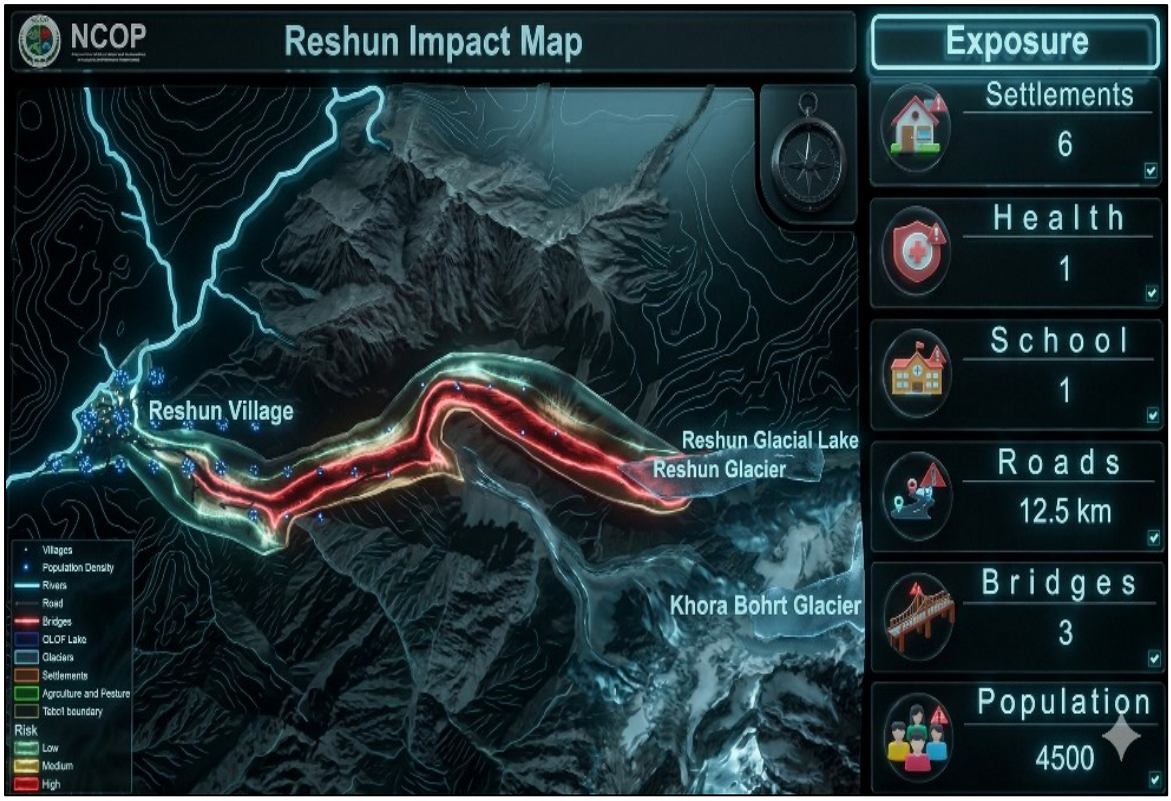


Figure 55 Reshun Impact Map

Figure 56 Badswat Impact Map

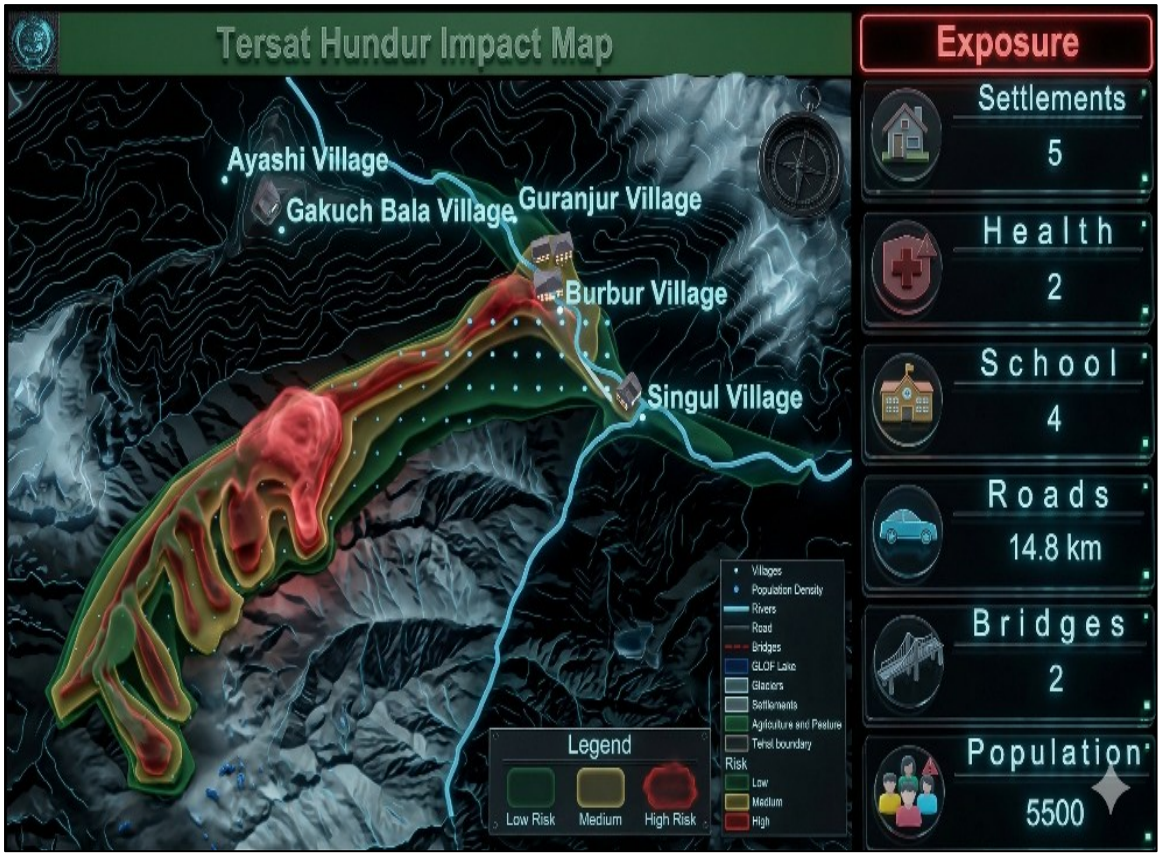


Figure 57 Tersat Hundur Impact Map

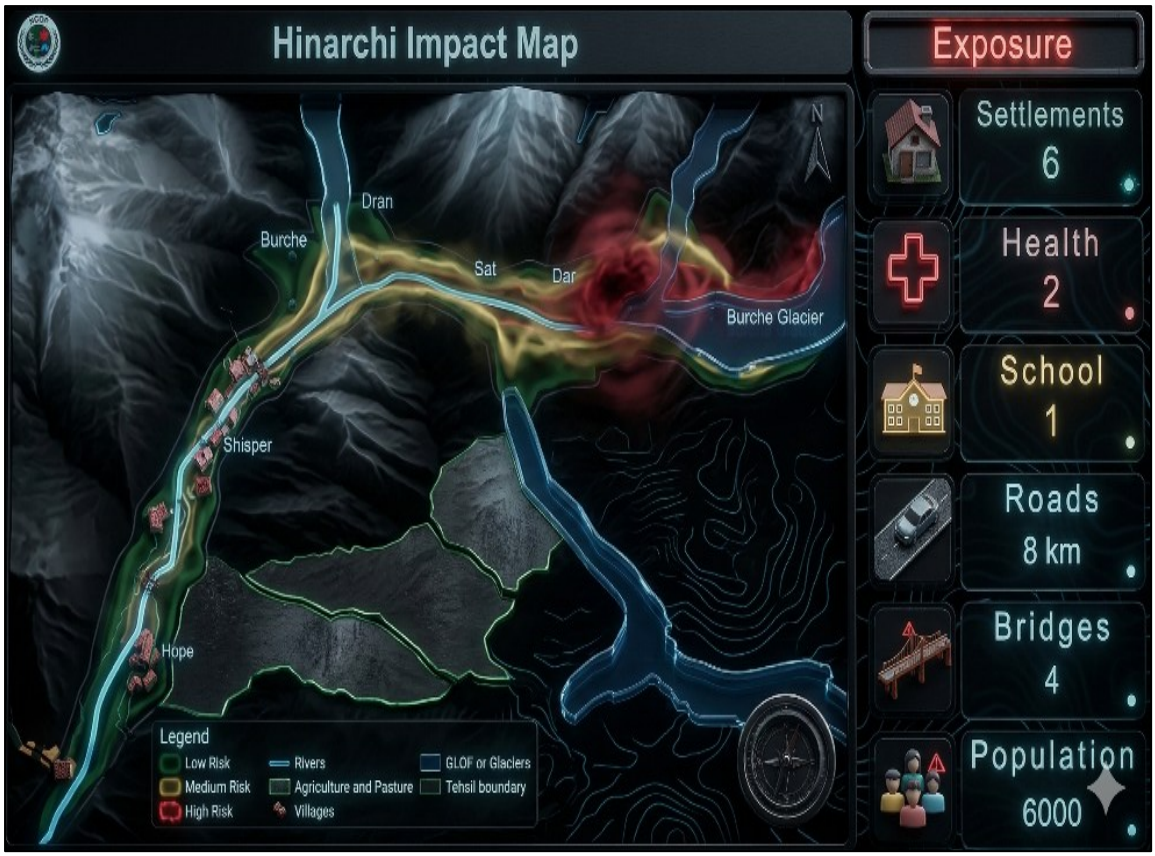


Figure 58 Hinarchi Impact Map

FLOODS

1. **Historical Context of Flooding in Pakistan**. Pakistan's flood regime is not limited to the peak monsoon months alone. In operational terms, the country is exposed to multiple flood types, including riverine floods, flash floods, urban floods, Glacial Lake Outburst Floods (GLOFs), and coastal flooding. While large riverine flooding is more common from July to September, the April to June period remains hydrologically important because it marks the transition from late winter and spring weather systems into the pre-monsoon and early monsoon phase. During these months, western disturbances, convective thunderstorms, snowmelt, glacier melt, and localized intense rainfall can already generate flash flooding in upper catchments, hill torrents in piedmont and arid zones, and urban inundation in major settlements. NDMA's national planning documents identify northern KP, GB, AJK, parts of Punjab, Sindh, and Balochistan among the most flood-vulnerable regions, with different flood mechanisms becoming active at different times of the warm season.

Figure 59 Historical Flood Context

2. In April, flooding in Pakistan is usually driven less by broad monsoonal river overflow and more by spring weather systems, especially western disturbances and associated thunderstorms. These systems can produce short-duration but intense rainfall, resulting in local nullah flooding, flash floods in hilly terrain, and urban flooding in low-lying settlements. This pattern was clearly visible in official reporting during April 2025, when NDMA circulated flood alerts for the Kabul, Indus, and Jhelum systems and advised close monitoring of flows and vulnerable locations. The broader climatological significance of April is reinforced by PMD's assessment of April to June 2024, which found the country's pre-monsoon season to be 48 percent above average overall and ranked it as the seventh wettest on record, while April

2024 alone was reported as 164 percent above average nationally, with exceptionally high departures in Balochistan, KP, and AJK.

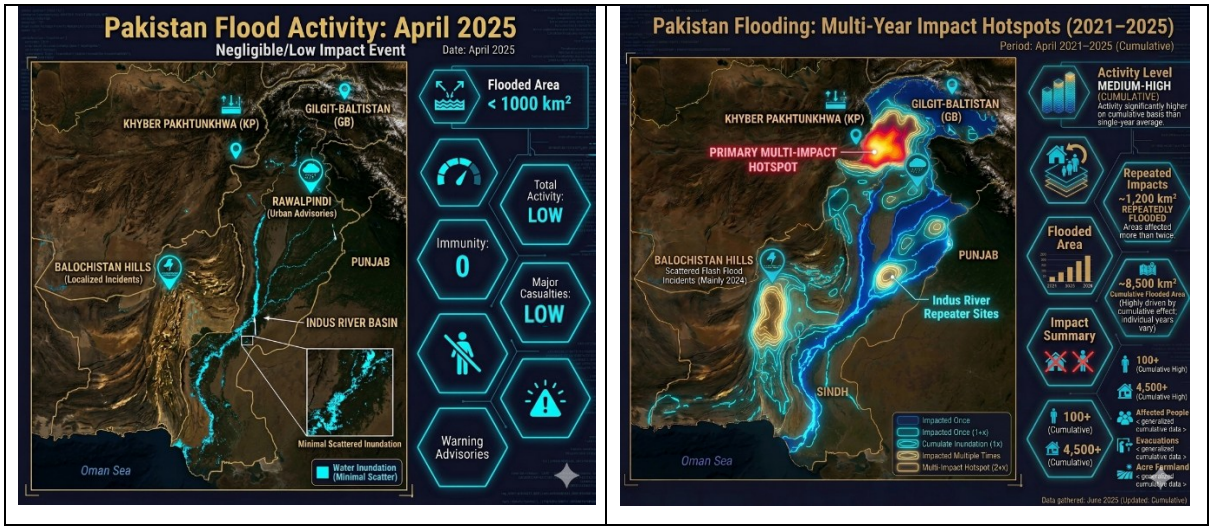


Figure 60 April Historical Flood Activity & Hotspots

3. May generally represents a mixed hazard month. At the national scale it is often less flood-dominant than peak monsoon, yet in northern Pakistan the hydrological sensitivity can actually increase because above-normal temperatures begin to accelerate snowmelt and glacier melt. This raises the likelihood of sudden runoff surges, localized flash flooding, and GLOF-type impacts in glaciated valleys, particularly in Gilgit-Baltistan and upper Khyber Pakhtunkhwa. NDMA's May 2025 advisories specifically warned that heavy rainfall could generate flash flooding in local nullahs, streams, and river tributaries, while landslides were expected in Galiyat, Mansehra, Kohistan, Chitral, Dir, Swat, Shangla, Buner, Sherani, Zhob, Kashmir, and Gilgit-Baltistan. In the same month, NDMA also issued a dedicated GLOF alert for GB and KP, explicitly linking rising mountain temperatures with accelerated snow and glacier melt and heightened outburst risk in vulnerable valleys.

Figure 61 May Historical Flood Activity & Hotspots

4. June is the month when Pakistan's flood pattern begins to shift from localized spring hazards toward more organized early monsoon hydrology. NDMA's 2025 monsoon outlook assessed that the monsoon season was expected to begin around 26 to 27 June, and late-June advisories already highlighted low to medium flows in River Kabul, urban flooding potential in cities of Punjab and Sindh, and flash-flood threats in River Swat, Chitral, Hunza, and other glacier-fed tributaries. The first operational impacts of that transition were visible in NDMA's daily situation reporting for late June 2025, which recorded deaths from flash flooding in Swat and Zhob and documented additional house damage, rescue operations, and cumulative casualties within just the first few days of the season. This confirms that even before the core monsoon matures in July, June can already produce meaningful flood emergencies, especially in northern catchments, hill torrent zones, and urban centers.

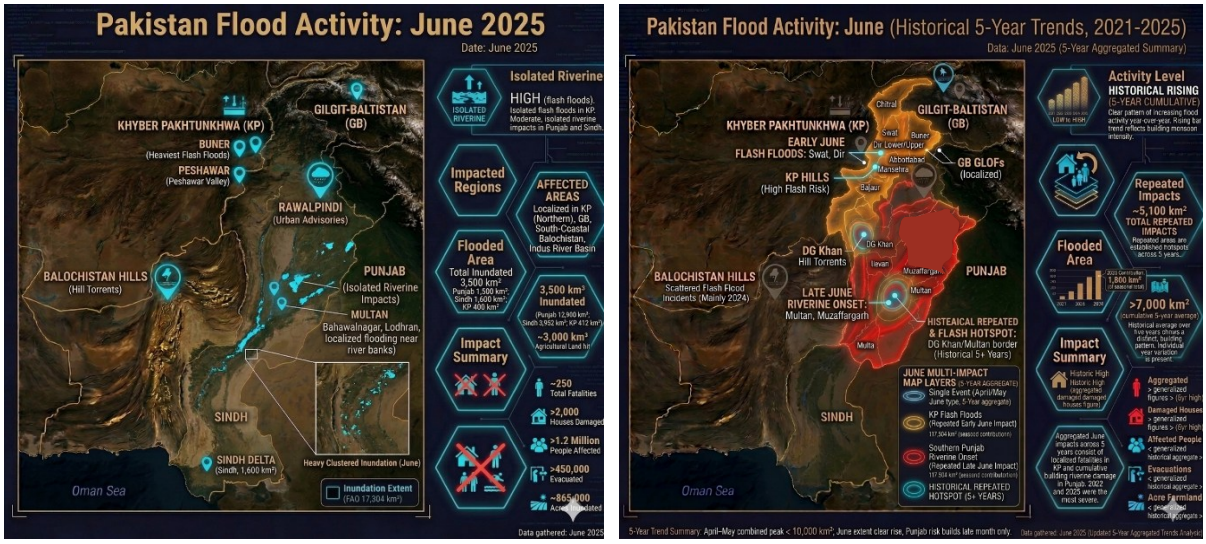


Figure 62 June Historical Flood Activity & Hotspots

5. From the perspective of last years' experience, April to June 2025 showed a clear progression of flood behavior rather than one uniform national pattern. April remained largely a localized alert month, with concern centered on spring rainfall, flash-flood-prone rivers, and vulnerable urban or low-lying pockets. May continued to show mostly localized hazards, but the operational emphasis shifted further toward temperature-driven snow and glacier melt, GLOF sensitivity, and mountain flash flooding. By late June, the hazard profile broadened into an early monsoon structure, with river monitoring, flash-flood events, urban flooding advisories, and actual reported casualties. In other words, last year's pattern suggests that April and May were primarily months of scattered hydro-meteorological disturbance, whereas June marked the beginning of more organized flood activity.

6. Over the last five years, the broader trend visible in official material is one of increasing hydro-climatic volatility, with repeated evidence that pre-monsoon conditions can no longer be treated as uniformly low risk. Publicly available official records are stronger for seasonal and monsoon-scale reporting than for a clean month-by-month April-May-June archive, but they

still show a consistent pattern: spring and early summer increasingly feature flash floods, urban flooding, landslides, glacier-related hazards, and earlier hydrological stress in upper catchments, before the larger riverine phase intensifies later in the season. PMD's exceptionally wet AMJ 2024 record and NDMA's subsequent planning and advisory documents together indicate that April to June now functions as a meaningful preparatory flood window, especially for northern basins, Potohar and upper Punjab, KP valleys, AJK foothills, and hill torrent belts of southern Punjab and Balochistan. This makes it essential that the AMJ 2026 DEW frame flooding not only as a monsoon issue, but as a staged and evolving hazard that begins well before peak season.

a. **April 2026**. The hydrological outlook for April 2026 indicates an overall moderate flood hazard potential across Pakistan, with relatively higher risk during the first half of the month. This elevated risk is primarily associated with forecasted near-normal to slightly above-normal rainfall at the national scale, coupled with more active convective weather patterns during the early weeks. As a result, upper catchments and northern regions are likely to experience episodic intense rainfall events, which may lead to flash flooding, localized streamflow surges, and urban flooding.

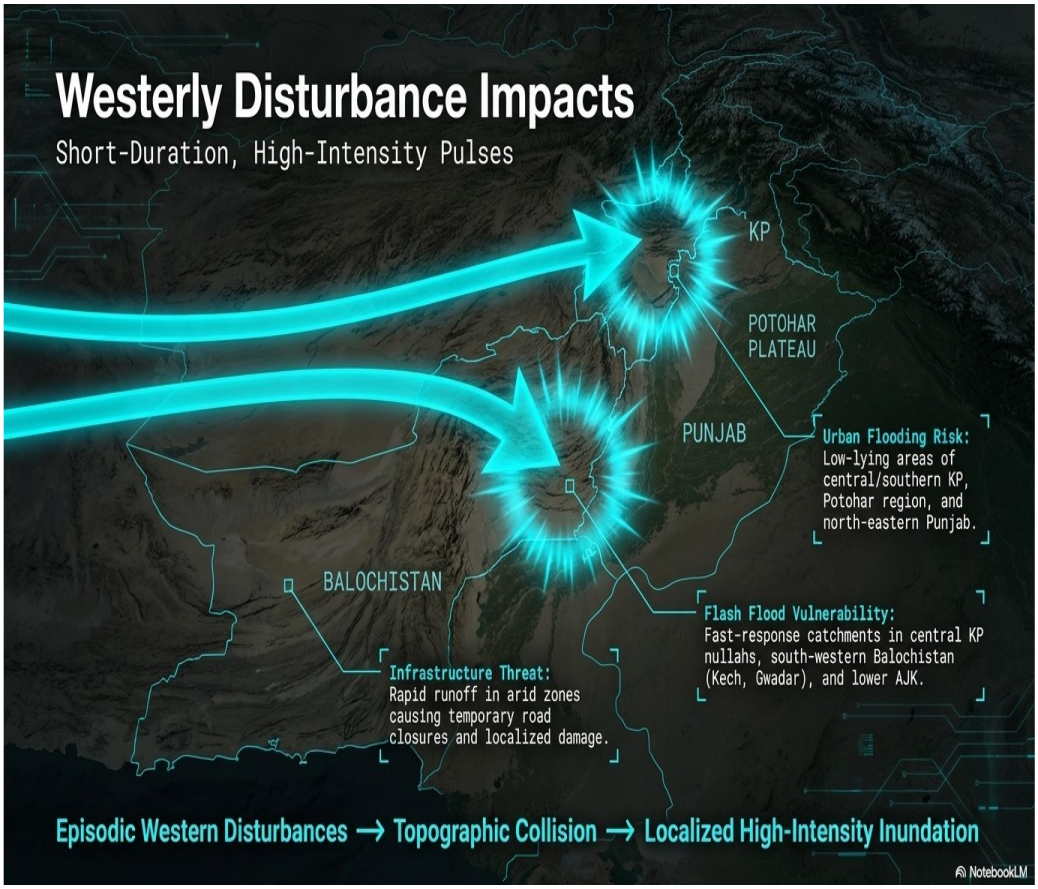


Figure 63 Western Disturbance April

(1) These risks are further compounded by above-normal temperatures over northern Pakistan, which are expected to accelerate seasonal snowmelt. The combined effect of rainfall-induced runoff and enhanced snowmelt is likely to increase flow variability in snow-fed and glacier-fed basins, thereby elevating short-term hydrological risks in vulnerable catchments during the early part of the month.

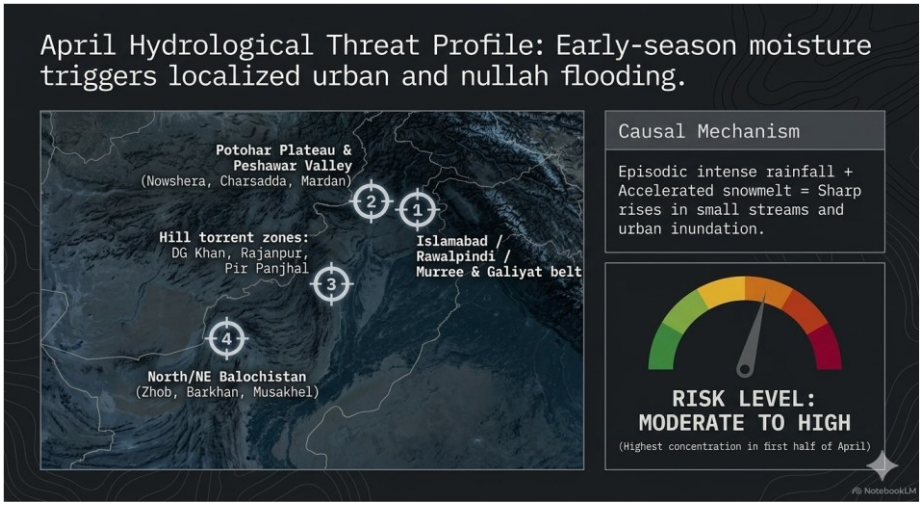


Figure 64 April Threat Profile

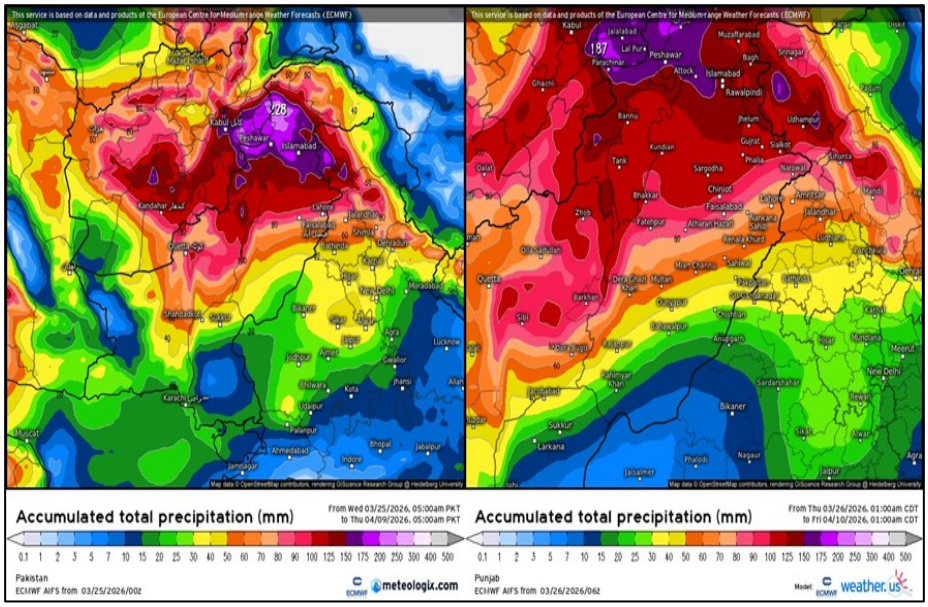


Figure 65 Accumulated Precipitation April 2026

(2) Spatially, the areas most exposed to these conditions include the Islamabad, Rawalpindi, Murree & Galliyat belt, the Potohar Plateau, and the Peshawar Valley, along with adjoining districts such as Nowshera, Charsadda, Mardan, and Swabi. Additional high-risk zones extend to the foothill regions of Azad Jammu and Kashmir, particularly Muzaffarabad and Bagh, as well as northern and central Punjab districts including Jhelum, Gujrat, Sialkot, Sargodha, Faisalabad, and Lahore. The hill torrent-prone areas of Dera Ghazi Khan and Rajanpur, along with parts

of northern to north eastern Balochistan such as Zhob, Barkhan, and Musakhel, also remain susceptible to rapid hydrological responses.

(3) In these regions, intense short-duration rainfall events may generate rapid surface runoff, triggering localized nullah flooding, hill torrent activity, urban inundation in low-lying areas, and sharp rises in small streams. However, as the month progresses into the latter half of April, a gradual reduction in rainfall activity is expected, which will likely lead to a corresponding decrease in hydrological risk, particularly across southern parts of the country where flood threat is anticipated to remain comparatively low.

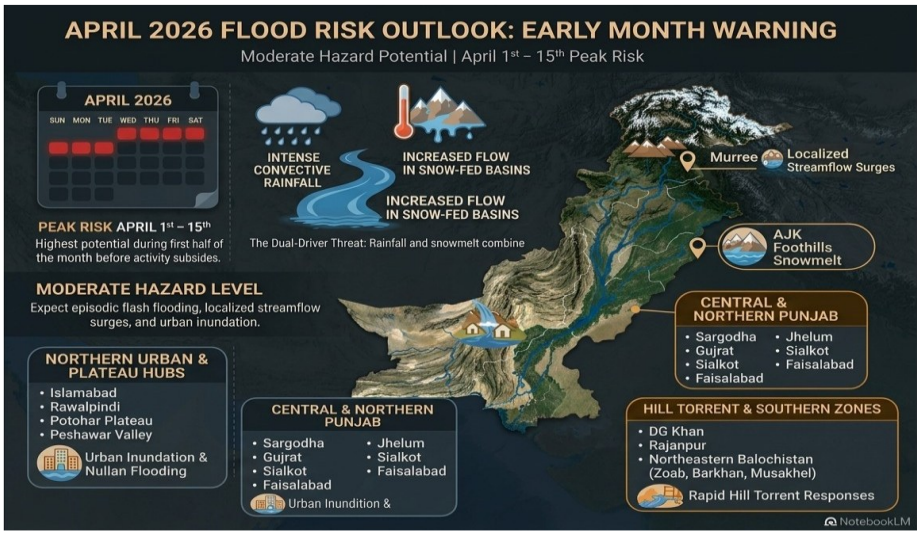


Figure 66 April Flood Risk Outlook

Major Torrents to Watch out

Buner Torrents - KPK

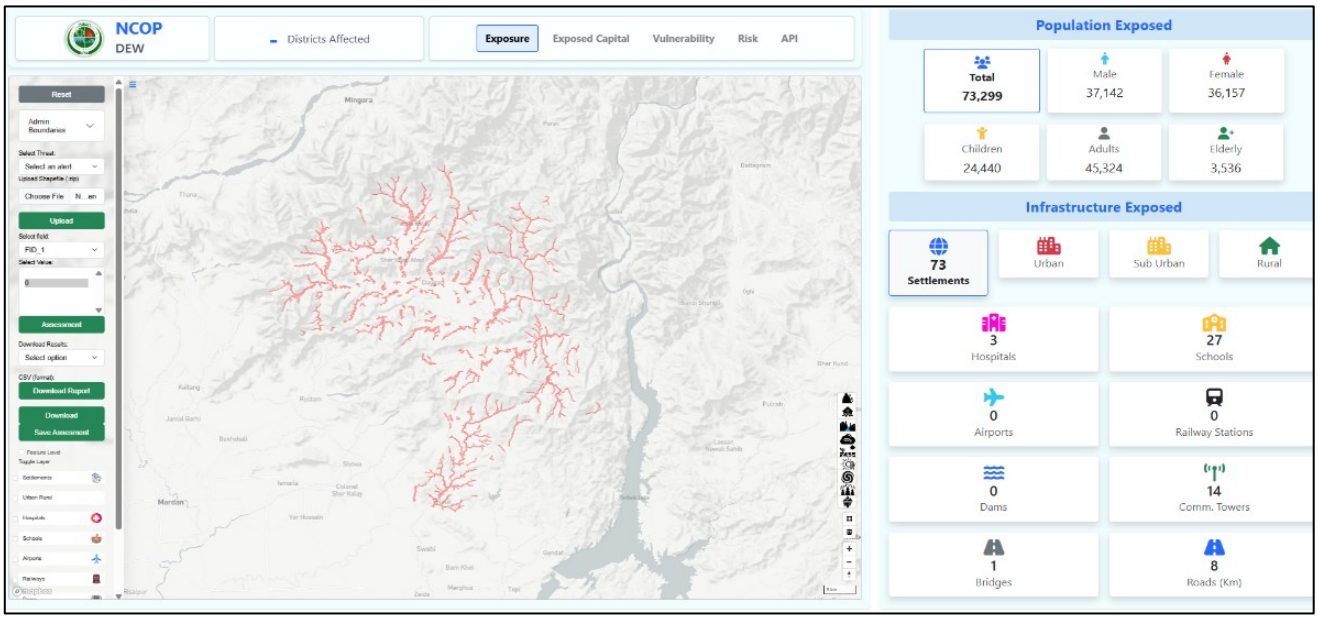


Figure 67 Buner Hill Torrents Impact Analysis 2026

Kech & Panjgur Torrents - Balochistan

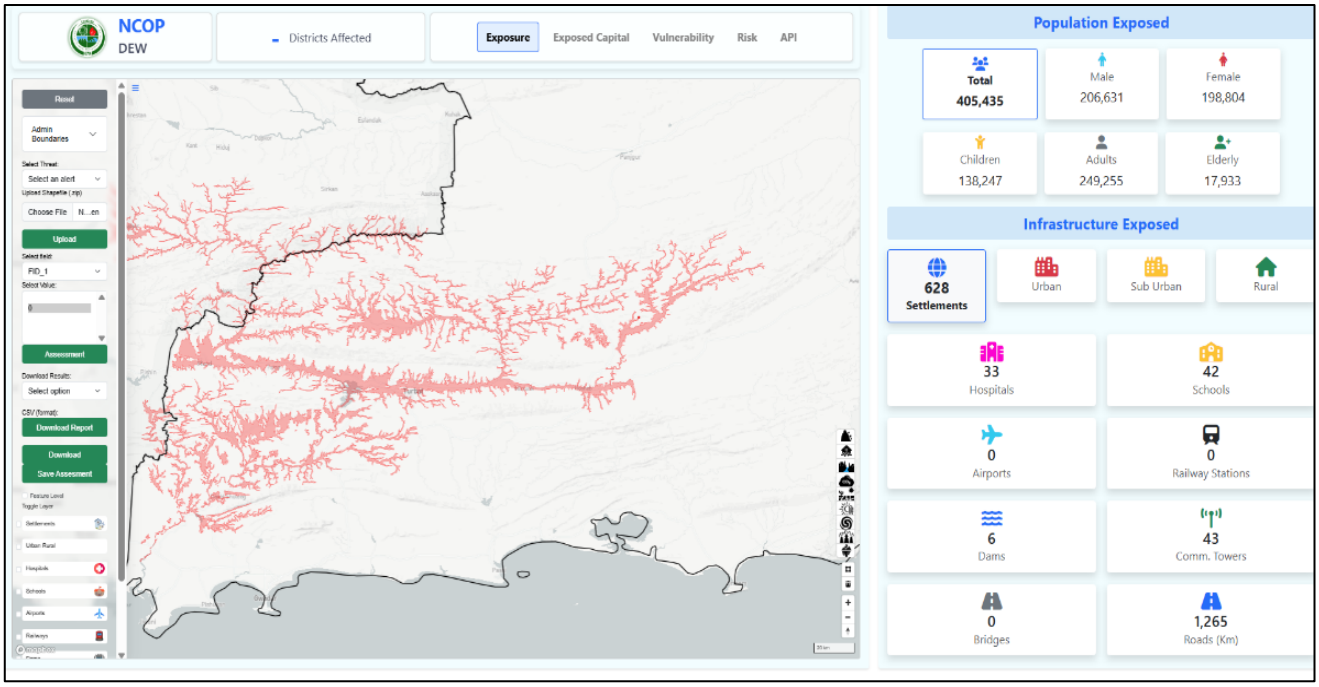


Figure 68 Kech-Panjgur Hill Torrents Impact Analysis 2026

Bajaur Torrents - KPK

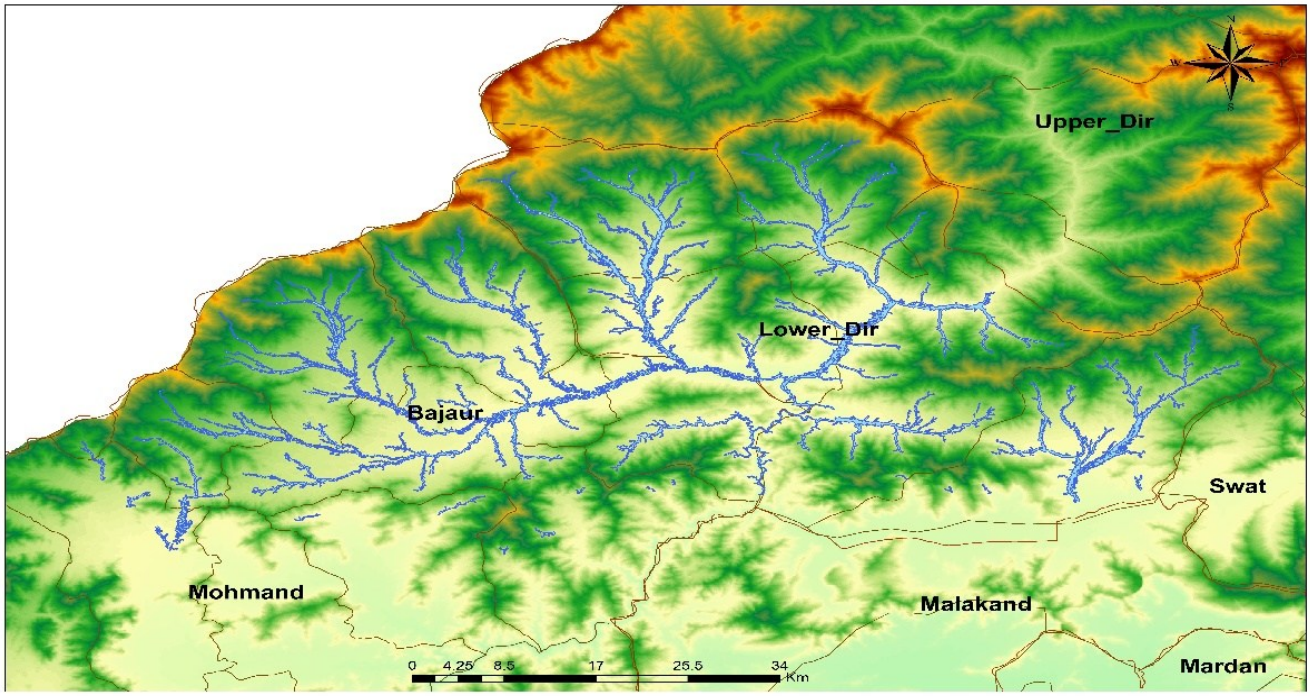


Figure 69 Bajaur Hill Torrents Impact Analysis 2026

Mardan - KPK

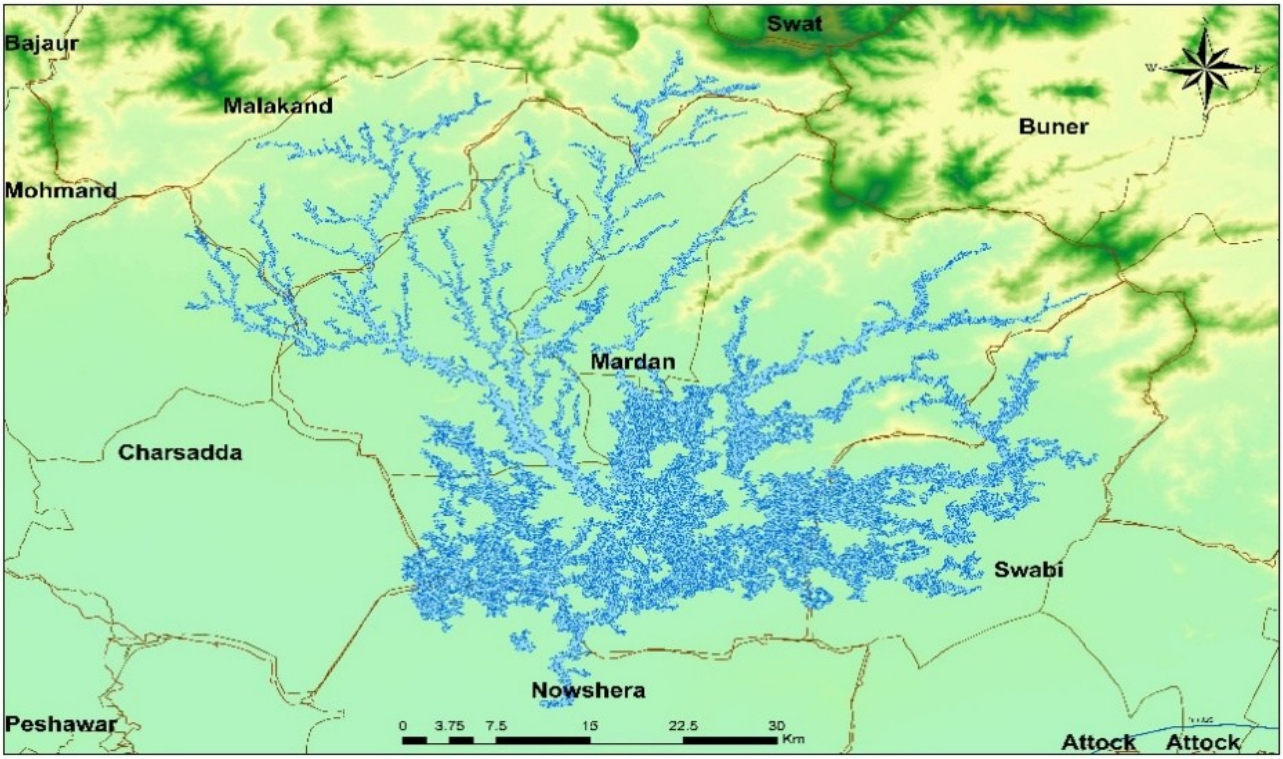


Figure 70 Mardan Hill Torrents Impact Analysis 2026

Pir Panjhal Range Torrents - Punjab

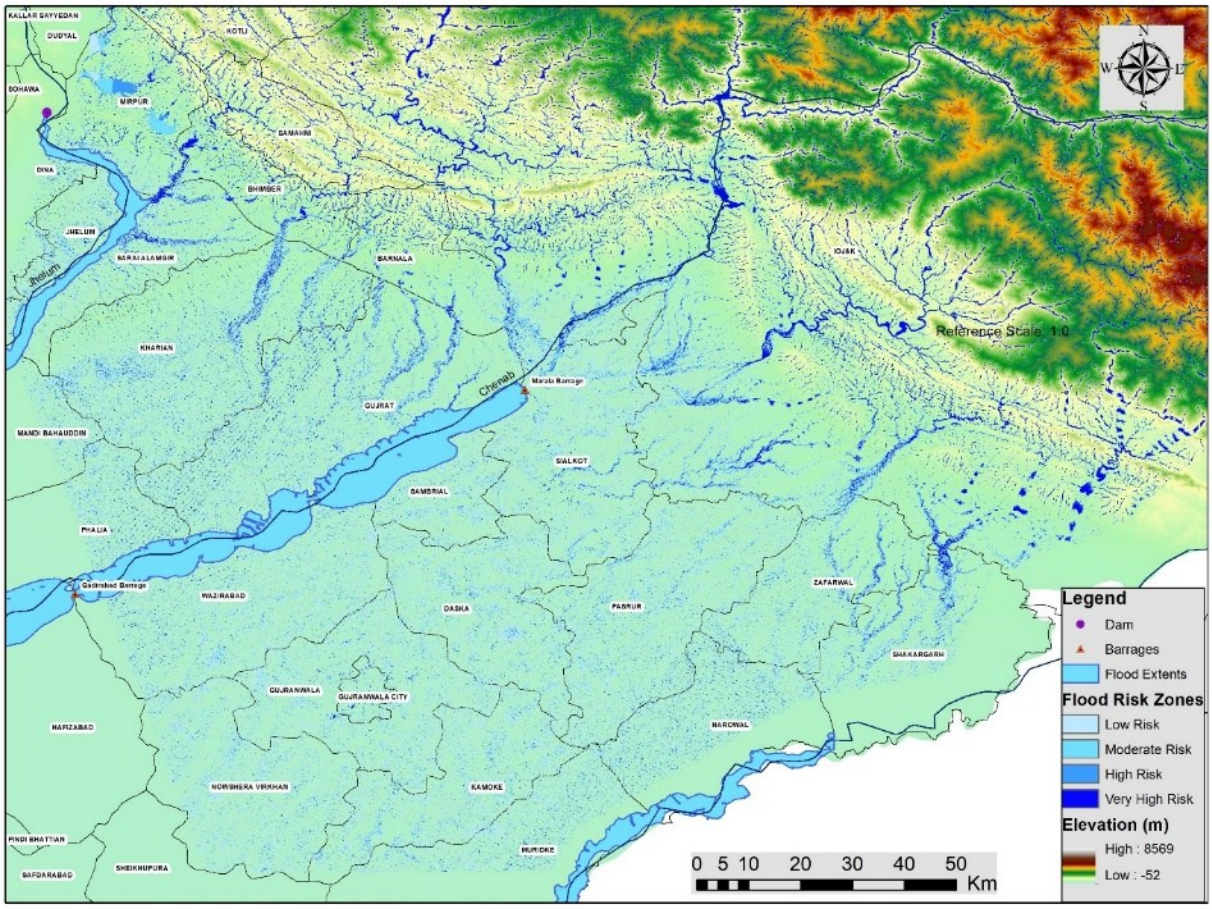


Figure 71 Pir Panjal Hill Torrents Impact Analysis 2026

DG Khan & Rajanpur Torrents - Punjab

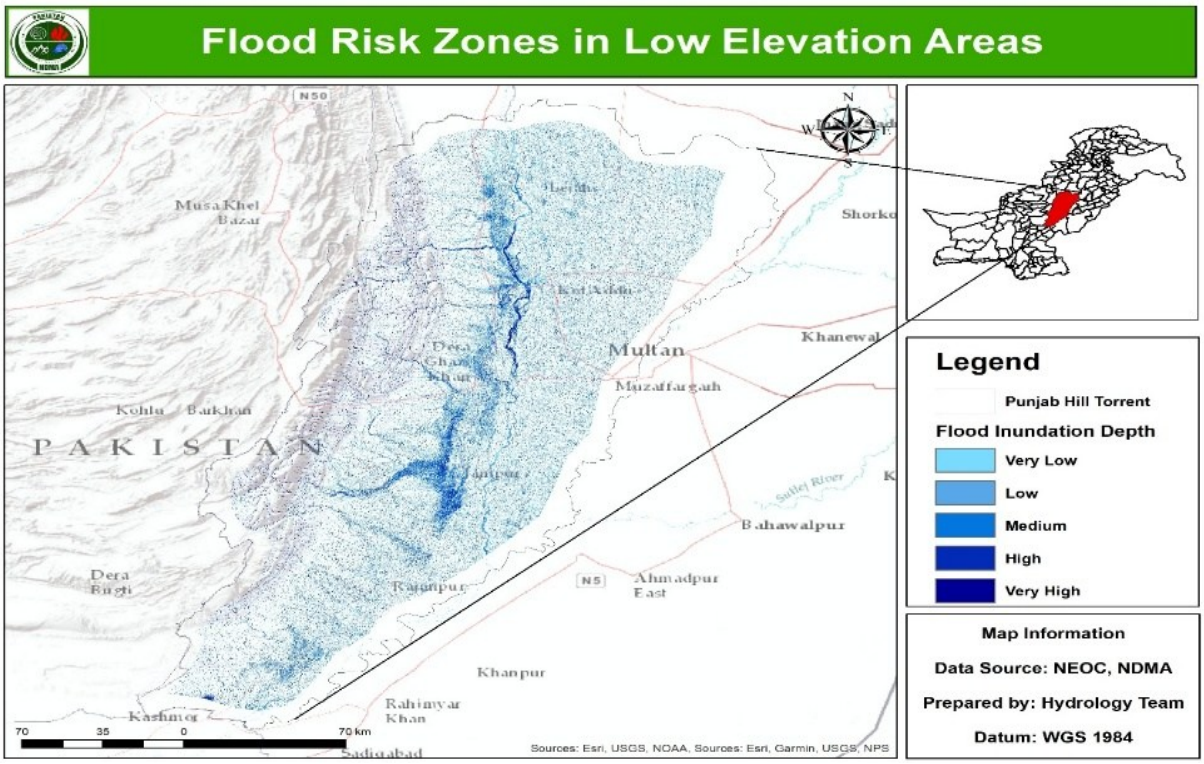


Figure 72 DG Khan Hill Torrents Impact Analysis 2026

b. **<u>May 2026</u>**. For May 2026, hydrological hazard potential is assessed as moderate overall, with localized elevated risk over northern and western catchments, as rainfall is expected to remain near normal at country scale with pockets of above-normal activity, while temperatures are projected to stay above normal, particularly over Gilgit-Baltistan, Kashmir, and northern Khyber Pakhtunkhwa. Under these conditions, the main flood-related concerns are likely to include localized flash flooding in upper catchments, rapid rises in small streams and nullahs, urban runoff flooding in vulnerable settlements, and increased snowmelt and glacier-fed runoff in northern basins, especially across KP, GB, AJK, Murree-Galiyat, Potohar, adjoining upper Punjab, and parts of northern Balochistan.

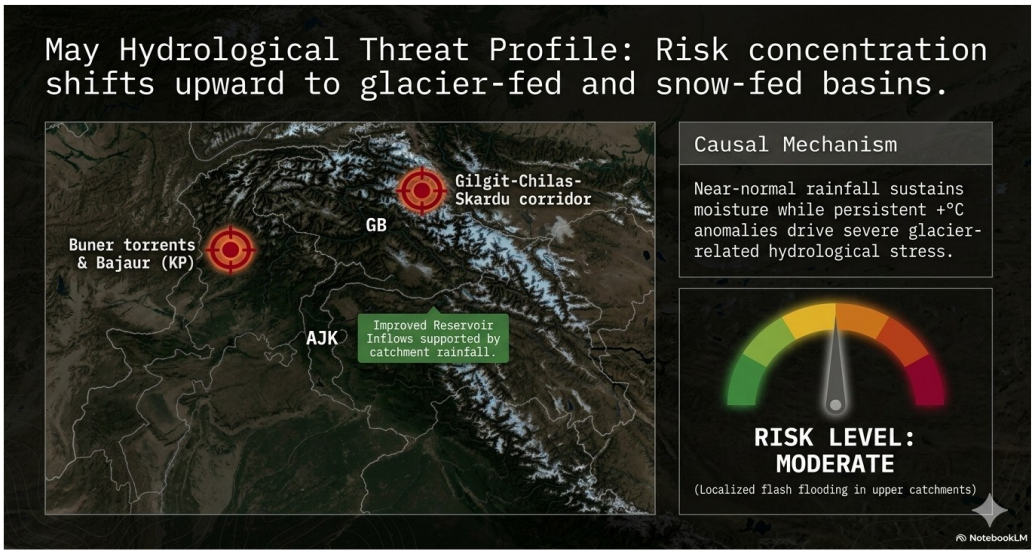


Figure 73 May Threat Profile

Figure 74 Flood Outlook May 2026

(1) Above-normal temperatures over the northern highlands may further accelerate snowmelt and contribute to glacier-related hydrological stress, including localized GLOF-sensitive conditions, while near-normal rainfall in catchment areas may also support improved reservoir inflows.

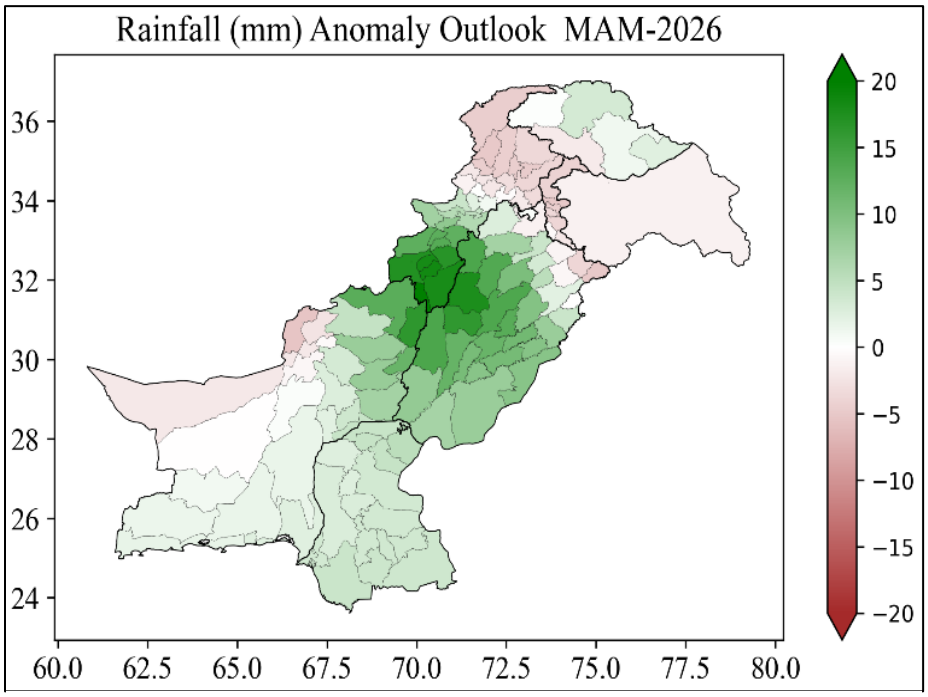


Figure 75 Precipitation Anomaly May 2026

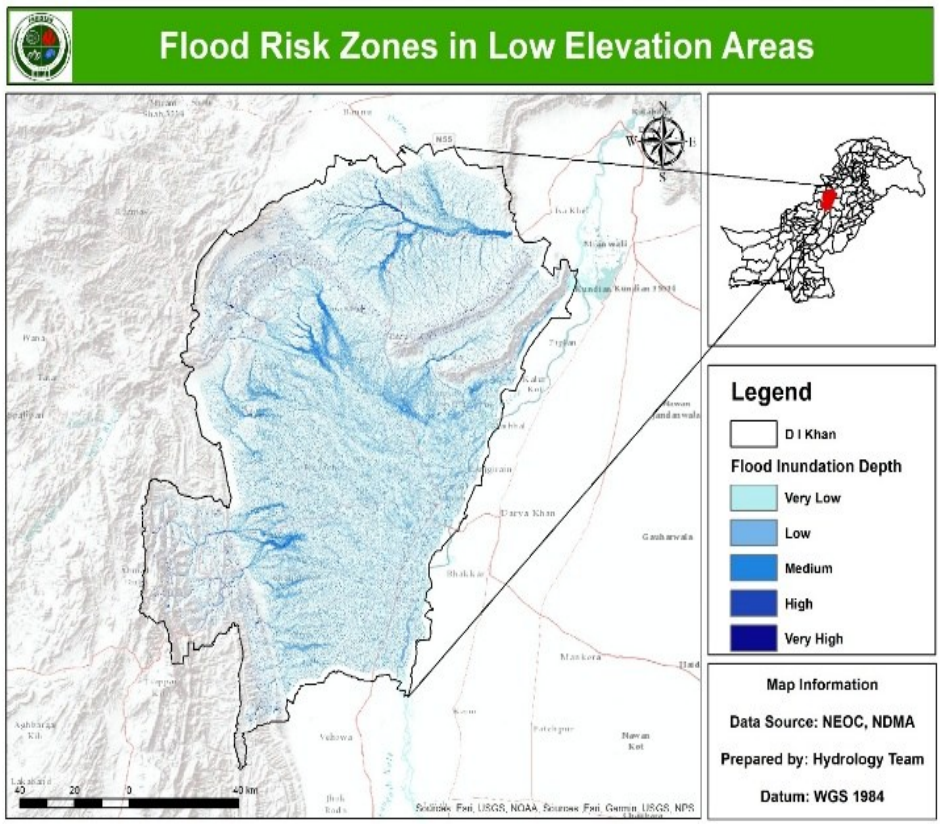


Figure 76 DI Khan Hill Torrents Impact Analysis 2026

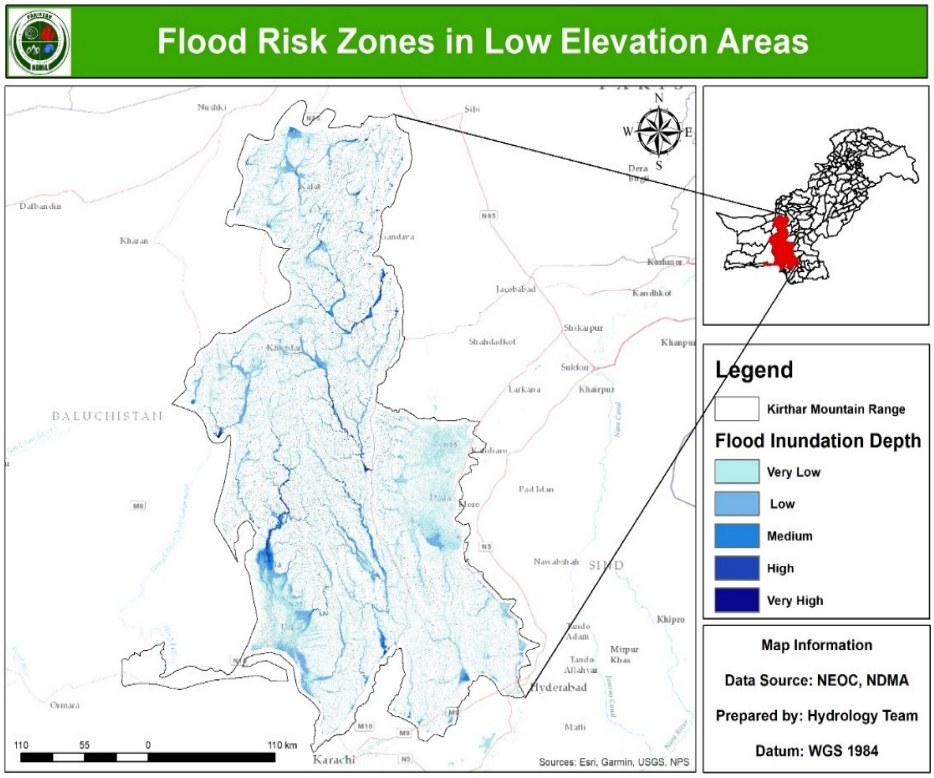
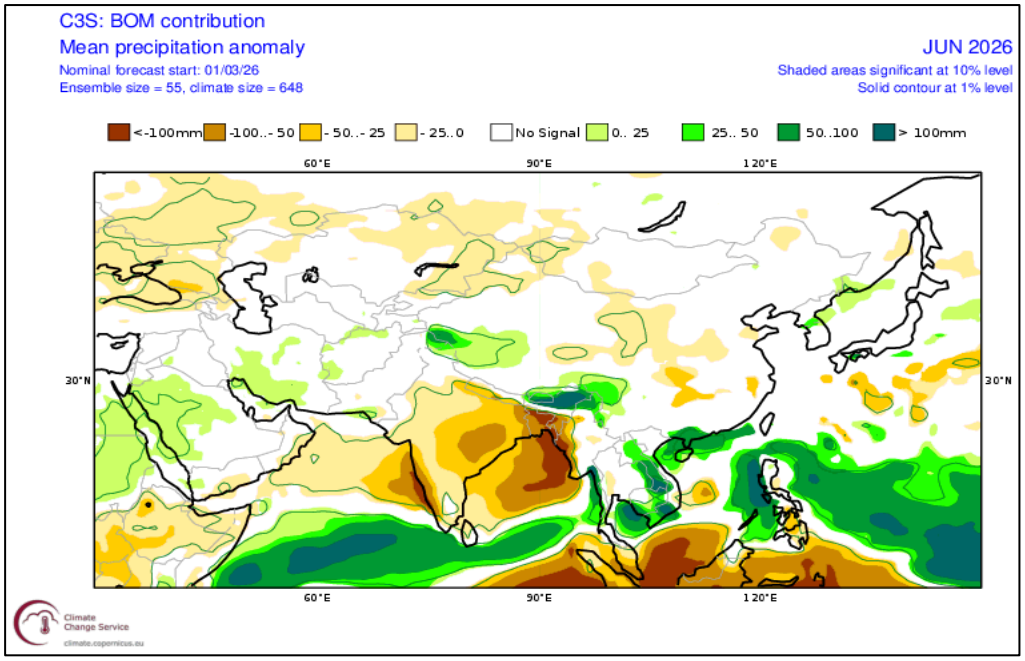
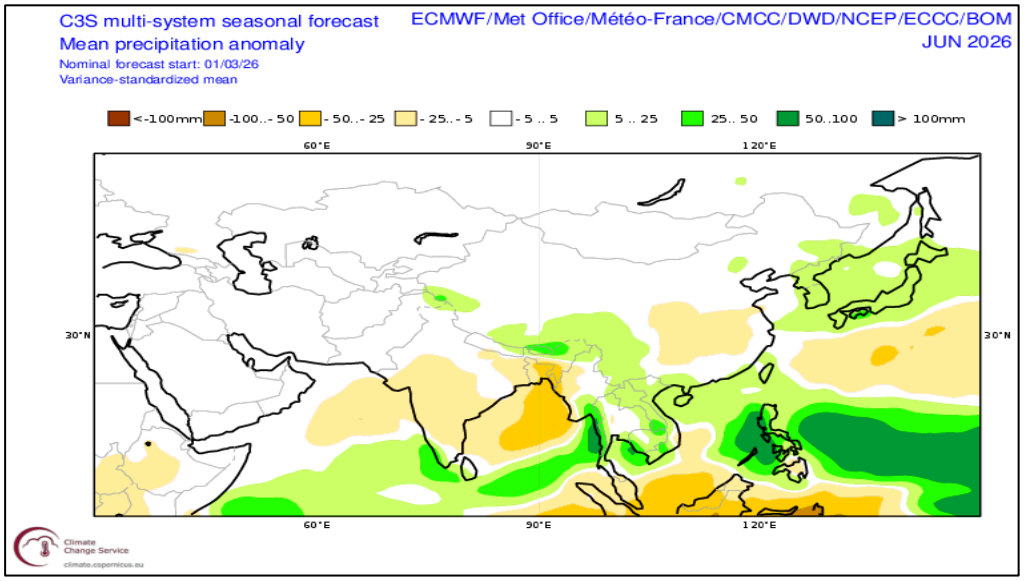


Figure 77 Kirthar Hill Torrents Impact Analysis 2026

c. **June 2026**. Based on the June 2026 outlook indicating near-normal to below-normal rainfall, with rainfall deficits of about 10 to 30 mm over central and southern parts of the country, and above-normal temperatures over northern and eastern regions, the overall flood and hydrological hazard outlook for Pakistan remains low to moderate during the month. Widespread riverine flood risk is expected to remain limited due to reduced rainfall activity; however, localized hydrological hazards cannot be ruled out, particularly in northern and upper catchment areas where above-normal temperatures may accelerate snowmelt and glacier-fed runoff. As a result, Gilgit-Baltistan, AJK, upper Khyber Pakhtunkhwa, and adjoining mountain catchments may remain exposed to localized flash flooding in small streams and nullahs, sudden runoff surges, and glacier-related hydrological stress including GLOF-sensitive conditions. In contrast, central and southern Punjab, Sindh, and much of Balochistan are likely to face suppressed runoff, lower surface water availability, and reduced reservoir inflow potential owing to below-normal rainfall. Overall, June 2026 is expected to remain relatively subdued from a large-scale flood perspective, though continued monitoring may be maintained over snowmelt-sensitive northern basins and localized flash flood-prone mountain catchments.

d. Multi-model Precipitation Analyses





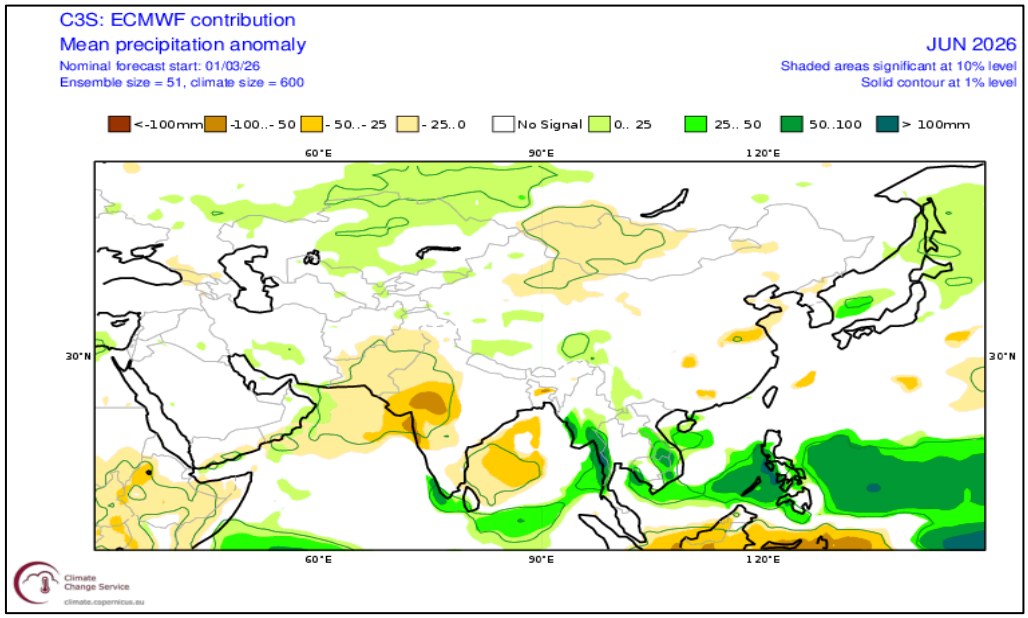


Figure 78 Multi-model Precipitation Analysis June 2026

Figure 79 Hydrological Outlook June 2026

e. Widespread riverine flood risk is expected to remain limited due to reduced rainfall activity; however, localized hydrological hazards cannot be ruled out, particularly in northern and upper catchment areas where above-normal temperatures may accelerate snowmelt and glacier-fed runoff. As a result, Gilgit-Baltistan, AJK, upper Khyber Pakhtunkhwa, and adjoining mountain catchments may remain exposed to localized flash flooding in small streams and nullahs, sudden runoff surges, and glacier-related hydrological stress including GLOF-sensitive conditions.

f. In contrast, central and southern Punjab, Sindh, and much of Balochistan are likely to face suppressed runoff, lower surface water availability, and reduced reservoir inflow potential owing to below-normal rainfall. Overall, June 2026 is expected to remain relatively subdued from a large-scale flood perspective, though continued monitoring may be maintained over snowmelt-sensitive northern basins and localized flash flood-prone mountain catchments.

Hydrological Deficit and Overall Seasonal Outlook

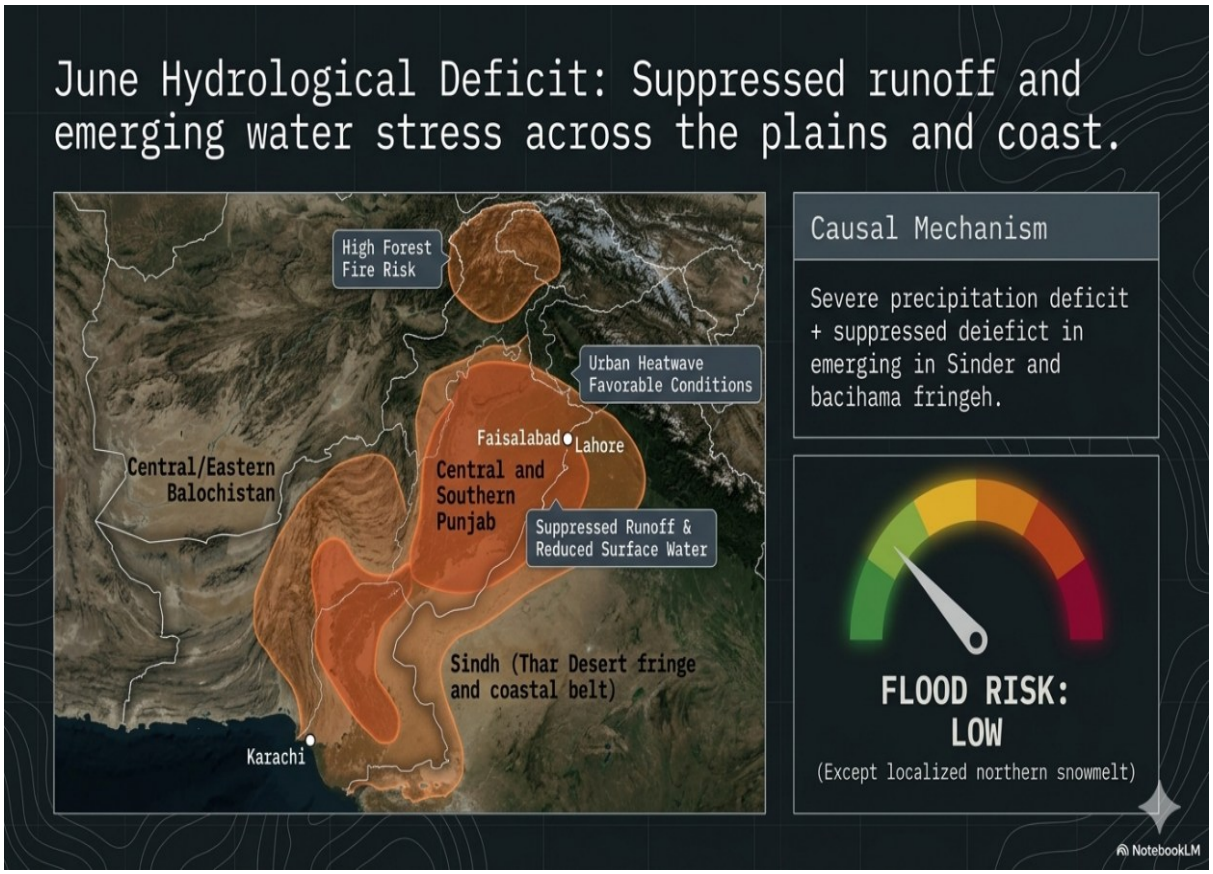


Figure 80 June Hydrological Deficit

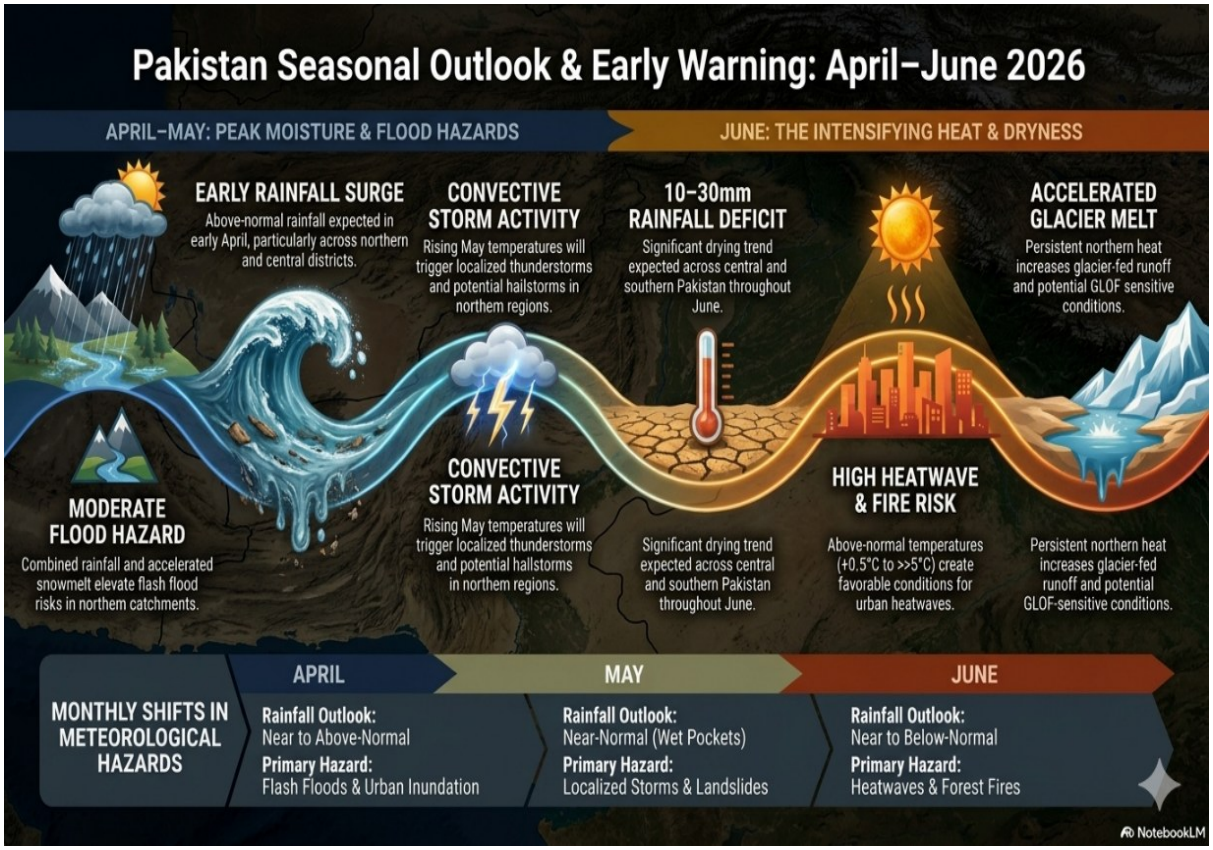


Figure 81 Seasonal Outlook Overall AMJ 2026

RESERVOIRS' SITUATION

7. Overall, Pakistan's water situation during early April 2026 remains generally favorable, with reservoir storages staying above normal and river flows showing surplus conditions compared with recent averages. This improved position appears to be supported by carryover storage, enhanced seasonal inflows, and continued melt contribution from northern catchments. However, the broader cryosphere signal remains less encouraging. In recent years, delayed and weaker snowfall patterns have increasingly favored the formation of loose seasonal snow in high glaciated areas rather than sustained accumulation and consolidation into glacier ice. As a result, the overall snowpack across northern mountain regions appears to be under stress, with reduced seasonal snow depth this year indicating a weakening natural storage buffer. This means that while short-term water availability may remain adequate or even above normal, the long-term outlook points toward increasing variability in melt runoff and greater hydrological sensitivity to temperature rise and rainfall events.

8. As of 3 April 2026, combined live storage in Tarbela, Mangla, and Chashma stands at 2.720 MAF, which is significantly higher than both the five-year average of 0.865 MAF and the ten-year average of 1.499 MAF. Individually, Tarbela holds 1.101 MAF, Mangla 1.339 MAF, and Chashma 0.280 MAF, all showing substantial positive departures from their recent averages. Reservoir levels are also elevated, with Tarbela at 1452.77 ft, Mangla at 1140.15 ft, and Chashma at 648.40 ft, indicating that the major storage system has entered the early melt and rainfall season in a relatively strong position. While this strengthens irrigation support and near-term water availability, it also requires continued operational vigilance, as any persistent rainfall spell or accelerated melting in upper catchments could quickly increase downstream flow pressure.

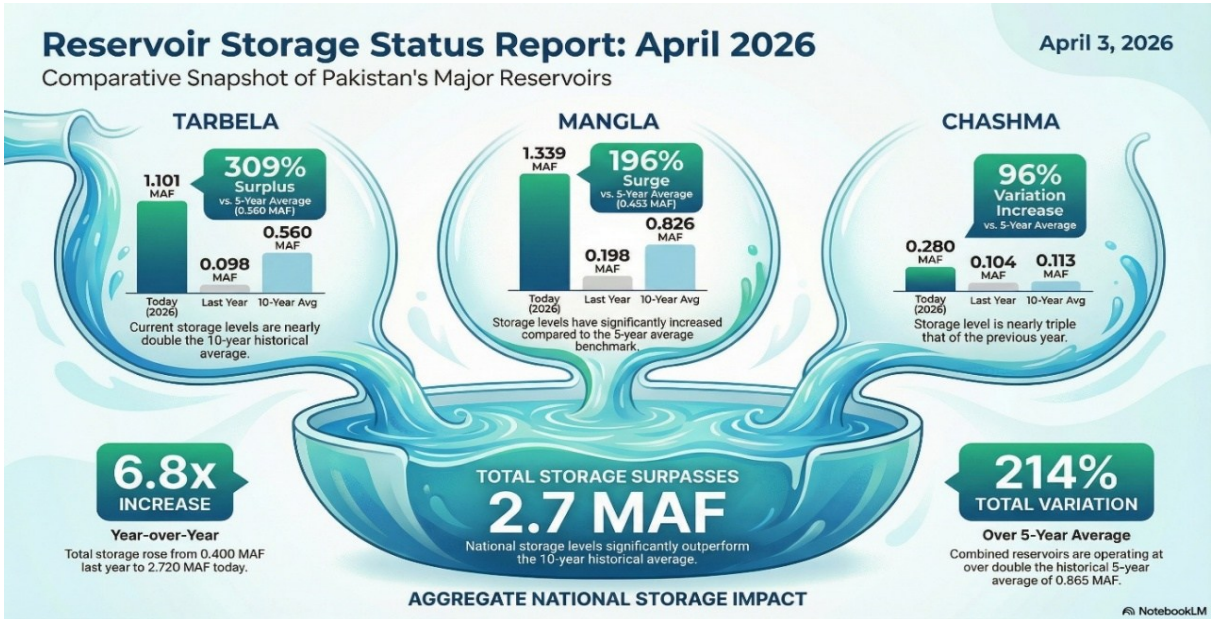


Figure 82 Storage Status

9. River inflows across the major systems are likewise running above normal. Mean inflow in the Indus at Tarbela is 37.6 thousand cusecs, Kabul at Nowshera 24.9 thousand cusecs, Jhelum at Mangla 32.1 thousand cusecs, and Chenab at Marala 15.2 thousand cusecs, giving a combined inflow of 109.8 thousand cusecs against a five-year average of 86.7 thousand cusecs. Barrage discharges are also elevated at key control points, particularly Khairabad Bridge, Jinnah, Chashma, and Panjnad, indicating that the river system is already carrying relatively active flows for this time of year. This suggests that Pakistan is entering the pre-Kharif period under hydrologically active conditions, where water availability is improved, but where the possibility of rapid flow escalation under additional rainfall or abrupt melt pulses remains an important early warning consideration.

a. **Kharif 2026 Water Availability.** For Kharif 2026, the forecast of water availability indicates broadly normal to slightly above-normal conditions in the major reservoir system. Seasonal availability is projected at 66.90 MAF against a normal of 66.25 MAF, reflecting a small overall surplus at the national scale. Tarbela is forecast to contribute 52.40 MAF compared with a normal of 50.43 MAF, while Mangla is projected at 14.50 MAF against a normal of 15.82 MAF. This suggests that aggregate water availability for the upcoming Kharif season is expected to remain generally adequate, although its temporal distribution may remain uneven through the season. Reduced snow depth in northern catchments, altered melt timing, and the likelihood of fluctuating spring and summer rainfall may all influence how this water becomes available over time. In this context, although the seasonal outlook remains broadly favorable, close monitoring of snowmelt progression, inflow trends, and rainfall-driven runoff will remain essential for early warning, reservoir operations, and downstream risk management.

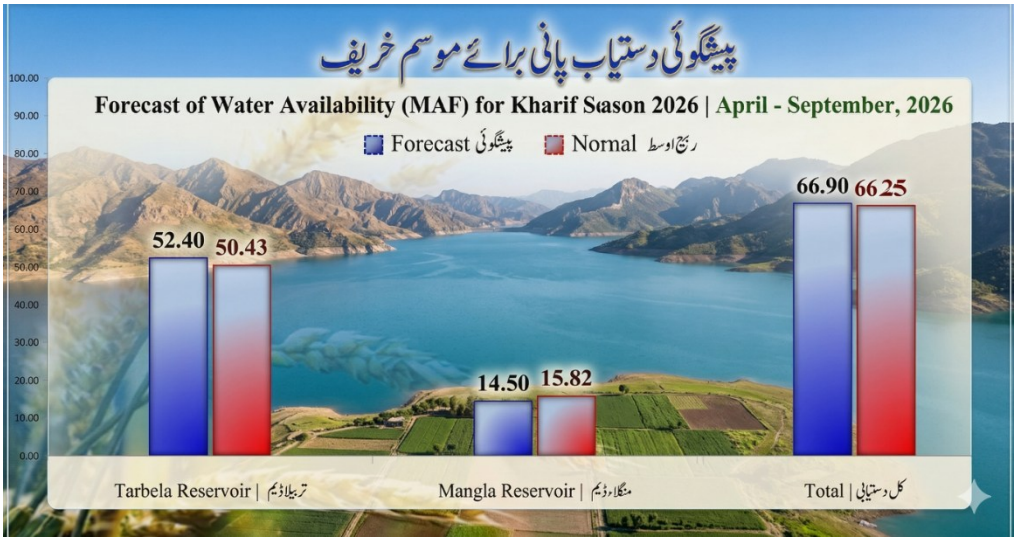


Figure 83 Tentative Forecast - Water Availability (MAF), 2026 (Source PMD)

b. **Preliminary Monsoon Outlook 2026.** Pakistan is likely to enter the 2026 monsoon season from a relatively strong hydrological base. Current combined live storage in Tarbela, Mangla, and Chashma stands at 2.720 MAF, well above the recent five-year average of 0.865 MAF, while total mean inflows at key river stations are 109.8 thousand cusecs against a five-year average of 86.7 thousand cusecs. At the same time, PMD's latest seasonal outlook indicates near-normal to slightly above-normal spring rainfall and above-normal temperatures, with the strongest temperature departures over northern Pakistan. PMD has already warned that above-normal temperatures over Gilgit-Baltistan and upper Khyber Pakhtunkhwa increase snowmelt and glacier-related hazard potential, and its 9 March 2026 GLOF alert specifically highlighted elevated risk of GLOF, flash floods, and landslides in GB and upper KPK under warm conditions and an incoming wet spell. In parallel, WMO and IRI guidance shows a rapid evolution from fading La Niña toward ENSO-neutral and then El Niño-favored conditions by JJA/JAS 2026, with WMO also indicating a tendency toward a positive IOD by July-August. Taken together, that points less to a smooth season and more to a volatile hydrological regime, where intense rainfall bursts, heat-driven melt pulses, and sharp river responses may occur within the same season.

c. **July 2026**. July 2026 is expected to represent the active onset phase of the monsoon season in Pakistan. Rainfall during the month is projected to remain around 10 percent higher than that observed during the corresponding period last year, which is likely to support an early increase in basin inflows and improved reservoir recharge. From a hydrological perspective, the principal concern will be the combined influence of active monsoon incursions, embedded western disturbances, and elevated temperatures over the upper catchments. Under these conditions, urban flooding and rain-related emergencies may occur in major cities of Khyber Pakhtunkhwa and Punjab, particularly in response to short-duration, high-intensity rainfall events. In addition, localized flash flooding may develop in the Swat and Kabul River catchments, including Dir, Swat, Shangla, Buner, Bajaur, and Charsadda, where rapid runoff generation is likely during intense precipitation spells.

Flash Flood Zonation

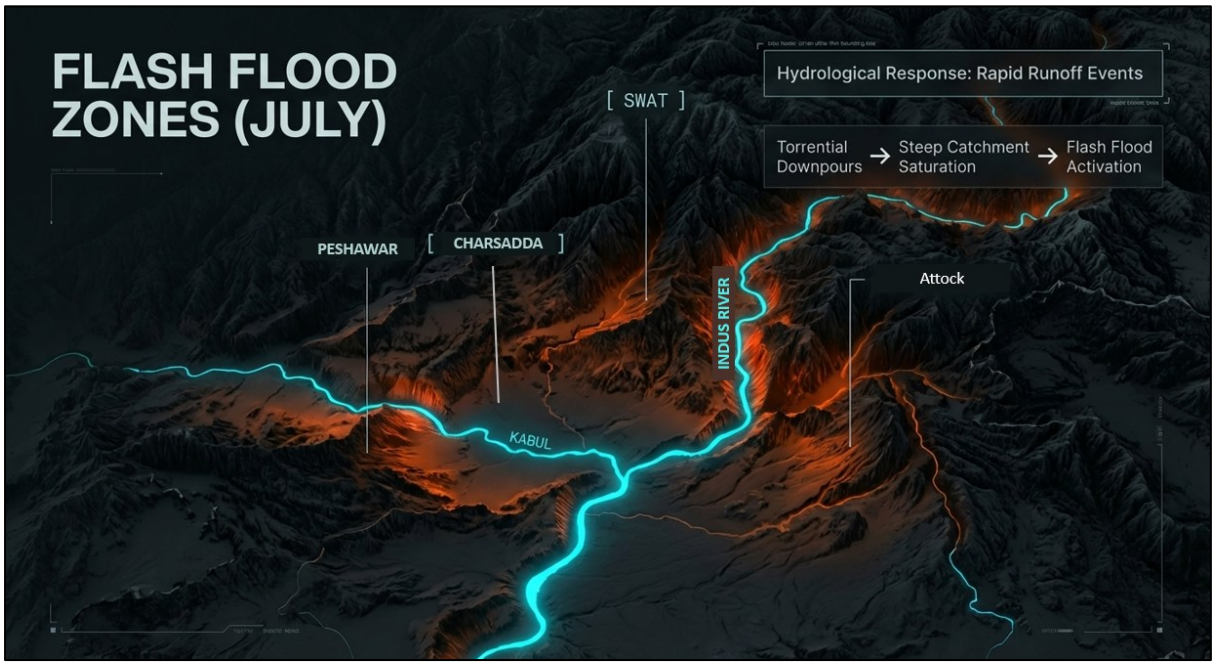


Figure 84 Possible Flash Flood Zones July 2026

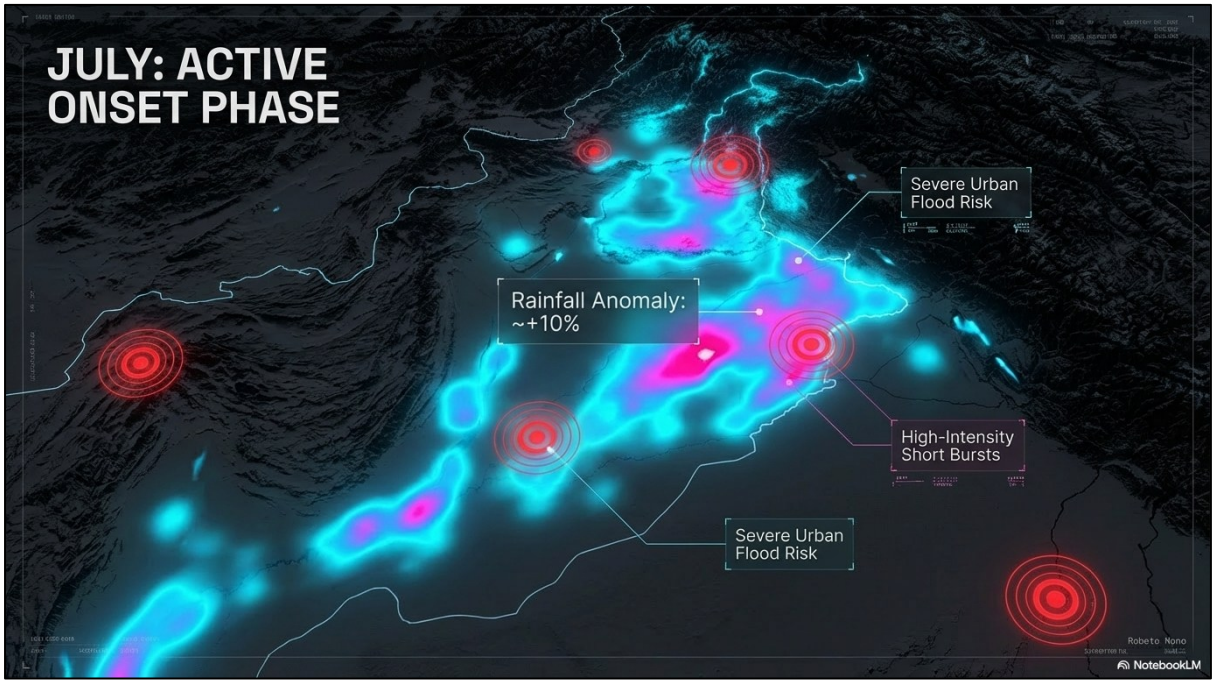


Figure 85 July Onset

In glacier-fed areas, particularly Chitral and parts of Gilgit-Baltistan, melt-fed streams and nullahs may respond rapidly to heavy rainfall due to the combined effect of precipitation and accelerated snow and glacier melt. In southern Punjab, hill torrents in Dera Ghazi Khan and Rajanpur may become active repeatedly during stronger monsoon episodes, posing localized flood risk to vulnerable settlements and infrastructure. Overall, reservoir inflows are expected to strengthen further during July, which is likely to keep storage levels above last year's levels as well as above recent historical averages.

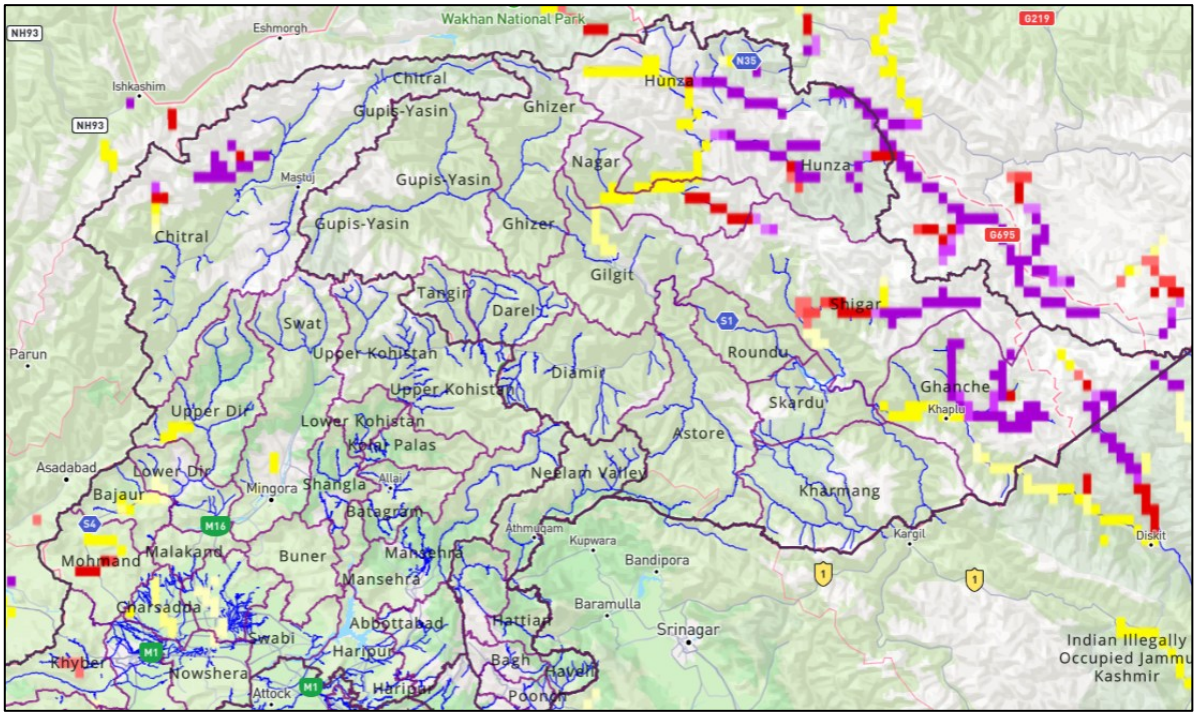


Figure 86 Northern Area Flood Prone Zones

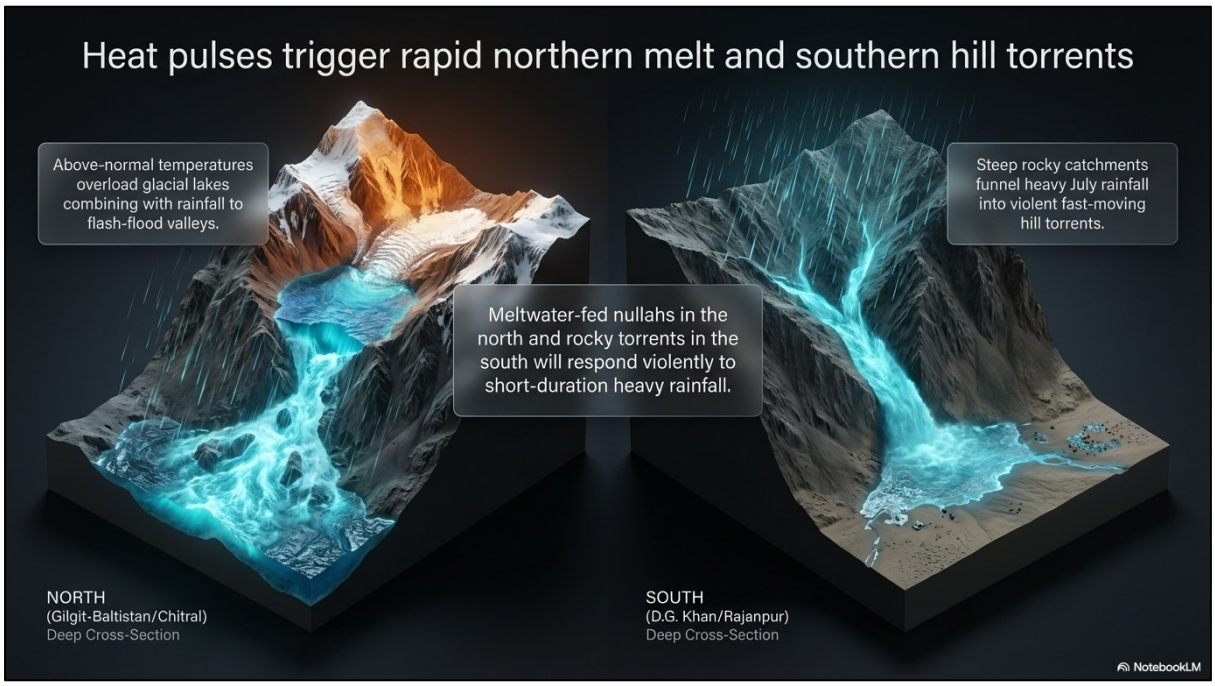


Figure 87 Snowmelt

d. **<u>August 2026</u>.** Rainfall during August 2026 is expected to remain generally suppressed, as the anticipated development of El Niño conditions during late summer may weaken the overall monsoon performance across the region. However, despite the likelihood of below-normal to near-normal seasonal rainfall at the broader scale, the interaction of active western disturbances with occasional intense monsoon spells may still generate significant hydrological risks in susceptible areas. Under such conditions, short-duration high-intensity

rainfall events may trigger urban flooding, flash floods, and localized riverine surges even in an otherwise relatively subdued monsoon month. The areas most exposed to these conditions are likely to include upper Khyber Pakhtunkhwa, Gilgit-Baltistan, north-eastern Punjab, the upper Indus basin, and low-lying floodplains located downstream of major barrages.

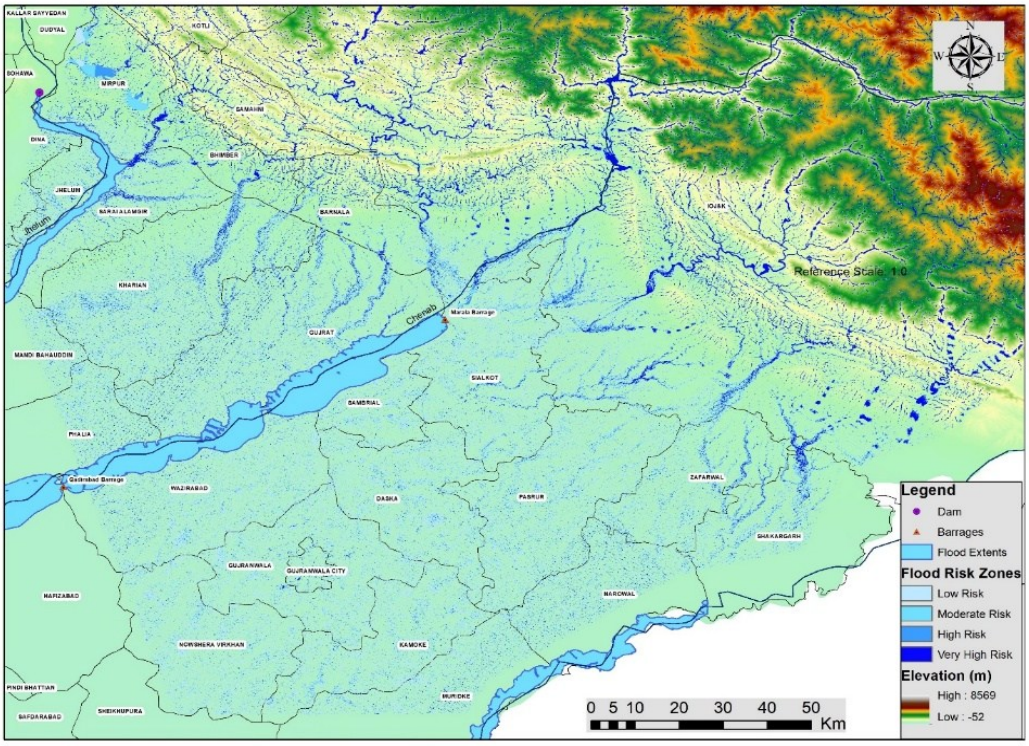


Figure 88 Pir Panjhal Range Transboundary Torrents

e. Hydrologically, Tarbela Reservoir may approach early filling during August, while flows in the Indus River system may rise to medium to high flood ranges. Under such conditions, the likelihood of riverbank erosion, inundation of bellas, and damage to floodplain agriculture is expected to increase.

f. August 2026 is expected to remain hydrologically sensitive despite a likely suppression in overall rainfall due to the anticipated emergence of El Niño conditions in late summer. However, interaction between western disturbances and intense monsoon spells may still trigger urban flooding, flash floods, and localized riverine surges in susceptible areas. In addition, transboundary flood risk may remain elevated due to possible operational releases from partially or fully filled upstream Indian reservoirs and hydropower structures on the Ravi, Chenab, and Sutlej River systems, particularly where such releases coincide with local runoff conditions.

g. **Transboundary Impact**

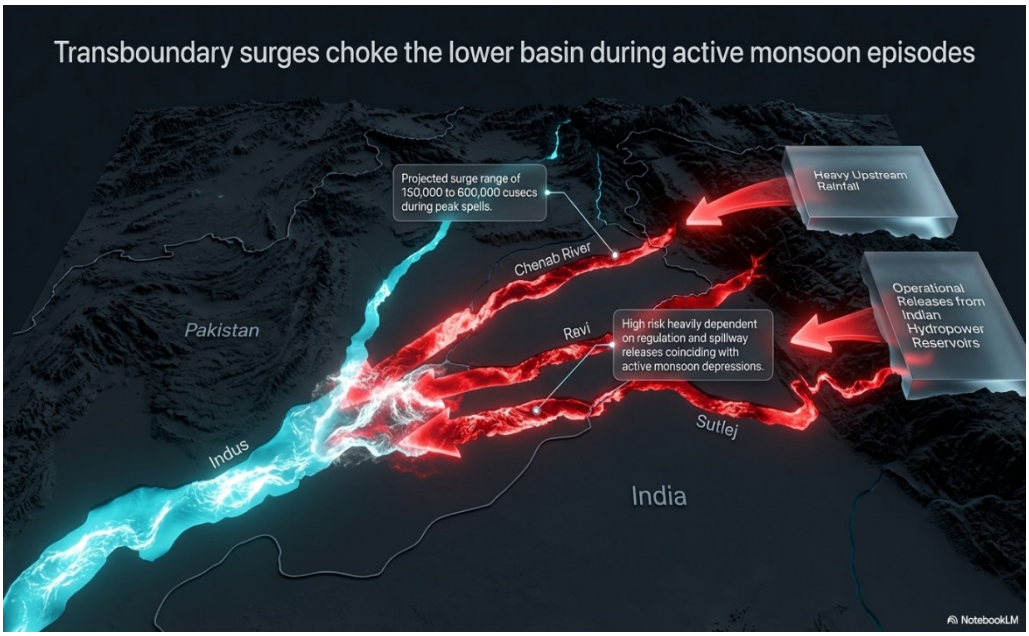


Figure 89 Transboundary Chokes

h. **September 2026.** September 2026 is expected to represent the retreat phase of the monsoon season; however, a complete reduction in hydrological risk is unlikely during this period indicating that intermittent late-season wet spells may still occur. By this stage of the season, the hydrological system is likely to be characterized by high antecedent moisture conditions, elevated river levels, and relatively fuller reservoirs. Consequently, even a limited number of intense rainfall events may generate disproportionately high impacts in susceptible areas.

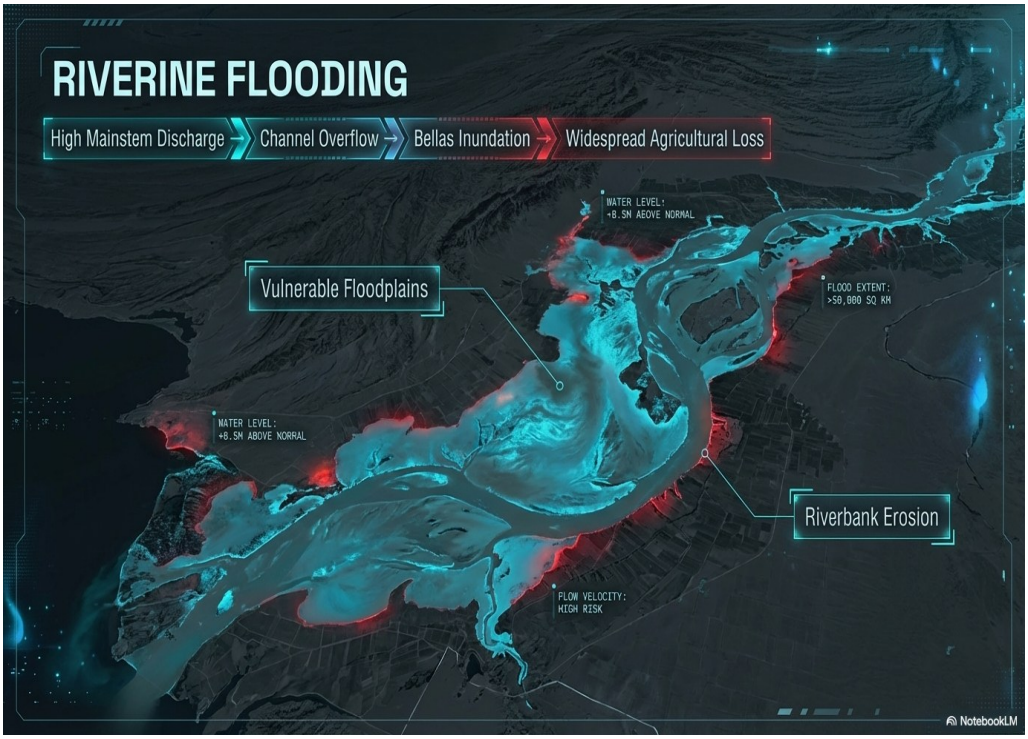


Figure 90 Riverine Flooding

i. **Ravi and Sutlej Concern**. The principal hydrological concerns during September are expected to include localized flash flooding in northern and eastern Pakistan, continued elevated baseflows in glacier-fed rivers, and possible late-season surges in transboundary rivers in the event that monsoon depressions coincide with upstream reservoir releases. In addition, late-season temperature anomalies may sustain above-average melt contributions, thereby prolonging runoff in upper catchments even as monsoon activity gradually weakens. From an operational perspective, September should continue to be treated as a period of residual flood risk, particularly for communities located along active river channels, bellas, low-lying urban areas, and vulnerable transport crossings.

Figure 91 Ravi & Sutlej