PAKISTAN
National Disaster Management Authority
NDMA

DISASTER EARLY WARNING

1. **Large Scale Climate Drivers.** The following climatic drivers generally enhance rainfall over the Bay of Bengal, eastern India, Bangladesh, Nepal, and Sri Lanka, while western South Asia (Pakistan, NW India) shows near normal metrological patterns.

a. **El Niño–La Niña Southern Oscillation (ENSO).** Global forecasts suggest a transition towards a weak La Niña during Oct–Dec 2025. For south asia, this typically favors slightly wetter than normal conditions in the northern and eastern regions during late autumn, with an increased likelihood of early winter rains.

b. **Indian Ocean Dipole (IOD).** A negative IOD in the early season tends to suppress rainfall over western South Asia, including Pakistan's southwest (Baluchistan and lower Sindh). This could reinforce drier-than-normal conditions in these areas, while eastern Pakistan may still benefit from La Niña–related rainfall.

c. **Siberian High.** Currently weak but projected to strengthen by late November and through winter. As it builds, it will drive cold air intrusions into South Asia northern and central regions, leading to sharp temperature drops from late November onwards, and enhancing cold wave potential into December.

d. **North Atlantic Oscillation (NAO).** A nominal negative phase of NAO supports slightly increased influence of western disturbances by interacting with the Azores High. This increases the probability of western disturbances (WDs) reaching in November–December, bringing rainfall and snowfall HKH region.

e. **Subtropical Jetstream (STJS).** If zonal flows dominate, WDs weaken before reaching South Asia, leading to drier spells. However, climate models suggest episodes of meridional flows, which would strengthen WD.

f. **Northern Hemisphere Snow Cover.** Expanding snow cover will strengthen the Siberian High and weaken WDs, but also channel cold northerly winds towards Pakistan. This points to strong counter balancing of Siberian High with WD in the late November–December, alongside reduced mobility of WDs in December.

2. **Global DEW.** From October to December 2025, South Asia's climate will be influenced by a weak La Niña and a negative Indian Ocean Dipole, bringing slightly wetter than normal conditions to the east and south, including Bangladesh, northeast India, Sri Lanka, and south peninsular India. In contrast, Pakistan and northwest India are likely to see mixed or near normal rainfall. Temperatures are expected to cool across the northern belt and Himalayan foothills, while plains and southern regions may remain closer to normal temperature. Overall, the season points low to moderate weather induced risks, including localized floods, landslides, and agricultural disruptions across the South Asian region, while deteriorating air quality and episodes of smog are also likely, particularly over norther western India and Pakistan during late October to December, driven by cooler temperatures, stagnant winds, and seasonal crop residue burning.

a. **Precipitation**. During October 2025, above normal rainfall is likely over northeast India, Nepal, Bangladesh, and Bhutan, increasing the risk of localized flooding and landslides in hilly terrain. South peninsular India and Sri Lanka are expected to experience the onset of the northeast monsoon with near to above normal rainfall. In contrast, Pakistan (particularly the northern and central parts) along with northwest India may receive localized rainy spells from westerly disturbances, but overall seasonal totals are expected to remain near normal, while southern Pakistan will likely remain drier. In November and December, rainfall patterns are projected to shift east and south. Eastern South Asia, including Bangladesh, eastern India, and coastal areas along the Bay of Bengal, face continued above normal rainfall, particularly in November. Sri Lanka and southern India are expected to remain wet under the influence of an active northeast monsoon extending into December. Meanwhile, Pakistan and western India are likely to stay comparatively drier, though northern areas may still receive occasional rainfall from episodic western disturbance.

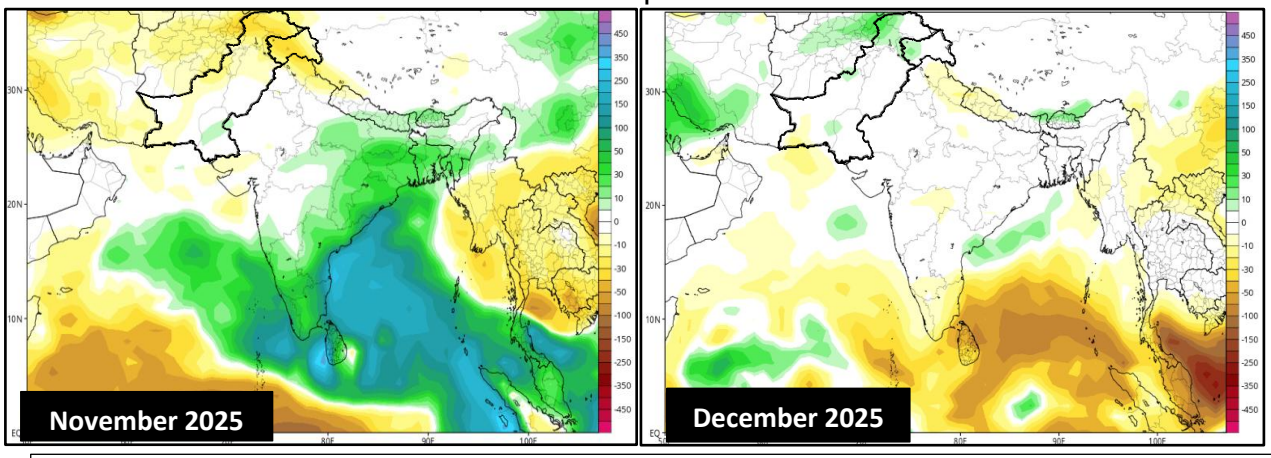


Fig.1 Total accumulated Precipitation anomaly (November-December 2025)

b. **Temperature**. In October, most parts of northern and central South Asia will experience cooling of day and night time temperature as the monsoon withdraws and westerly systems become more active, bringing cooler continental air into the region. As the season progresses into November and December, the weak La Niña pattern is expected to favor slightly cooler conditions across the northern belt and Himalayan foothills. In contrast, the plains and southern regions are projected to experience near normal to slightly above normal temperatures.

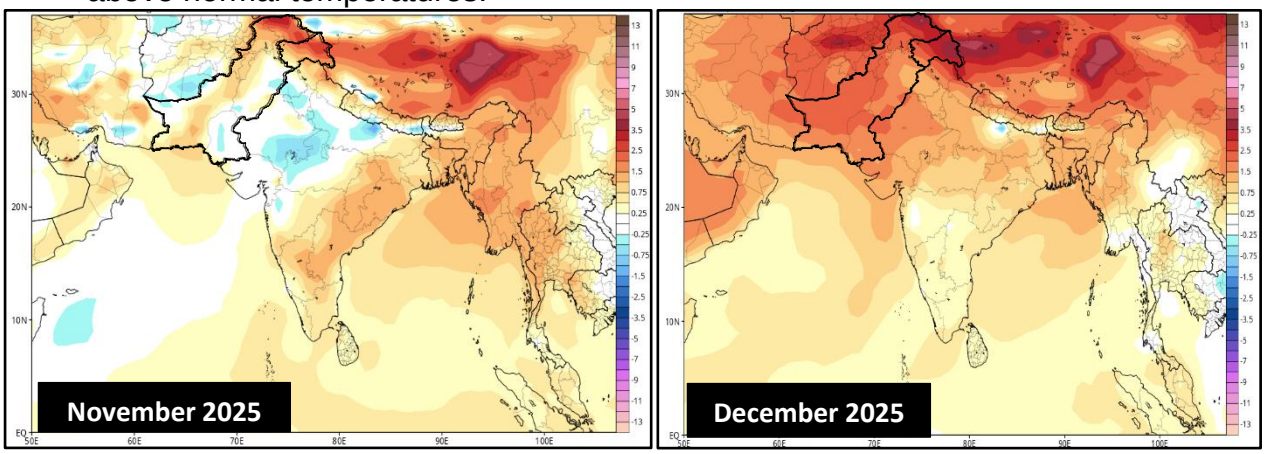


Fig.2 Temperature anomaly (November-December 2025)

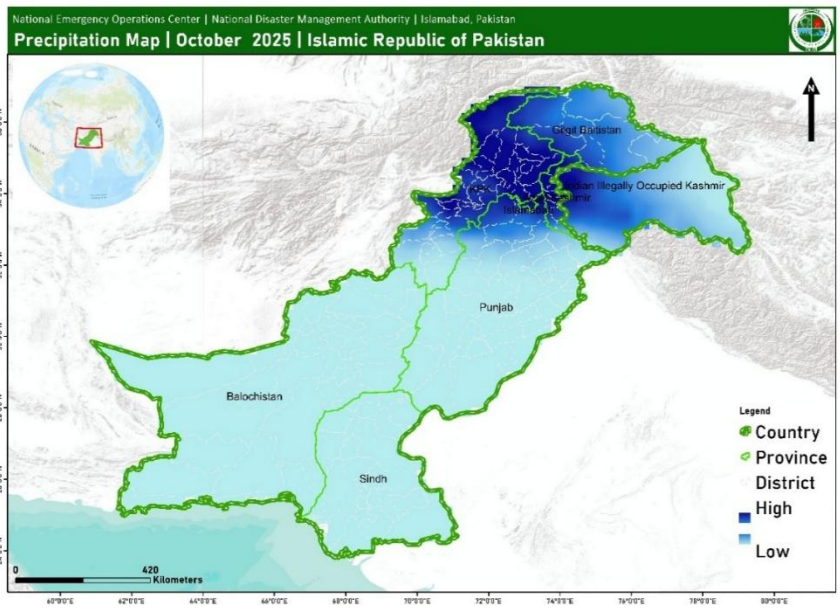
3. **National DEW**

a. **Precipitation Outlook (October 2025)**

(1) Overall, near normal conditions are likely over northern Khyber Pakhtunkhwa, Gilgit-Baltistan, and AJ&K.

(2) Southern and central Punjab, and southeastern Sindh may experience slightly above normal rainfall, mainly from residual monsoon incursions and weak low-pressure systems.

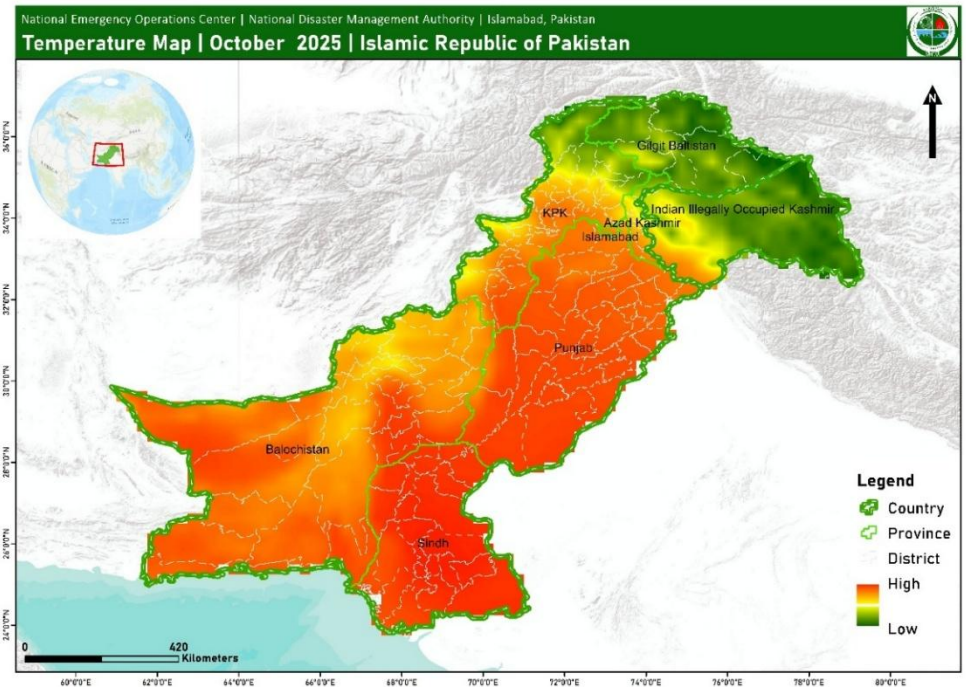
(3) Western Balochistan expected to stay near normal. The following figure highlights these patterns.



b. **Temperature Outlook**

(1) Daytime temperatures expected to remain slightly above normal in most regions, particularly Sindh and Balochistan.

(2) Nights will gradually cool in northern areas, with anomalies close to normal. The following figure highlights these patterns.

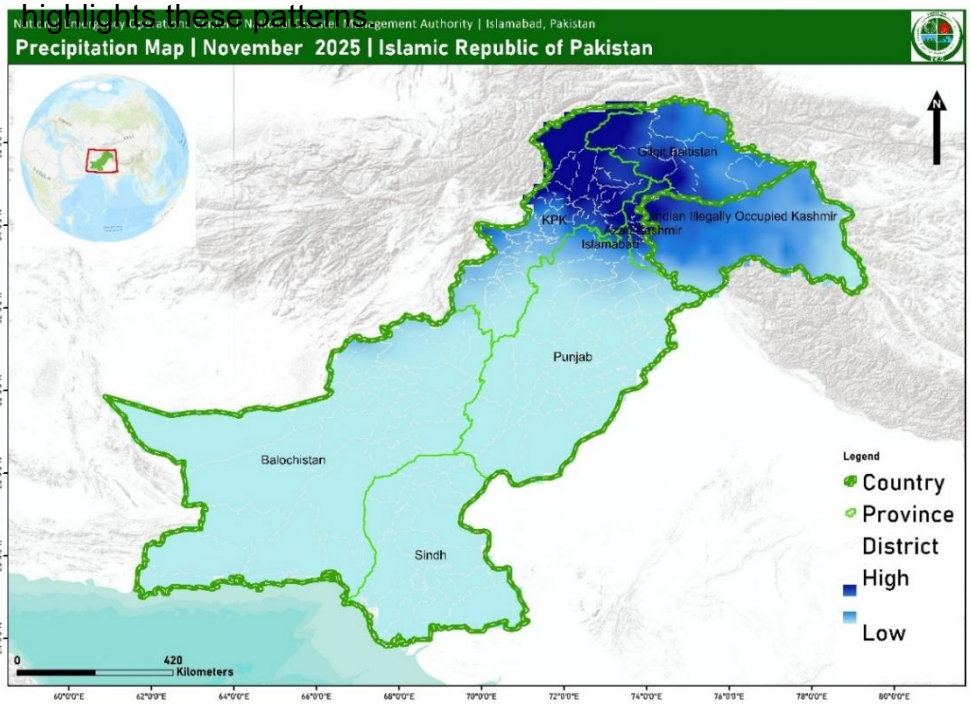


c. **Precipitation Outlook (*November 2025*)**

(1) Near normal conditions are expected across most of Pakistan.

(2) Light to moderate rainfall spells may occur in upper Punjab and northern Pakistan due to westerly troughs.

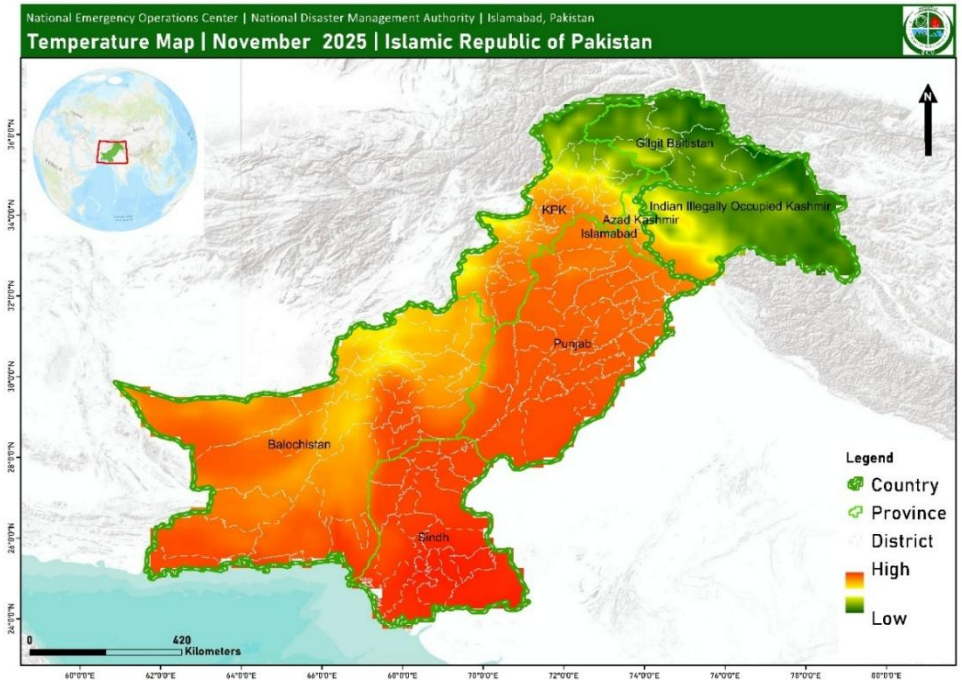
(3) Sindh and Balochistan remain mostly dry. The following figure highlights these patterns.



d. **Temperature Outlook**

(1) Above normal temperatures likely in southern Pakistan, extending into central Punjab.

(2) Northern areas (Khyber Pakhtunkhwa, Gilgit Baltistan, AJK) to experience a significant drop in night temperatures, with anomalies close to normal or slightly negative. The following figure highlights these patterns.

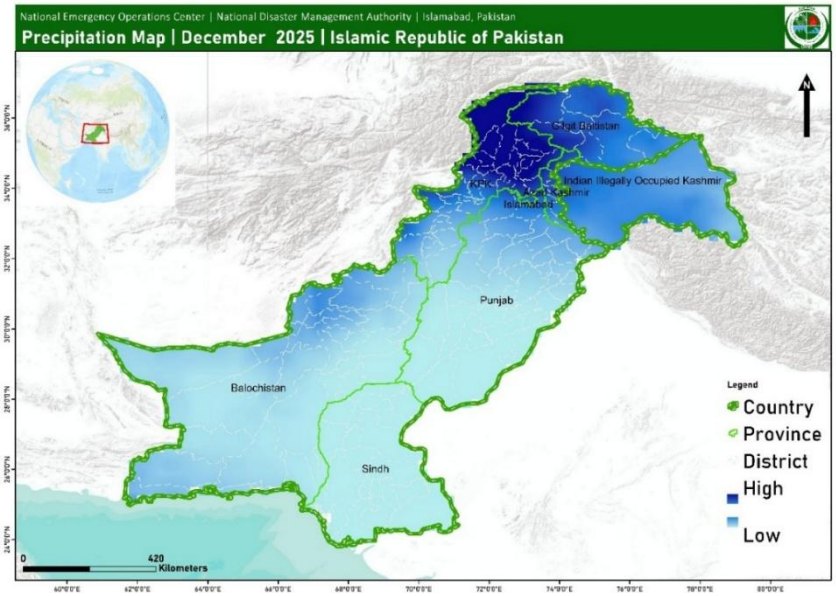


e. **Precipitation Outlook (*December 2025*)**

(1) Western disturbances expected to become more active.

(2) Northern of the country (including Kashmir, Gilgit-Baltistan, northern KP) may receive near-normal precipitation, including early snowfall at higher altitudes.

(3) Southern parts of the country (Sindh, Balochistan, southern Punjab) will mostly remain dry as shown in the figure below.

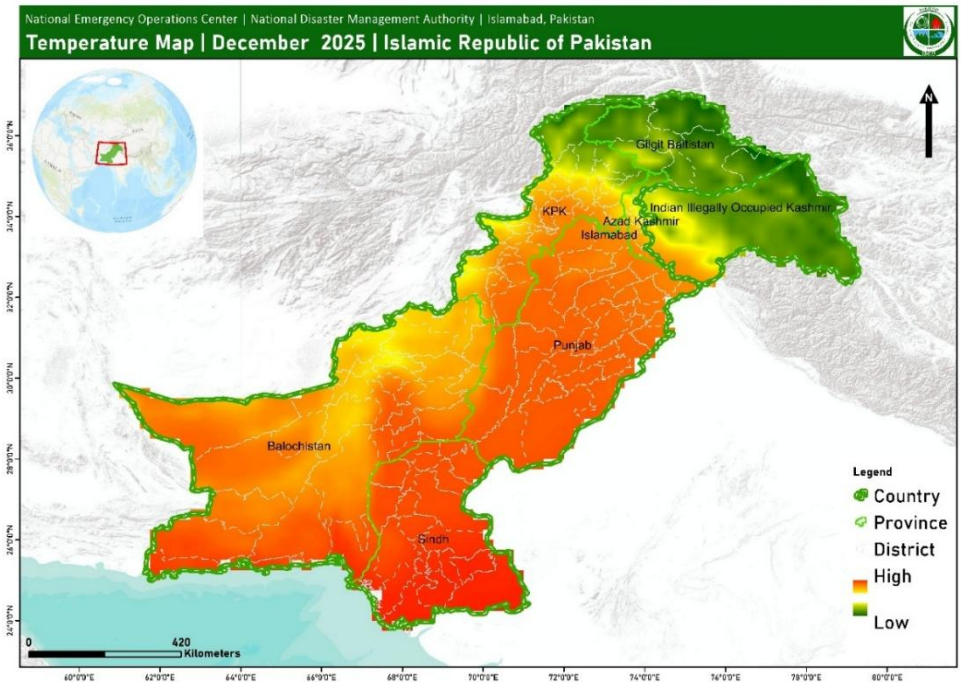


f. **Temperature Outlook:**

(1) Cooler than normal nights expected in northern Pakistan.

(2) Slightly above normal daytime temperatures likely to persist in southern and southwestern parts of the country.

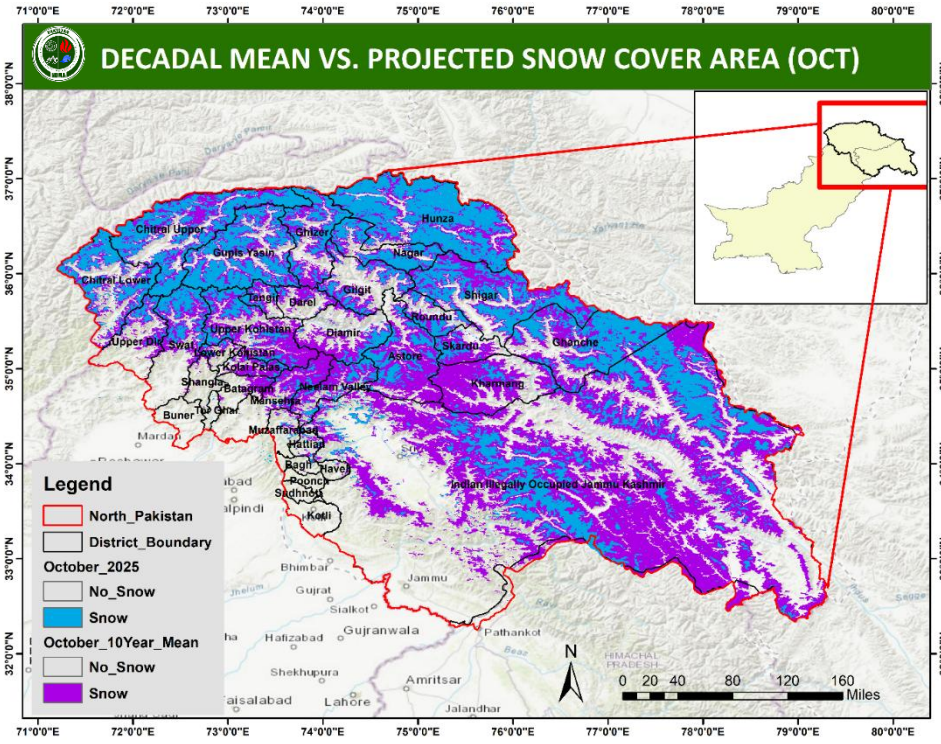
(3) Seasonal shift into winter will be more pronounced in high altitude regions. The following figure highlights these patterns.



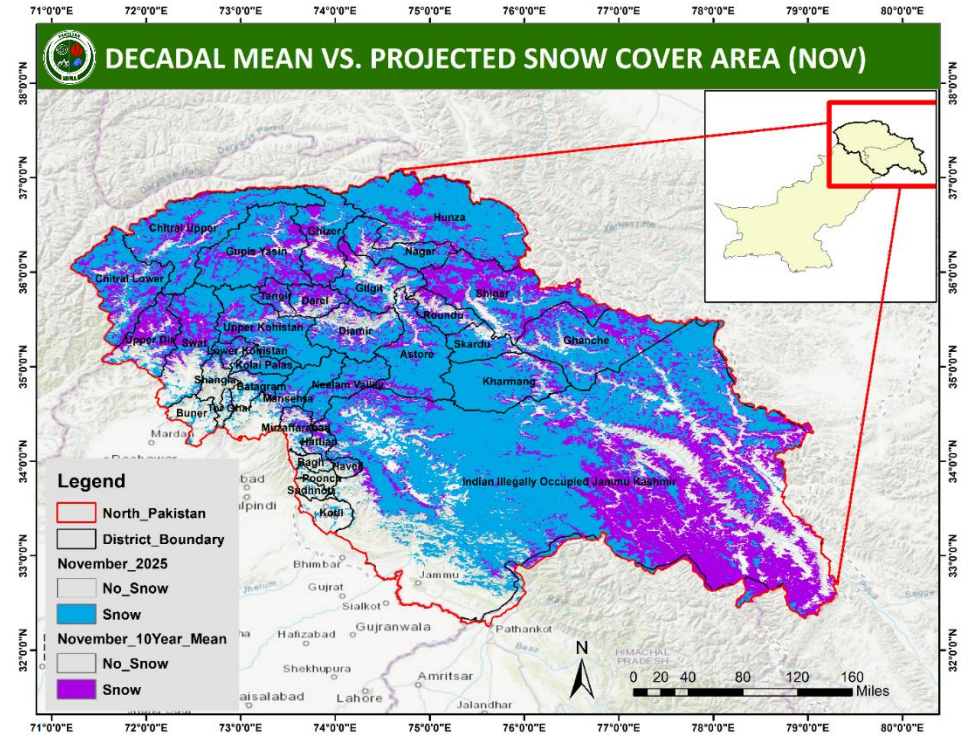
4. **Implications**.

a. **Snowfall**. Snowfall trend across Pakistan for the months Oct-Dec is projected to be slightly below compared to its climatological average, particularly in areas like Gilgit-Baltistan, Pirpanjal range, Galiyat region, and parts of Khyber Pakhtunkhwa that traditionally receive seasonal snow during these months. Western Disturbances are expected to continue bringing winter precipitation to the northern mountains, but global and regional forecasts suggest drier-than-normal conditions, reducing overall snow accumulation. This will have implications for water availability in the northern regions, as much of Pakistan's summer river flows are fed by snowmelt and glaciers, particularly in the pre-monsoon months of 2026. However, the downstream areas will not be at much threat owing to the filling of major dams due to the monsoon 2025 rainfall. Reduced snow cover further accelerates glacier retreat by exposing ice earlier in the season, making high-altitude regions more vulnerable to glacial lake outburst floods (GLOFs) when spring and summer temperatures rise.

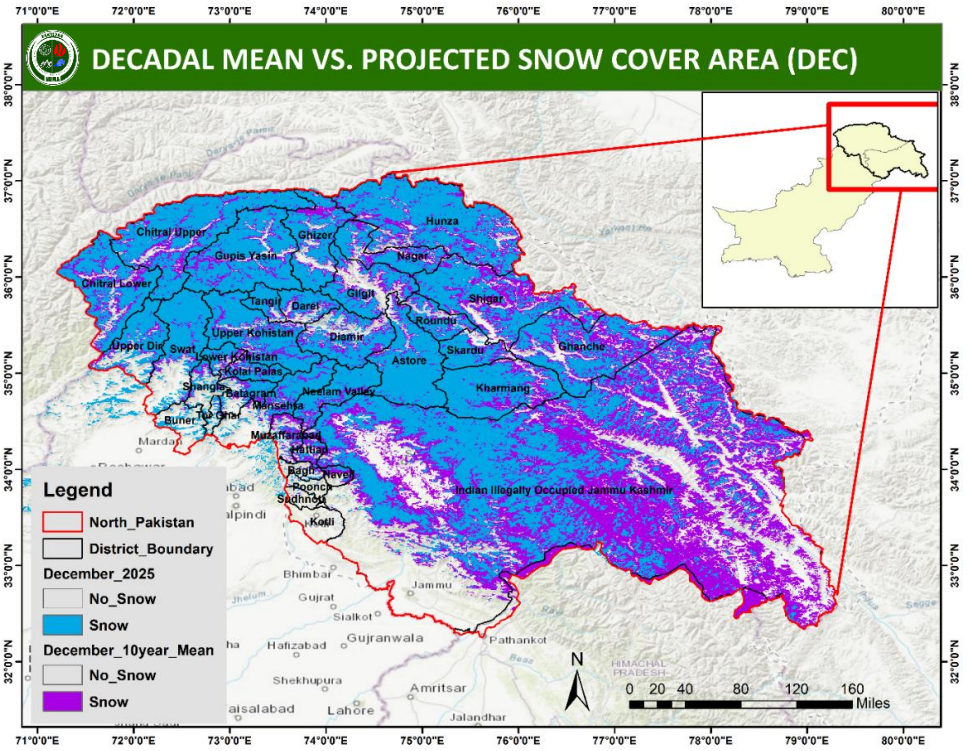
(1) In **October 2025**, Pakistan's snowfall will remain limited to the northern high-altitude regions, as the Siberian High is still building and Western Disturbances are only beginning to appear. Weak La Niña conditions may enhance occasional precipitation, allowing for light and patchy early snow in Gilgit-Baltistan, Chitral, and upper KP valleys. Plains will stay mostly dry, with only scattered rains in the north and a wide day–night temperature range.



(2) In **November 2025**, snowfall in Pakistan is expected to become more frequent and widespread across the northern mountains as La Niña influence strengthens and Western Disturbances gain consistency. A stronger Siberian High will trigger cold air outbreaks, bringing mild cold spells and frost in high-altitude areas and even northern plains by late month. Temperatures will run slightly below normal in the north, supporting snow accumulation in Gilgit-Baltistan, Chitral, and upper KP, while the upper plains may receive occasional rainfall from passing WDs.

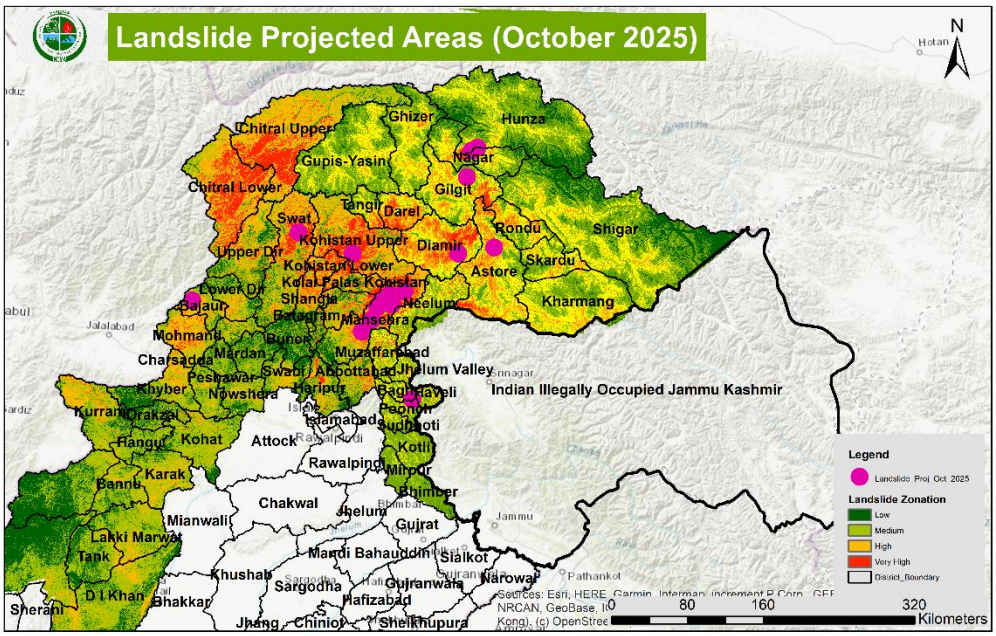


(3) In **December 2025**, snowfall activity over Pakistan will intensify as La Niña-driven teleconnections align with a well-established Siberian High and more regular Western Disturbances. By mid-month, steady jet streams will support frequent storms, leading to significant snow accumulation across the high mountain zones of Gilgit-Baltistan, Chitral, and upper KP. Northern plains may experience cold spells with rain from WDs, while southern and central regions are likely to remain comparatively drier if moisture inflow is limited.

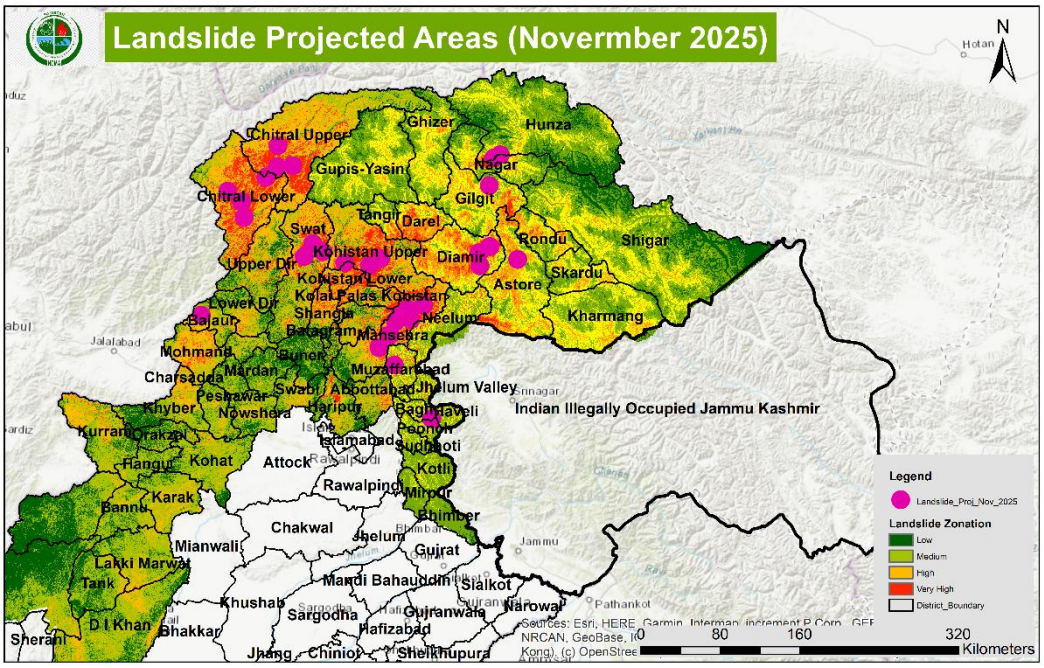


b. **Landslides.** Northern Pakistan, encompassing the mountainous regions of **Khyber Pakhtunkhwa (KP), Gilgit-Baltistan (GB), and Azad Jammu & Kashmir (AJK)**, is highly susceptible to landslides due to its rugged topography, steep slopes, fragile geology, and active tectonic setting along the Himalaya–Karakoram–Hindukush ranges. Seasonal **monsoon rains, snowmelt, and glacial processes** contribute to soil saturation and slope instability, while frequent seismic activity further aggravates vulnerability. Expanding infrastructure, such as roads, hydropower projects, and settlements along river valleys, also increases human exposure to landslide hazards. As a result, this region remains one of the most landslide-prone areas in South Asia, where even **moderate rainfall or seismic triggers** can cause significant slope failures, blocking highways, damaging property, and threatening lives.

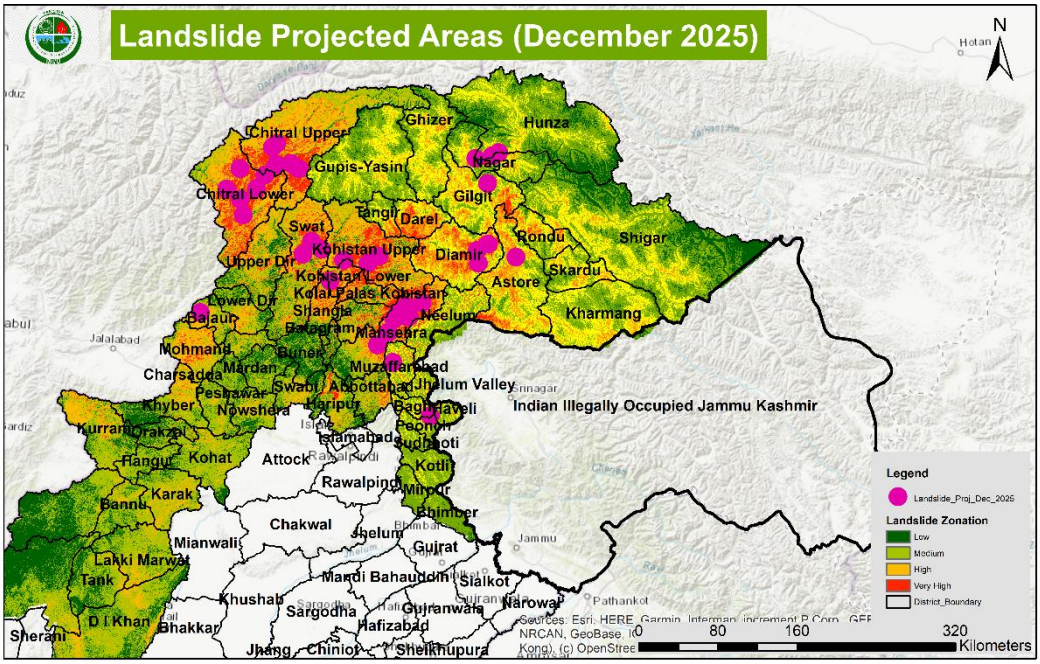
(1) **October 2025.** In October, northeastern Pakistan is expected to receive **normal to near-normal precipitation**. With the soils in northern regions still moist following the monsoon season, the terrain remains vulnerable to instability. The projected landslide-prone areas are concentrated in **Kohistan (Upper and Lower), Kolai Palas, Batagram, Mansehra, Astore, and Nagar**, extending towards parts of Diamir and Neelum. Although the precipitation is not projected to be extreme, the residual soil saturation enhances the **medium probability** of landslides. This indicates localized slope failures, especially along fragile mountain slopes and road corridors connecting Gilgit-Baltistan with Khyber Pakhtunkhwa (KP).



(2) **<u>November 2025.</u>** By November, widespread **high to very high landslide susceptibility zones** are projected across **Kohistan, Swat, Batagram, Mansehra, Muzaffarabad, Diamir, Neelum, and Nagar**, with more points marked compared to October. Normal to near-normal precipitation is anticipated, but cumulative soil wetness and seasonal temperature drops may further weaken slopes. The **medium probability of landslides** persists, with higher risks in **Upper Chitral, Lower Chitral, Swat, and Azad Jammu & Kashmir districts**. Infrastructure in these regions, including highways (such as the Karakoram Highway and Neelum Valley Road), may face disruptions due to increased susceptibility to slope failures.



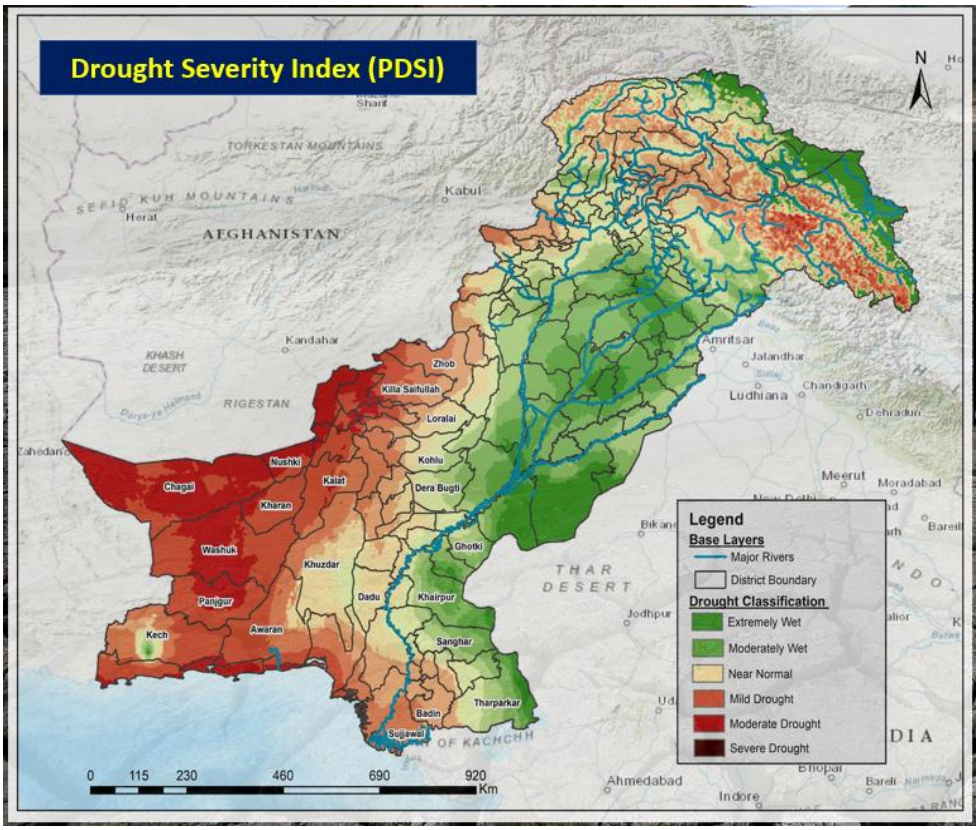
(3) **<u>December 2025.</u>** In December, despite precipitation continuing at **normal to near-normal levels**, the already saturated soils combined with freezing conditions can trigger slope instability. The projections show significant **very high-risk zones in Chitral, Kohistan, Diamir, Astore, and parts of Gilgit-Baltistan (Nagar and Gupis-Yasin)**. Compared to November, the spread of landslide points decreases slightly, but the intensity within identified hotspots remains elevated. The **medium probability of landslides** holds, especially in northern high-altitude valleys where snow accumulation and thawing cycles can induce additional slope pressure.



(4) **Overall Assessment.** Across **October to December 2025**, north-eastern Pakistan is expected to experience **normal to near-normal precipitation**, but with soils still moist from preceding monsoon rains, the **northern mountainous belt (KP, Gilgit-Baltistan, and AJK)** faces a **medium probability of landslides**. The risk escalates where fragile geological conditions coincide with steep terrain, particularly along transport corridors and populated valleys. Authorities should prioritize **monitoring and preparedness in Chitral, Kohistan, Batagram, Diamir, Neelum, Nagar, and Astore**, where recurrent slope instability may cause localized hazards.

c. **Meteorological Drought.** It refers specifically to below-average precipitation levels c*ompared with long-term climatological norms.* The projections are based on climate models, historical rainfall patterns, groundwater and temperature data, as well as the Palmer Drought Severity Index (PDSI). These insights aim to support policymakers, provincial and district disaster management authorities along with local communities in preparing for possible rainfall shortages and their impacts on water availability and livelihoods during the period October-December 2025.

(1) **Outlook (October to December 2025).** As per Meteorological projection of Tech EW, in the coming months (i.e., October – December 2025), Pakistan will experience normal to near normal precipitation in the north western parts while the southern Pakistan will experience mainly dry conditions. Met projections coupled with the reservoir level due to above normal rainfall in monsoon 2025 indicate less likelihood of drought. However, the south-western part of Balochistan and some parts of Sindh, which are already classified as arid climate zones, will experience mild to moderate meteorological drought. In addition, the Palmer Drought Severity Index (PDSI) indicates mild drought in some northern regions of Pakistan, although this is primarily linked to snow cover rather than rainfall deficit.



Projections (Oct-Dec 2025)

(2) **<u>Regional Drought Assessment</u>**

(a) **<u>Balochistan.</u>** The province remains the most affected province in the forecast. Several districts are projected to experience meteorological drought ranging from mild to moderate intensity. The persistence of meteorological drought in these districts is linked to their reliance on groundwater, sparse rainfall, and the limited capacity of local infrastructure to store excess

water from wet years. **Mild Drought:** the districts include Killa Saifullah; Kharan**,** Awaran, Kalat, Zhob, Mastung. **Moderate Drought:** the districts include Chagai, Washuk, Nushki, Panjgur, Parts of Gwadar

(2) **Sindh.** While much of Sindh remains in near-normal to moderately wet conditions, isolated districts in the **southern and western parts** are expected to show **mild meteorological drought tendencies**. These localized impacts highlight the importance of continuous monitoring of rainfall and irrigation flows in the province.

(3) **Overall Assessment**. The NEOC drought outlook for October–December 2025 indicates that **Pakistan will likely avoid a nationwide meteorological drought crisis** due to normal to near-normal rains in the north of the country. However, **localized mild to moderate meteorological drought** conditions in parts of **Balochistan and Sindh** demand focused attention. Proactive planning, combined with community-level awareness and preparedness, will be crucial in mitigating the impacts on agriculture, livelihoods, and water resources. The findings underscore the need for **short-term and long-term drought resilience strategies**, including investment in water storage infrastructure, groundwater management, and climate-smart agriculture practices, to reduce vulnerability in the most drought-prone regions.

d. **Smog**

(1) A toxic mixture of air pollutants, mainly fine particulate matter ($PM_{2.5}$), nitrogen oxides (NO_x), sulfur dioxide (SO_2), carbon monoxide (CO), volatile organic compounds (VOCs), and secondary aerosols trapped near the surface. It causes severe health impacts (respiratory and cardiovascular diseases), reduces visibility, affects transport, and disrupts economic activities. In Pakistan, it forms primarily (October–December) due to:

(a) **Meteorological Conditions**. Temperature inversion, low wind speed, low precipitation, and high relative humidity.

(b) **Emission Sources**. Crop residue burning, vehicular emissions (especially motorcycles and old diesel vehicles),

industrial smoke (brick kilns, steel, cement), and power generation from coal/furnace oil.

(c) **Geography**. The Indo-Gangetic Plain (Punjab and Eastern KP) traps pollutants between the Himalayas, worsening smog intensity.

(d) **Climate Pattern**. Cool nights and reduced diurnal temperature variation trap emissions near the surface.

(2) **Smog Projections.** Smog conditions in Pakistan are expected to intensify from October through December 2025, driven by seasonal meteorology and high emission loads. In October, Diurnal temperature variation and temperature inversion will begin trapping pollutants near the surface, while crop residue burning in Punjab and across the border adds to the burden of vehicular and industrial emissions.

(a) In **October 2025**, Low to moderate smog episodes are expected in central and eastern Punjab, especially Lahore, Faisalabad, Sheikhupura, and Gujranwala and adjacent areas, with AQI levels greater than 250 (very unhealthy) The onset of temperature inversion and seasonal crop residue burning will drive visibility reduction during mornings. Low to Moderate smog episodes are expected in southern Punjab (Multan, Vehari, DG Khan and adjacent areas). Peshawar Valley (Peshawar, Mardan, Nowshera) may see low smog, linked to vehicle exhaust and stagnant conditions.

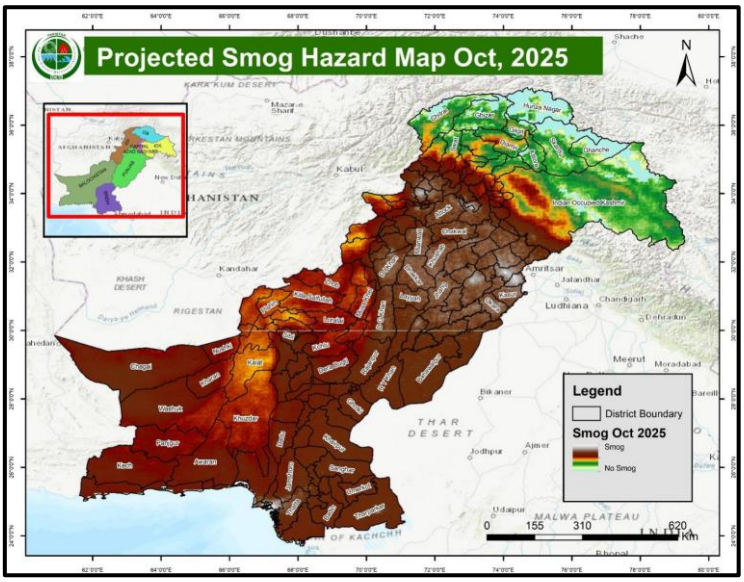


Figure: Projected Smog Hazard Map (October, 2025)

(b) In **November 2025,** the combination of a stronger and more persistent inversion layer, calm winds, and higher humidity will lead to a buildup of fine particulate matter and gases. This period is projected to mark the seasonal peak of smog (Moderate to Dense), with unhealthy to hazardous air quality across Punjab's industrial and agricultural belt, and moderate smog episodes extending into KP urban valleys. Smog will peak with dense and persistent episodes across central and eastern Punjab, with AQI values greater than 350 (hazardous).

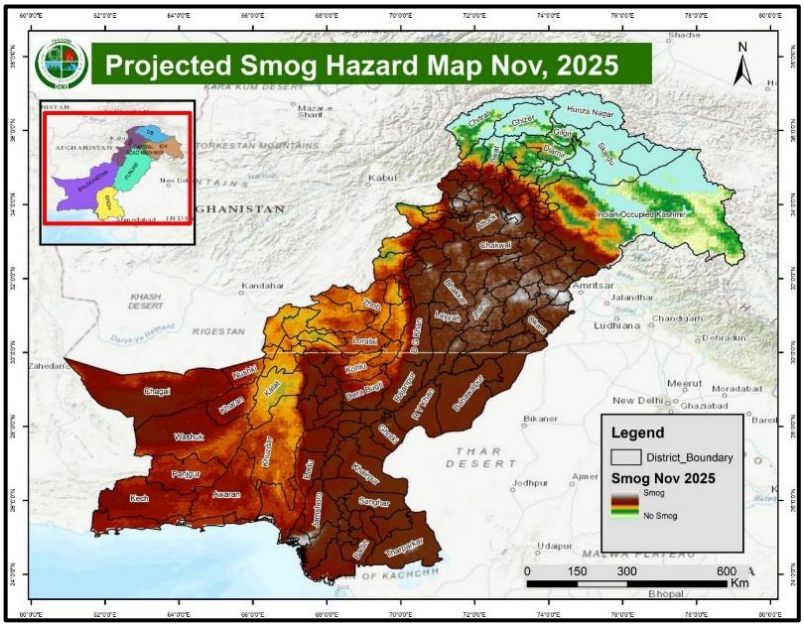


Figure: Projected Smog Hazard Map (November, 2025)

(c) **December 2025**, smog in Pakistan becomes severe due to strong temperature inversion, calm winds, and stagnant conditions that trap pollutants near the surface. Although crop burning declines, emissions from vehicles, industries, brick kilns, and domestic heating keep particulate levels high. High humidity at night enhances haze formation, often mixing with fog. Punjab's urban centers, especially Lahore, Faisalabad, Multan, Gujranwala, and adjacent areas, will probably face (moderate to dense smog episodes) with AQI Greater than 300 (hazardous). KP Peshawar Valley (Peshawar, Mardan, Nowshera) may also see Low to moderate smog episodes.

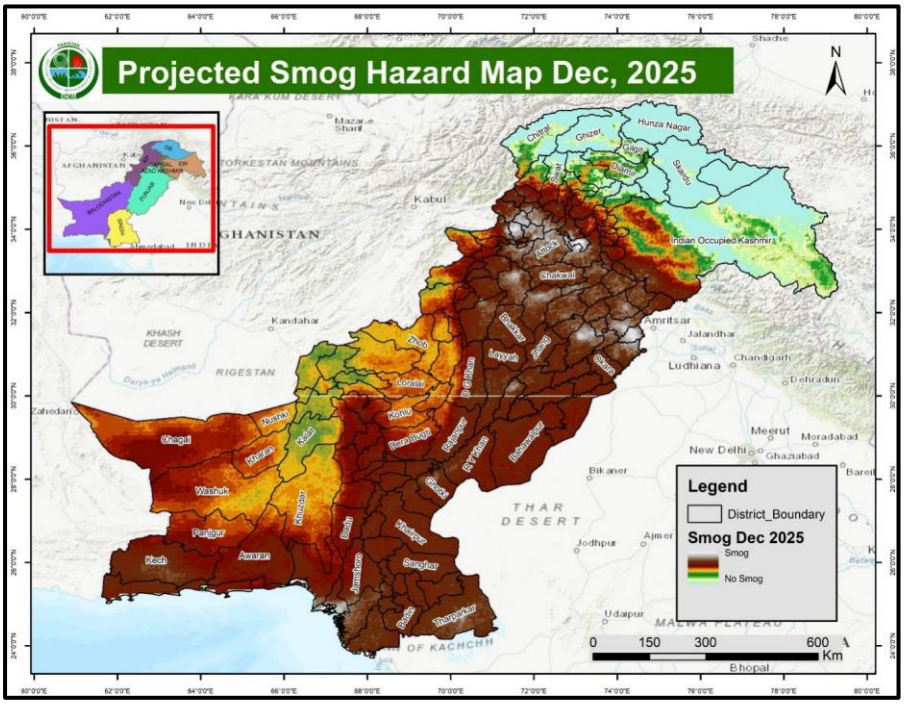


Figure: Projected Smog Hazard Map (December, 2025)

5. **Conclusion.** The climate outlook for Pakistan during October–December 2025 reflects a complex interplay of evolving weak La Niña conditions, a persistent negative Indian Ocean Dipole, and active Western Disturbances, shaping both opportunities and risks. While northern regions are expected to receive near-normal precipitation and episodic snowfall, overall snow accumulation may fall below climatological averages—posing long-term implications for water resources, glacier health, and downstream summer flows in 2026. Concurrently, northern high-altitude areas remain highly vulnerable to landslides, particularly in Chitral, Kohistan, Diamir, and AJK, where fragile terrain, residual soil moisture, and winter precipitation may trigger slope failures and disrupt critical transport routes**.** In contrast, southern Pakistan—especially Balochistan and parts of Sindh—is projected to face localized mild to moderate drought, stressing water-dependent livelihoods despite the replenishment of major reservoirs from the 2025 monsoon. Moreover, smog emerges as an acute seasonal hazard, with Punjab and urban valleys of KP likely to experience prolonged episodes of hazardous air quality, especially during November–December, severely affecting public health, transport, and the economy. Overall, the outlook underscores the need for **multi-sectoral preparedness**:

a. **Snow and Glacier Monitoring** to anticipate GLOF risks and manage 2026 water supplies.

b. **Landslide Risk Management** with early warning and slope stabilization in northern valleys.

c. **Targeted Drought Mitigation** in arid Balochistan and Sindh through groundwater management and climate-smart agriculture.

d. **Aggressive Air Quality Interventions** in Punjab and KP to reduce smog-related health and economic losses.

e. **Timely action by federal, provincial, and local authorities** will be crucial to reduce vulnerabilities and strengthen resilience against the diverse set of hazards projected for the winter season 2025–26.