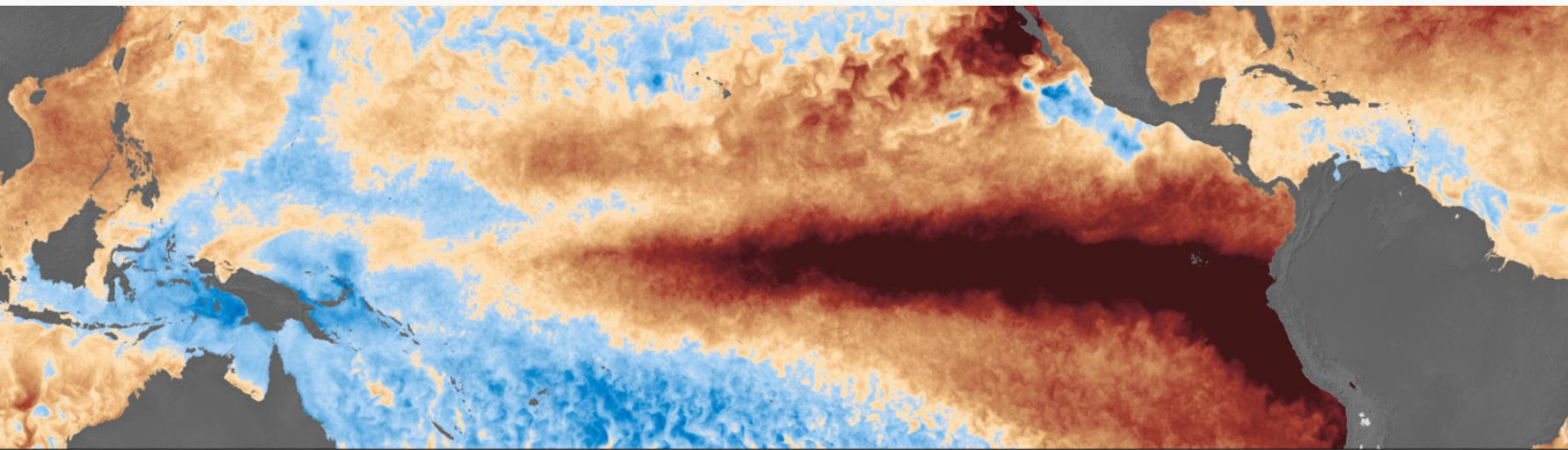


El Niño 2026 and Pakistan

Between Drought and Deluge

EL NIÑO | THE PACIFIC WARMING SIGNAL



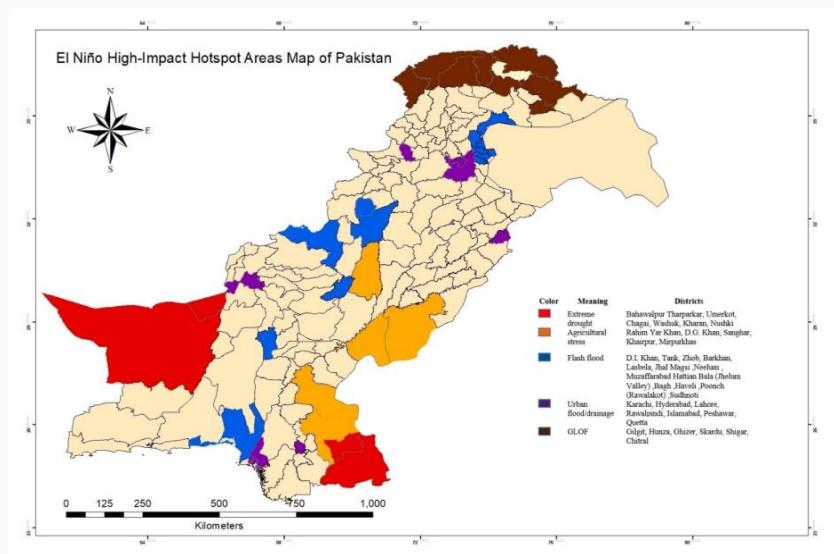
Sea-surface temperature anomalies in 2026 • NASA Scientific Visualization Studio

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PAKISTAN HAZARD HOTSPOTS

GIS assessment from this policy brief

Publication information

El Niño 2026 and Pakistan Between Drought and Deluge

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Suggested citation

Saleem, J. and Naeem, Z. (2026). El Niño 2026 and Pakistan Between Drought and Deluge. Policy Brief. Islamabad: Sustainable Development Policy Institute.

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First edition October 2026

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Key messages

1. The 2026–27 El Niño presents a compounding development risk for Pakistan, as water stress can weaken agricultural earnings while increasing energy costs, with consequences for food affordability and public finances.
2. The GIS mapping identifies hotspot areas and distinct preparedness priorities, with glacial hazards requiring attention in Gilgit-Baltistan. While drought exposure makes western Balochistan and the Sindh districts of Tharparkar and Umerkot particularly important for early action.
3. Seasonal rainfall deficits can coexist with damaging storms, leaving vulnerable cities exposed to flooding even during otherwise dry conditions. Uncertainty about a possible transition to La Niña later in 2027 reinforces the importance of keeping preparedness responsive to changing forecasts.
4. The central policy challenge is to connect early warnings with funded action before losses occur, using locally validated triggers and costed plans that can be activated within the available lead time.
5. Linking contingency funds with pre-approved expenditure offers a practical route to anticipatory financing. Adaptive social protection can help protect household consumption, while suitable insurance can complement public reserves where coverage is affordable and payouts are timely.
6. Remote sensing can update the mapped assessment as conditions change, while AI-supported dashboards could connect verified alerts with public financing and pre-arranged donor grants, making funding delays visible while protective action remains possible.

1 Introduction

The El Niño begins in the tropical Pacific Ocean, yet its impacts can reach Pakistan through a reduced harvest and a more expensive food basket long before they appear in national economic statistics. The 2022 floods caused more than US\$30 billion in combined damage and economic losses, demonstrating how rapidly extreme weather can reverse development gains ^[1]. As the 2026–27 El Niño strengthens, Pakistan needs to assess where another climatic shock could undermine recovery and how early action can protect those least able to withstand it. The warning from the World Meteorological Organization (WMO) is unusually strong, with its September update assigning a near-100 per cent probability that El Niño will persist through February 2027 ^[2]. Its outlook issued on 21st October projects an average sea-surface temperature anomaly of approximately +3.8°C in the Niño 3.4 region for November 2026–January 2027, with peak warming around December ^[3]. The El Niño develops when warming in the central and eastern equatorial Pacific alters atmospheric circulation and redistributes rainfall far beyond the ocean basin. The term “**super El Niño**” is informal, while WMO uses “**very strong**” to describe exceptional intensity. Its impacts can be amplified by a warmer background climate, which increases the energy and moisture available for extreme weather ^[4].

For Pakistan, these effects will vary with the season and cannot be inferred from Pacific temperatures alone. The Famine Early Warning Systems Network (FEWS NET) reports below-average monsoon rainfall during 2026 and expects reduced kharif production to weaken agricultural earnings, with food insecurity most severe during January–March 2027 ^[5]. However, WMO’s October–December outlook favours normal to above-normal rainfall in northwestern South Asia, showing why a weak summer monsoon should not be treated as a forecast of a uniformly dry winter ^[6]. This variation requires preparedness for drought in the

1 Government of Pakistan (2022) Pakistan Floods 2022: Post-Disaster Needs Assessment. Islamabad: Ministry of Planning, Development and Special Initiatives. Available at: <https://www.undp.org/pakistan/publications/pakistan-floods-2022-post-disaster-needs-assessment-pdna> (Accessed: 25 October 2026).

2 World Meteorological Organization (WMO) (2026b) El Niño/La Niña Update (August 2026). 3 September. Available at: <https://wmo.int/resources/publication-series/el-ninola-nina-updates/august-2026> (Accessed: 25 October 2026).

3 World Meteorological Organization (WMO) (2026c) Global Seasonal Climate Update for November–December–January 2026. 21 October. Available at: <https://wmo.int/resources/publication-series/global-seasonal-climate-updates/gscu-ndj2026> (Accessed: 25 October 2026).

4 World Meteorological Organization (WMO) (n.d.) El Niño / La Niña Phenomena. Available at: <https://public.wmo.int/themes/el-nino-la-nina-phenomena> (Accessed: 25 October 2026).

5 Famine Early Warning Systems Network (FEWS NET) (2026) 2026–2027 El Niño food security impacts. 6 October. Available at: <https://fews.net/global/special-report/october-2026> (Accessed: 25 October 2026).

6 World Meteorological Organization (WMO) (2026a) El Niño influences South Asia winter climate outlook. 14 October. Available at: <https://wmo.int/media/news/el-nino-influences-south-asia-winter-climate-outlook> (Accessed: 25 October 2026).

plains alongside continued vigilance against floods in mountain catchments. In water-stressed agricultural districts, lower soil moisture can reduce yields while shortages of fodder increase pressure on livestock-dependent households. In the north, unusual warmth can accelerate melt and increase concern about unstable glacial lakes, where an outburst can isolate downstream communities ^[7]. Moreover, cities also remain exposed because a season with limited rainfall can still contain an intense storm that overwhelms drainage already constrained by development. The resulting losses can spread across the economy as reduced water availability increases groundwater pumping, raising energy costs when farm incomes may already be falling. Furthermore, the changes in reservoir inflows can affect hydropower, while a weaker harvest can increase import requirements and expose consumers to international price movements. Assessing these connections matters for fiscal planning because falling household incomes can increase demand for social protection while emergency expenditure competes with development spending.

Box 1. El Niño explained

When El Niño begins. El Niño is a warm phase of El Niño Southern Oscillation (ENSO) develops when unusually warm surface waters interact with changes in the atmosphere above them. A commonly used temperature benchmark is **at least 0.5°C above the usual seasonal average**, sustained for several months and accompanied by changes in tropical winds. “Normal” means the long-term average for that area and season, so it is not one fixed ocean temperature. For illustration, water at **27.5°C against a seasonal average of 27°C** would have a **+0.5°C temperature anomaly**.

Where it is measured. Scientists monitor several areas of the tropical Pacific called the **Niño regions**. The most widely used is **Niño 3.4**, which stretches across the central and eastern Pacific near the Equator, between 5°N–5°S and 170°W–120°W. Its temperature helps scientists track changes that can influence weather far beyond the Pacific.

For the current event, WMO forecasts an average anomaly of about **+3.8°C during November 2026–January 2027**, with warming peaking around December.

What it can bring to South Asia. El Niño often favours weaker summer monsoon rainfall in parts of South Asia, increasing the likelihood of dry conditions that affect farming and water supplies. Its influence changes with the season, however, and cooler-season rainfall can increase in parts of Pakistan and Afghanistan. WMO’s October–December 2026 outlook favours normal to above-normal rainfall in northwestern South Asia, illustrating why preparedness must account for both water shortages and locally heavy rainfall.

This brief examines these risks through Pakistan’s historical experience of El Niño and the evolving outlook for 2026–27, identifying where preparedness should receive priority. It considers how satellite observations can support early warning and how geographic information systems can help direct assistance towards exposed districts. A possible transition to La Niña later in 2027 is treated as a contingency requiring

7 United Nations Development Programme (UNDP) (n.d.) Scaling Up of Glacial Lake Outburst Flood Risk Reduction in Northern Pakistan. Available at: <https://www.adaptation-undp.org/projects/scaling-glacial-lake-outburst-flood-risk-reduction-northern-pakistan> (Accessed: 25 October 2026).

continued monitoring, so that preparations remain responsive to a changing outlook. The case for acting before losses occur is also reflected in FAO and WFP's 2026–27 appeal, which connects forecast warnings with measures that protect livelihoods ^[8]. For Pakistan, this means agreeing when a warning should release funding and which institution must act, while sufficient time remains to prevent avoidable harm.

2. Methodology

This brief combines a structured review of published evidence with GIS mapping in ArcMap to assess Pakistan's exposure during the 2026–27 El Niño. It draws on material available by 26 October 2026 and focuses on risks through early 2027, while considering a later transition to La Niña as a contingency. The assessment links the climate outlook with mapped hazard zones and examines how public financing could support action before losses occur.

2.1 Evidence base and source selection

The review prioritizes official sources that specify the period covered and explain the basis of their assessment. WMO updates establish the global and regional outlook, while the US National Oceanic and Atmospheric Administration (NOAA) provides historical context and explains the indices used to monitor the El Niño–Southern Oscillation (ENSO) ^[9].

Pakistan-specific evidence is considered alongside that outlook. A dated advisory from the Pakistan Meteorological Department (PMD) provides guidance on glacial lake outburst floods (GLOFs), while FEWS NET assesses livelihood implications. The FAO–WFP appeal informs the selection of anticipatory measures, and publications from the National Disaster Management Authority (NDMA) provide the policy basis for linking early warnings with financing.^[10]

8 Food and Agriculture Organization of the United Nations (FAO) and World Food Programme (WFP) (2026) El Niño FAO–WFP Joint Anticipatory Action Appeal June 2026–March 2027. 18 June. Available at: <https://www.wfp.org/publications/el-nino-fao-wfp-joint-anticipatory-action-appeal-june-2026-march-2027> (Accessed: 25 October 2026).

9 National Oceanic and Atmospheric Administration Climate Prediction Center (NOAA CPC) (2026a) Cold and warm episodes by season ERSSTv5 Oceanic Niño Index. Historical series. Available at: https://www.cpc.ncep.noaa.gov/products/analysis_monitoring/enso/oni/v5/; World Meteorological Organization (WMO) (2026b) El Niño/La Niña Update (August 2026). 3 September. Geneva: WMO. Available at: <https://wmo.int/resources/publication-series/el-ninola-nina-updates/august-2026>; World Meteorological Organization (WMO) (2026c) Global Seasonal Climate Update for November–December–January 2026. 21 October. Geneva: WMO. Available at: <https://wmo.int/resources/publication-series/global-seasonal-climate-updates/gscu-ndj2026> (Accessed: 26 October 2026).

10 Pakistan Meteorological Department (PMD) (2026) GLOF Alert. 18 June. Islamabad: Research and Development Division. Available at: https://weather.gov.pk/storage/uploads/rd/press_release/image/1781851505_GLOF_Alert_-_2818June_2026%29_Modified.pdf (Accessed: 1 October 2026); Famine Early Warning Systems Network (FEWS NET) (2026) 2026–2027 El Niño food security impacts. 6 October. Available at: <https://fews.net/global/special-report/october-2026>; Food and Agriculture Organization of the United Nations (FAO) and World Food Programme (WFP) (2026) El Niño

2.2 Analytical approach

The assessment first distinguishes observed conditions from forecasts and records the season to which each statement applies. It then examines how a climate signal could interact with local exposure, tracing the implications for essential services and household income. For example, a rainfall deficit may reduce irrigation supplies, which can increase reliance on groundwater pumping and raise production costs. These connections are assessed qualitatively rather than converted into numerical loss estimates.

Table 1. Analytical approach and decisions informed

Analytical step	Evidence used	Decision informed
Establish the outlook	Dated WMO updates and NOAA ENSO assessments	Define the planning period and distinguish observations from forecasts
Interpret local exposure	Regional outlook and a dated PMD hazard advisory	Identify the local conditions that require verification
Map hazard zones and preparedness priorities	GIS mapping undertaken in ArcMap with interpretation of climate and vulnerability evidence	Identify high-risk zones and high-priority areas for anticipatory action
Trace consequences likely	Published livelihood analysis and the sector links examined in this brief	Identify where a loss could affect essential services or household income
Identify early action	GIS outputs and the sector assessment considered alongside FAO and WFP guidance	Agree a coordinating institution and an activation basis

2.3 GIS mapping in ArcMap and geographic prioritization

ArcMap was used to develop GIS maps of high-risk zones and to identify high-priority areas for anticipatory action across Pakistan. The district boundaries provided the geographic basis for presenting the mapped patterns, which were interpreted alongside the climate outlook and evidence on local vulnerability. The hazard map differentiated areas exposed to drought and agricultural stress, while also showing the distribution of flood-related hazards. It included glacial lake outburst flood exposure in northern catchments and drainage-related flooding in urban areas, allowing the geographic pattern of risk to be read alongside the sector assessment. A separate priority map classified districts into preparedness categories ranging

FAO–WFP Joint Anticipatory Action Appeal June 2026–March 2027. 18 June. Rome: FAO and WFP. Available at: <https://www.wfp.org/publications/el-nino-fao-wfp-joint-anticipatory-action-appeal-june-2026-march-2027>.

from very high to low, so that areas requiring earlier attention could be identified. These GIS outputs informed the geographic prioritization presented in Section 3.2 and helped connect the type of hazard with the appropriate preparedness response. The policy recommendations therefore draw on both the evidence review and the mapping undertaken in ArcMap. Recommendations are selected according to whether they address an identified risk and can begin while households still have time to protect their livelihoods. Each proposed action is linked to a coordinating institution in Section 4, while the activation basis is stated as a decision for the relevant authority to agree.

3. Discussion and Analysis

3.1. Historical El Niño Events and Their Impacts on Pakistan (1951–2024)

Pakistan's historic climate scenario demonstrates a strong association between moderate-to-very-strong El Niño episodes with adverse meteorological impacts across large parts of the country. Major events, predominantly those of **1972-73, 1982-83, 1997-98, and 2015-16**, were characterized by below-normal monsoon rainfall, elevated temperatures, and prolonged drought conditions, especially in province of Sindh, southern Punjab, and Baluchistan. These climatic inconsistencies result in reduced agricultural production, damages to livestock, shortage of drinking water resources, increased groundwater extraction, inflated food-price inflation, and intensified pressure on public relief systems ^[11]. Historically, El Niño has not had the same impact throughout the country bringing frequent cryosphere and hydrological hazards in the northern mountainous regions, such as Gilgit-Baltistan, KP Khyber Pakhtunkhwa and AJK, Azad Kashmir. The warming temperatures have combined with localized precipitation anomalies to speed up snow and glacier melt, and raised the potential for flash floods, Glacial Lake Outburst Floods (GLOFs), landslides, and damage to mountain infrastructure.

Table 2 presents selected episodes using a consistent historical Oceanic Niño Index (ONI) series, while regional guidance remains necessary to assess implications for Pakistan. The country's exposure also changes between the plains and northern catchments. A rainfall deficit may place pressure on agricultural production, whereas an intense storm in a vulnerable mountain valley can cause sudden flooding. Such hazards require their own assessment, because their occurrence cannot be attributed to an ENSO phase without a separate analysis.

The historical review therefore supports preparedness that remains responsive to changing conditions. Water conservation may be needed in an affected agricultural district while another area needs an effective flood warning, so planning should retain both capabilities. The historical record therefore highlights a critical policy lesson: **El Niño should not be viewed solely as a drought risk**. It has a tendency to create a complex cascading profile in Pakistan of drought and water scarcity in plains and increased floods and cryosphere risks in mountain areas. Preparedness must be based on an integrated approach to risk management which include planning for water conservation, agricultural risk resilience, flood forecasting, monitoring GLOFs, disaster preparedness and social protection.

11 National Oceanic and Atmospheric Administration Climate Prediction Center (NOAA CPC) (2026a) Cold and warm episodes by season ERSSTv5 Oceanic Niño Index. Historical series. World Meteorological Organization (WMO) (n.d.) El Niño / La Niña Phenomena. Geneva: WMO.

Table 2. Historical events of El Niño and documented impacts

El Niño episode (peak)	Peak three-month ONI (°C)	ENSO strength* Niño-3.4 SST anomalies and duration	Pakistan climate signal (typical)	Documented / likely impacts in Pakistan
1951–52	+1.2	Moderate	Weaker monsoon over plains	Agricultural stress in Punjab/Sindh; localized drought reports in some districts (data sparse)
1965–66	+2.0	Moderate–Strong	Below-normal monsoon rainfall in parts	Crop yield reductions in rainfed zones; water shortages reported in Sindh/Balochistan
1972–73	+2.1	Strong	Marked monsoon suppression regionally	Significant drought conditions in parts of Pakistan; food grain shortfalls; relief measures initiated
1982–83	+2.2	Very Strong	Strong suppression of monsoon; warmer temperatures	Widespread drought in Sindh & southern Punjab; livestock losses; migration from arid zones; increased groundwater use
1987–88	+1.7	Moderate	Mixed; some monsoon deficit	Localized crop failures; water stress in Balochistan
1991–92	+1.7	Moderate	Slight monsoon deficit tendency	Modest agricultural impacts; urban heat stress episodes
1994–95	+1.1	Moderate	Near-normal to slightly below monsoon	Limited large-scale impacts; some district-level droughts
1997–98	+2.4	Very Strong	Strong monsoon suppression; high temperatures	Severe drought in Sindh & parts of Punjab; sharp declines in kharif yields; drinking water crises; increased food prices; emergency allocations

El Niño episode (peak)	Peak three-month ONI (°C)	ENSO strength* Niño-3.4 SST anomalies and duration	Pakistan climate signal (typical)	Documented / likely impacts in Pakistan
2002–03	+1.3	Moderate–Strong	Below-normal monsoon	Drought conditions in Balochistan & Sindh; crop losses; livestock distress
2004–05	+0.7	Moderate	Variable; some deficit pockets	Localized agricultural stress
2006–07	+0.9	Moderate	Slight monsoon suppression	Moderate impacts; some canal water shortfalls
2009–10	+1.6	Moderate–Strong	Below-normal monsoon	Drought in parts of Sindh/Balochistan; crop yield penalties; water rationing in some cities
2014–16	+2.8	Strong–Very Strong (peak 2015–16)	Suppressed monsoon; heatwaves	2015: significant heat stress; water scarcity in Sindh/Punjab; kharif yield reductions in some belts; increased tube-well extraction
2018–19	+1.0	Weak–Moderate	Mixed signals	Limited El Niño-specific impacts relative to other drivers
2023–24	+2.1	Moderate–Strong	Variable monsoon; heat extremes	Heatwaves; urban flooding from intense spells despite seasonal deficit in some areas

3.2. El Niño 2026–27: Current Outlook and Pakistan-Specific Risks

3.2.1. ENSO Outlook and Forecast Confidence

El Niño has become firmly established across the central and eastern equatorial Pacific and is expected to strengthen further over the coming months. According to the World Meteorological Organization (WMO), there is a near 100 percent probability that El Niño will persist through February 2027, with forecasts indicating a strong to very strong event by the end of 2026. This unprecedented level of forecast confidence

reflects strong ocean-atmosphere coupling and broad agreement across international climate models ^[12]. For Pakistan, the implications are significant. Historical evidence shows that strong El Niño episodes are commonly associated with suppressed monsoon rainfall, higher temperatures, increased drought risk, and disruptions to agriculture and water resources ^[13]. Consequently, El Niño is expected to be a major driver of Pakistan's climate risk landscape through early 2027.

3.2.2. Pakistan-Specific Climate Signals: PMD and Regional Forecasts

The climate outlook issued by the Pakistan Meteorological Department (PMD) and national disaster management authorities indicates that the 2026 El Niño event is likely to produce a spatially heterogeneous pattern of climatic impacts across Pakistan ^[14]. Seasonal forecasts suggest below-normal rainfall across much of the country's plains, including northeastern and central Punjab, southern Khyber Pakhtunkhwa (KP), southeastern Sindh, Baluchistan, and adjoining areas of Kashmir. In contrast, near-normal to above-normal precipitation is expected in the northern mountainous regions, particularly Gilgit-Baltistan (GB), northern KP, and parts of Azad Jammu and Kashmir (AJK). This distribution is broadly consistent with the classical El Niño teleconnection pattern, which typically suppresses southwest monsoon activity over the Indo-Gangetic Plains while enhancing precipitation over portions of the Himalaya-Karakoram-Hindukush region.

Temperature projections further indicate above-average conditions during September 2026, with the most pronounced warming and rainfall deficits expected in southern Sindh. Elevated temperatures are likely to increase evapotranspiration rates, intensify crop water requirements, reduce soil moisture availability, and heighten heat stress risks for both human populations and livestock. These conditions could significantly amplify the vulnerability of already water-stressed agricultural systems and rural livelihoods ^[15].

Although seasonal rainfall totals are projected to remain below normal in many areas, the risk of short-duration, high-intensity rainfall events persist. Consequently, the National Disaster Management Authority (NDMA) and Provincial Disaster Management Authorities (PDMAs) have repeatedly warned of flash floods in local streams and nullahs, urban flooding in low-lying areas of major cities including Islamabad, Rawalpindi, Lahore, Gujranwala, and Sialkot, as well as landslides in vulnerable hill regions such as Murree and the Galiyat. These warnings highlight an important policy consideration: El Niño conditions do not necessarily eliminate the occurrence of damaging heavy rainfall events and may coexist with localized convective storms capable of causing significant disruption and losses.

12 World Meteorological Organization (WMO) (2026b) El Niño/La Niña Update (August 2026). 3 September. Geneva: WMO. World Meteorological Organization (WMO) (2026c) Global Seasonal Climate Update for November–December–January 2026. 21 October. Geneva: WMO.

13 National Oceanic and Atmospheric Administration Climate Prediction Center (NOAA CPC) (2026b) ENSO Diagnostic Discussion. 8 October.

14 World Meteorological Organization (WMO) (2026a) El Niño influences South Asia winter climate outlook. 14 October. Geneva: WMO.

15 Famine Early Warning Systems Network (FEWS NET) (2026) 2026–2027 El Niño food security impacts. 6 October.

3.2.3. Cryosphere Hazards: Glaciers, Snowmelt, and Glacial Lake Outburst Floods (GLOFs)

A particularly significant Pakistan-specific risk associated with the 2026 El Niño event is the interaction between warmer temperatures and near-normal to above-normal precipitation across northern mountainous regions. This combination increases the likelihood of cryosphere hazards, including accelerated glacier melt, enhanced snowmelt runoff, landslides, flash floods, and Glacial Lake Outburst Floods (GLOFs). In response, NDMA has issued multiple multi-hazard alerts covering GB, KP, AJK, and northern Punjab, emphasizing the growing threat posed by climate-induced changes in high-altitude environments ^[16].

District administrations in Upper Kohistan, Mansehra, and other mountainous districts have already issued GLOF advisories linked to persistent hot weather conditions combined with intermittent rainfall. During the 2026 monsoon season, at least two major GLOF incidents were officially recorded in Gilgit-Baltistan, causing localized damage to roads and infrastructure ^[17]. However, the absence of casualties demonstrated the effectiveness of early warning systems, community preparedness measures, and timely emergency response mechanisms. Risk assessments identify particularly vulnerable zones in Hunza, Skardu, Gilgit, Ghizer, Shigar, and Kharmang districts in GB; Chitral, Swat, Kohistan, Mansehra, Shangla, and Buner districts in KP; and the Neelum Valley, Jhelum Valley, and Leepa areas of AJK. Rising air temperatures accelerate glacier and snowpack melting, while concurrent rainfall events increase runoff volumes and river discharge, heightening the probability of glacial lake failures and downstream flooding.

3.2.4. El Niño Hazard Hotspots and Exposure Patterns Across Pakistan

The projected impacts of the 2026-27 El Niño event are unlikely to be uniformly distributed across Pakistan. Variations in climate exposure, hydrological conditions, topography, land use, and socio-economic vulnerability are expected to produce distinct hazard hotspots across different regions of the country. Based on historical El Niño impacts, PMD seasonal outlooks, NDMA hazard advisories, documented ENSO teleconnections, and sectoral vulnerability assessments, a spatial hazard mapping exercise was undertaken to identify districts facing elevated risks from drought, agricultural stress, flash floods, urban flooding, and glacier-related hazards.

16 Pakistan Meteorological Department (PMD) (2026) GLOF Alert. 18 June. Islamabad: Research and Development Division.

17 Pakistan Meteorological Department (PMD) (2026) GLOF Alert. 18 June. Islamabad: Research and Development Division. United Nations Development Programme (UNDP) (n.d.) Scaling-up of Glacial Lake Outburst Floods Risk Reduction in Northern Pakistan (GLOF-II Project). Islamabad: UNDP.

Figure 1. Spatial Distribution of El Niño Hazard Hotspots in Pakistan (2026–27)

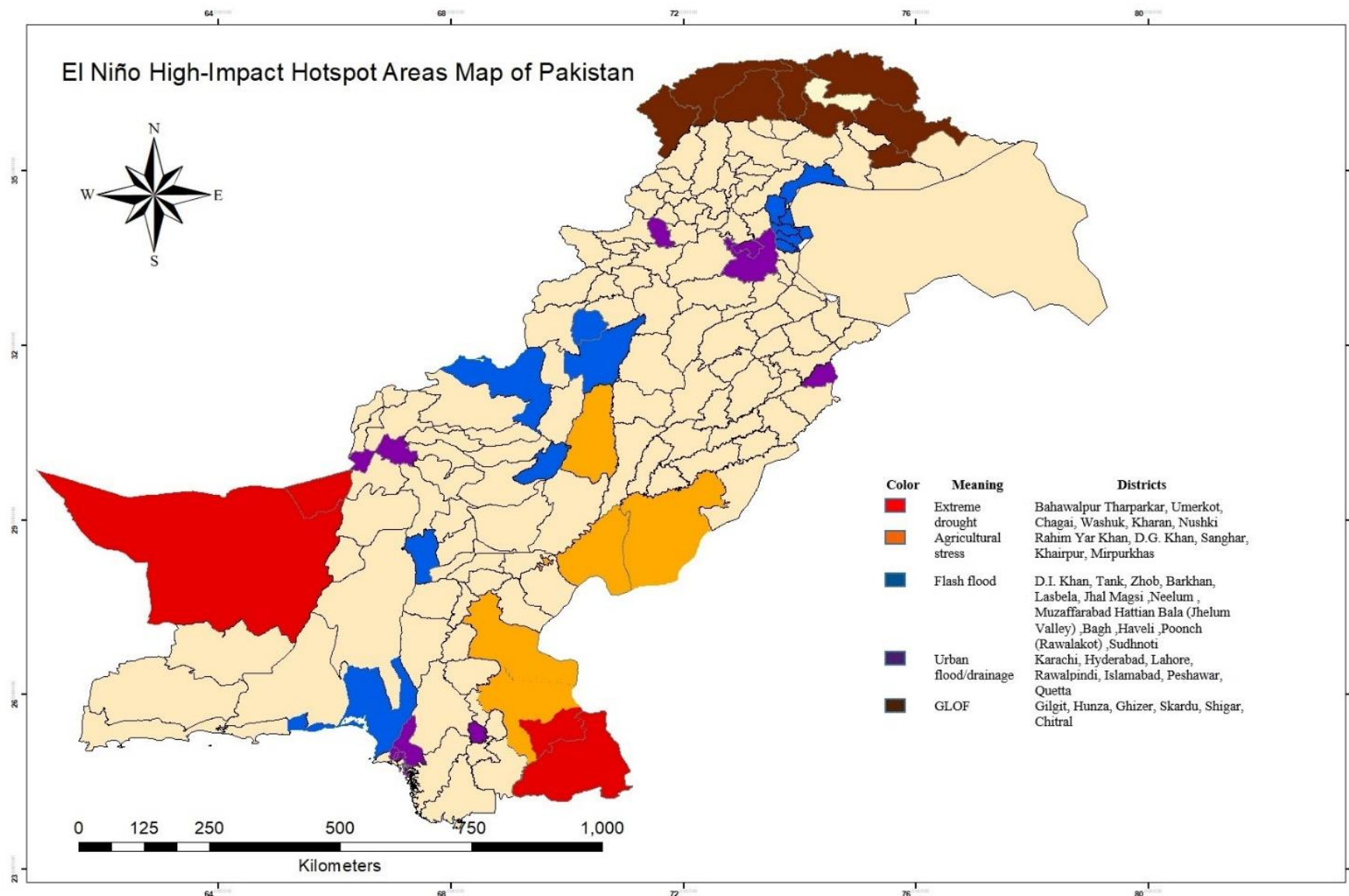


Figure 1 and Table 3 illustrates the distribution of high impact El Niño hazard hotspots across Pakistan. The assessment identifies two principal risk corridors. The first extends across drought-prone districts of Balochistan, Sindh, and southern Punjab, where reduced rainfall and elevated temperatures may increase water scarcity and agricultural losses. The second encompasses the northern mountainous regions of Gilgit-Baltistan, Khyber Pakhtunkhwa, and Azad Jammu and Kashmir, where climate anomalies may increase the likelihood of glacier melt, flash floods, landslides, and Glacial Lake Outburst Floods (GLOFs). Major urban centers also emerge as localized hotspots owing to drainage constraints and exposure to high-intensity rainfall events.

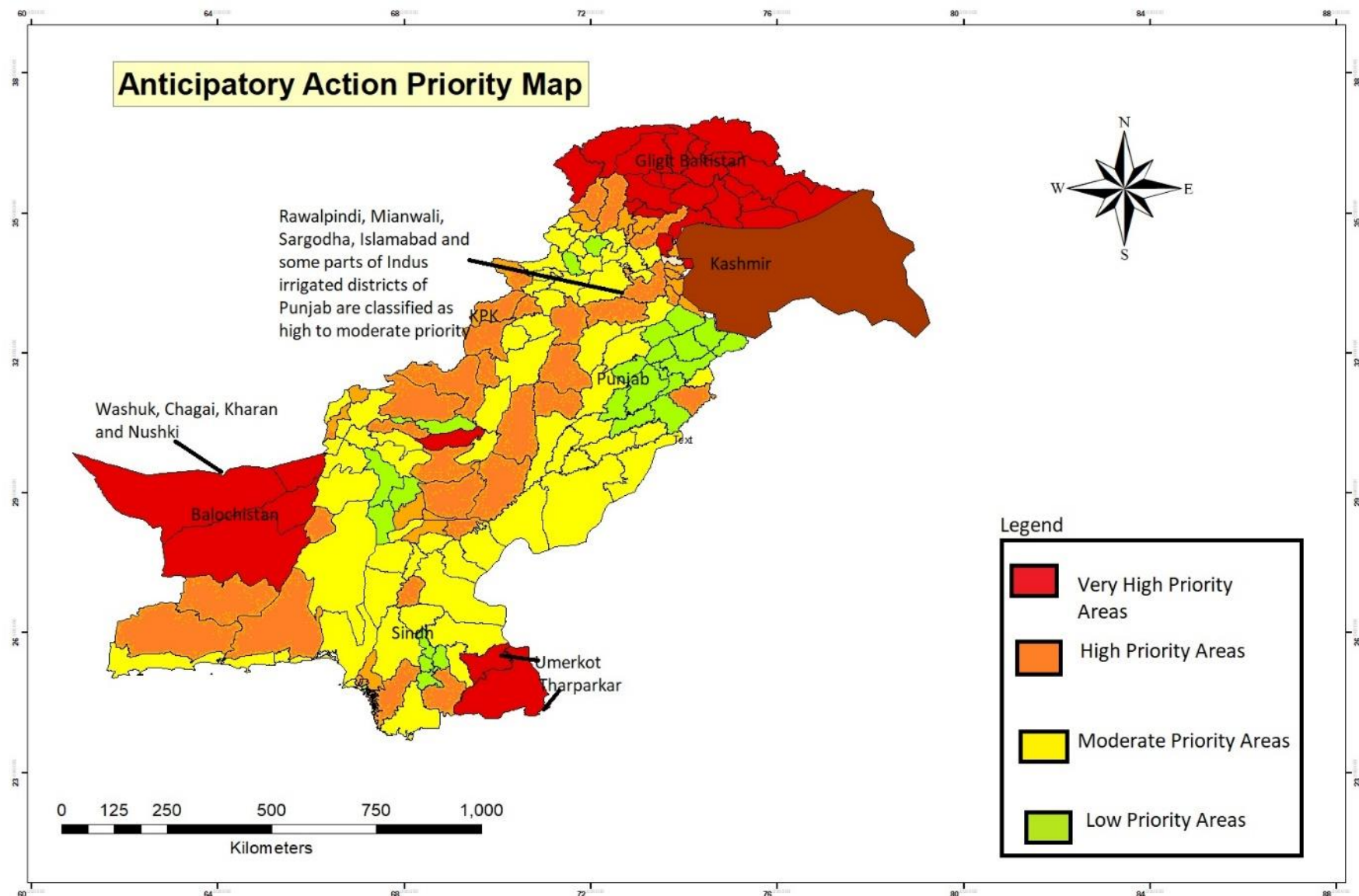
Table 3. El Niño Hazard Hotspots and Priority Preparedness Actions (2026–27)

Hazard Type	Key Districts	Principal Risk
Extreme Drought	Tharparkar, Umerkot, Chagai, Washuk, Kharan, Nushki	Water scarcity, crop failure, livestock stress
Agricultural Stress	Rahim Yar Khan, D.G. Khan, Sanghar, Khairpur, Mirpurkhas, Bahawalpur	Reduced yields, irrigation shortages
Flash Floods	D.I. Khan, Tank, Zhob, Barkhan, Lasbela, Neelum Valley	Flash floods, landslides, infrastructure damage
Urban Flooding	Karachi, Hyderabad, Lahore, Rawalpindi, Islamabad, Peshawar, Quetta	Drainage overflow, infrastructure disruption
GLOF Risk	Gilgit, Hunza, Ghizer, Skardu, Shigar, Chitral	Glacier lake outburst floods, river flooding

3.2.5. Assigning Operational Priority

Pakistan's exposure to El Niño-related hazards is not geographically uniform. Drawing upon historical El Niño impacts, PMD seasonal forecasts, NDMA hazard advisories, exposure patterns, and sectoral vulnerabilities, Figure 2 presents a district-level prioritization framework for anticipatory action. The map categorizes districts into Very High, High, Moderate, and Low Priority classes to support risk-informed preparedness planning and resource allocation. The district administrations should translate these priorities into locally relevant measures for exposed communities. Figure 2 identifies Gilgit-Baltistan and western Balochistan as very high priority, alongside Umerkot and Tharparkar. Its annotation places Rawalpindi and Islamabad in a high-to-moderate priority grouping, together with Mianwali, Sargodha and selected Indus-irrigated districts.

Figure 2. El Niño Anticipatory Action Priority Map of Pakistan (2026–27)



Building on this assessment, Table 4 outlines the corresponding anticipatory actions for each priority category, linking geographic risk patterns with sector-specific measures for water security, agriculture, livestock management, flood preparedness, GLOF risk reduction, and urban emergency response. Table 4 connects the locations identified in the maps with relevant measures at union council (UC) level and proposed financing arrangements. These proposals would support implementation of Pakistan’s National Anticipatory Action Strategy 2026–2030, which links early-warning triggers with pre-arranged financing across government levels ^[18]. Section 4 sets out the institutional decisions required to implement these measures. Together, the map and table offer a practical framework for proactive climate risk management and resource allocation.

Table 4. Comprehensive Priority-Based Anticipatory Actions for El Niño-Related Climate Risks in Pakistan

Mapped zone and associated hazard	District and UC adaptation measures	Contingency financing and PFM linkage	Risk insurance
Northern GLOF hotspots Exposed valleys in Gilgit, Hunza, Ghizer, Skardu and Shigar, alongside Chitral. Gilgit-Baltistan is identified as very high priority.	Test sensors and warning systems before the melt season, while identifying exposed settlements and safe routes. Conduct drills and arrange assisted evacuation. Protect vulnerable water supplies through district adaptation plans.	Fund warning maintenance and evacuation readiness before the season. Approve spending ceilings for transport and temporary shelter, with activation under the agreed warning protocol.	Assess suitable protection for essential public infrastructure, while retaining reserves for immediate protective action.
Western Balochistan Chagai, Washuk, Kharan and Nushki are identified as very high priority drought zones.	Identify UCs dependent on unreliable water sources and rehabilitate essential supplies through district plans. Arrange emergency storage before shortages deepen, while monitoring groundwater abstraction and protecting livestock watering points.	Pre-arrange safe water delivery contracts and approve eligible drought expenditure. Release an action tranche when agreed indicators show that essential supplies are at risk.	Assess suitable livestock or drought cover, with premium support considered where products are affordable and reliable.

18 National Disaster Management Authority (NDMA) (2026a) Pakistan National Anticipatory Action Strategy 2026–2030. Islamabad: NDMA.

Mapped zone and associated hazard	District and UC adaptation measures	Contingency financing and PFM linkage	Risk insurance
Southeastern Sindh Tharparkar and Umerkot are identified as very high priority drought zones.	Repair community water points and prepare drinking-water storage. Establish accessible fodder arrangements and coordinate veterinary outreach, while adapting crop advice to expected rainfall and local growing conditions.	Allocate funding against costed UC drought plans. Establish advance purchasing arrangements for water and livestock support, with release tied to agreed drought triggers.	Explore group livestock cover and suitable drought insurance, with a fallback where the trigger fails to reflect local losses.
Agricultural stress zones Rahim Yar Khan and Dera Ghazi Khan in Punjab; Sanghar, Khairpur and Mirpurkhas in Sindh. Bahawalpur is identified in the drought legend.	Align crop advice with expected water availability and adjust sowing decisions where appropriate. Coordinate irrigation scheduling and promote efficient water use, while helping exposed farmers protect essential inputs.	Use regular agricultural budgets for extension and planned adaptation. Reserve contingency funding for time-sensitive assistance when forecasts indicate likely crop or livelihood losses.	Assess locally suitable crop cover, with eligibility that can accommodate smallholders and tenant farmers where feasible.
Flash-flood corridors in Khyber Pakhtunkhwa and Balochistan Dera Ismail Khan, Tank, Zhob, Barkhan, Lasbela and Jhal Magsi.	Identify exposed UCs along watercourses and map safe access routes. Maintain local warnings and prepare assisted evacuation, while protecting essential facilities through district adaptation planning.	Pre-arrange transport and essential supplies within approved ceilings. Release action funding against agreed warnings while sufficient lead time remains.	Assess suitable cover for agricultural assets and essential infrastructure, alongside public funding for early evacuation.
Flash-flood hotspots in Azad Jammu and Kashmir Neelum, Muzaffarabad, Hattian Bala, Bagh, Haveli, Poonch.	Link upstream monitoring with warnings for exposed downstream settlements. Identify alternative routes where access could be cut off and prepare safe locations before forecast heavy rainfall.	Approve local readiness allocations and standby transport arrangements. Enable district officials to activate eligible spending under the agreed warning protocol.	Assess protection for essential infrastructure, with reserves available for risks that remain uninsured.

Mapped zone and associated hazard	District and UC adaptation measures	Contingency financing and PFM linkage	Risk insurance
Urban flooding and drainage hotspots Karachi, Hyderabad, Lahore, Rawalpindi, Islamabad, Peshawar and Quetta.	Identify exposed neighbourhoods at UC or ward level and clear critical drains before forecast rainfall. Test pumping arrangements and prepare safe access to essential services, while warning residents in low-lying areas.	Finance routine drainage maintenance through municipal budgets. Use contingency funding for additional pumping and evacuation support when an agreed warning is activated.	Assess suitable cover for municipal assets and small enterprises, alongside assistance for uninsured vulnerable households.
High-to-moderate priority areas highlighted in the priority map Mianwali, Sargodha and selected Indus-irrigated districts of Punjab. Rawalpindi and Islamabad are addressed in the urban row.	Translate district priorities into UC plans according to the local hazard. Coordinate agricultural advice with water availability, while identifying settlements requiring protection if flood forecasts deteriorate.	Maintain readiness allocations and increase contingency support when updated warnings indicate greater exposure. Record releases against the affected locality and funded activity.	Assess crop cover against local hazards, with products suited to the exposure of the intended participants.

3.3 Contingency if La Niña develops later in 2027

A possible transition to La Niña later in 2027 remains a contingency, with substantial uncertainty at this lead time ^[19]. The authorities should monitor subsequent ENSO updates and revise plans when the evidence supports a change in the expected seasonal pattern. If wetter conditions develop, additional rainfall could improve water availability while also increasing concern about flooding in exposed areas. Preparedness should retain the ability to respond to that change, with local actions based on the timing of official guidance.

3.4. Using GIS, remote sensing and AI for early action

The maps developed in ArcMap for this brief identify high-risk zones and high-priority areas. These provide a foundation for AI-supported dashboards that could connect early warnings with timely action and financing.

19 Famine Early Warning Systems Network (FEWS NET) (2026) 2026–2027 El Niño food security impacts. 6 October.

3.4.1 Monitoring and automated alerts

The AI could help update dashboards by analysing satellite observations alongside PMD forecasts, highlighting emerging risks within mapped districts. When locally validated thresholds are reached, automated alerts could prompt designated officials to activate agreed actions. Model outputs should be checked against ground observations, while PMD remains responsible for official weather warnings.

3.4.2 Targeting local support

Linking dashboard alerts with assessments at union council level could help authorities identify vulnerable households and support farmers before losses deepen. Updated evidence on crop conditions could also help irrigation departments prioritise areas facing water shortages.

3.4.3 Mobilizing donors and anticipatory finance

AI could analyze past funding responses alongside published grant criteria to identify recurring approval delays. This proposed use of behavioural intelligence could help tailor alerts for donors and development agencies, presenting costed actions with clear deadlines for decisions. Pre-agreed financing arrangements should connect validated triggers to the authorized release of grants or contingency funds, while the dashboard tracks disbursements and flags delays.

4 Priority decisions for early action

The National Disaster Management Authority (NDMA) should coordinate implementation with provincial disaster management authorities (PDMAs), alongside the relevant authorities in Gilgit-Baltistan and Azad Jammu and Kashmir. The Ministry of Climate Change and Environmental Coordination should connect this work with adaptation planning, while provincial governments agree the measures that districts can activate. These proposals would strengthen existing arrangements under the National Anticipatory Action Strategy [20].

Table 5. Priority decisions and proposed activation arrangements

Proposed decision	Lead and supporting institutions	Activation basis to agree
Issue a shared outlook with a clear planning period	PMD with NDMA and provincial or regional disaster management authorities	A new official outlook or a material change in a hazard warning
Translate the GIS maps into costed UC action plans	District administrations with the relevant disaster management authority and local government	The mapped priority combined with verified local exposure
Link warnings with authorized early action	PMD provides technical guidance; disaster management authorities and districts activate agreed measures	A locally calibrated hazard threshold with sufficient lead time for the selected action
Enable contingency funding before impact	Provincial Finance Departments with disaster management authorities and authorized spending officers	The pre-agreed trigger and an approved action package within the relevant spending ceiling
Align irrigation decisions with energy requirements	IRSA and WAPDA with provincial irrigation departments and energy planners	A confirmed change in water availability that affects operating plans
Prepare adaptive household assistance and suitable insurance	Provincial governments with the relevant social protection departments and Finance Departments	Forecast exposure and household vulnerability assessed against pre-approved eligibility rules

20 National Disaster Management Authority (NDMA) (2026a) Pakistan National Anticipatory Action Strategy 2026–2030. Islamabad: NDMA.

5. Conclusion

Pakistan's preparedness for El Niño will depend on how effectively early warnings lead to action while communities still have time to protect themselves. The GIS mapping undertaken in ArcMap provides a basis for directing resources towards high-risk zones and high-priority areas, while current forecasts should determine when measures are activated. Preparedness must reflect local conditions, because water-stressed agricultural districts require different interventions from northern valleys exposed to sudden flooding. The immediate priority is to connect these mapped risks with costed measures at union council level, supported through approved district plans. Provincial contingency funds should provide accessible financing before impacts occur, with clear spending authority and procedures that allow timely release. The adaptive social protection should help exposed households withstand interruptions to income, while suitable insurance can complement public reserves where coverage is affordable and payouts arrive when needed.

The AI-supported dashboards could strengthen implementation by tracking emerging risks and notifying responsible authorities when validated triggers are reached. The analysis of funding responses could also help tailor alerts to donors and development agencies, while pre-agreed grant provisions establish a route to earlier disbursement. These arrangements would give practical effect to Pakistan's National Anticipatory Action Strategy 2026–2030 and can help activate and develop sub national climate adaptation plans at district level. Their success should be measured by whether action, implementation and funding reaches priority communities early enough to prevent avoidable losses and protect the development gains already achieved.

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