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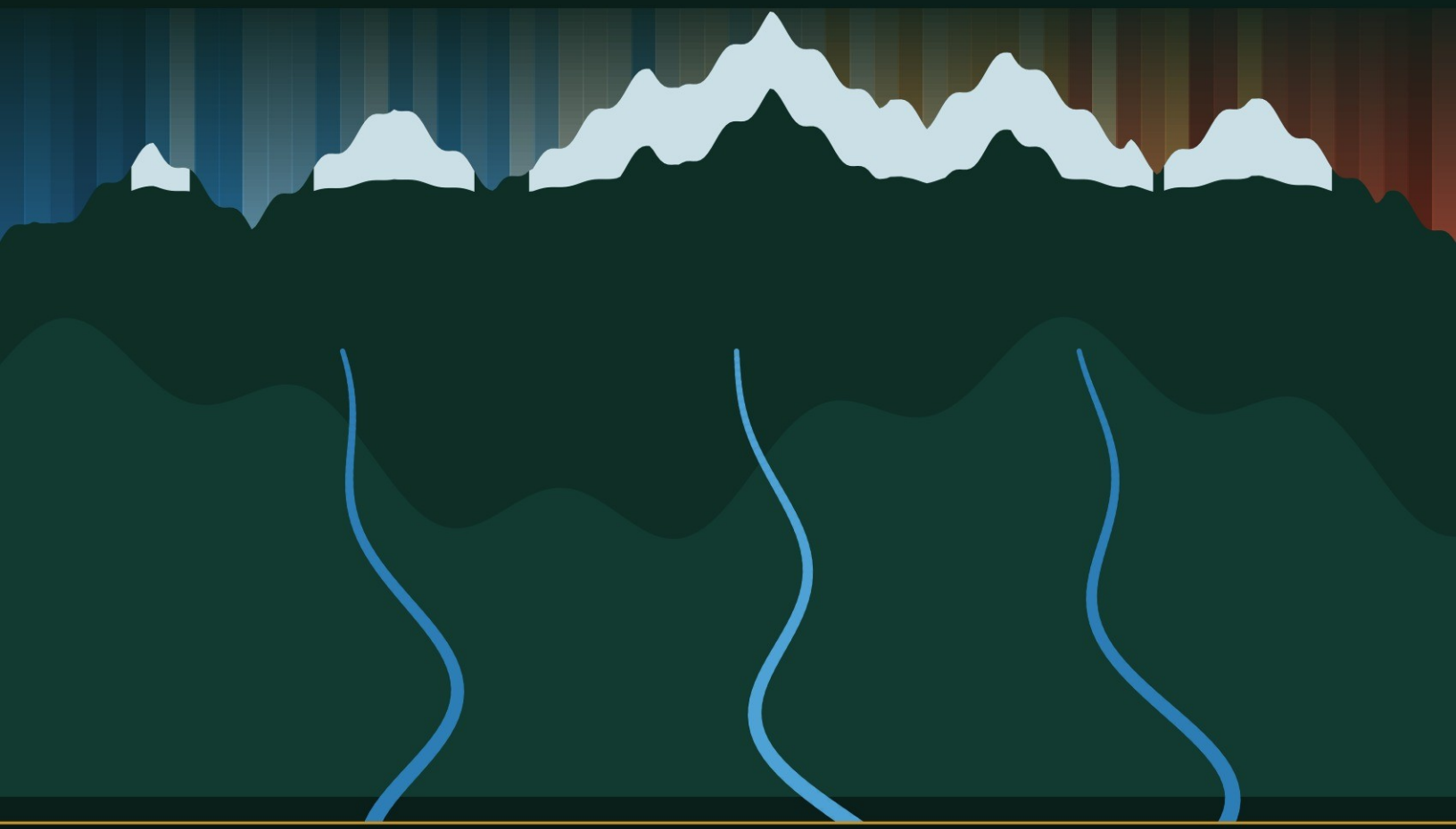
CLIMATE CHANGE AS SOUTH ASIA'S EMERGING SECURITY THREAT

Glacier Retreat, Hydrological Uncertainty, Food-System Shocks and Climate Mobility in a Region of Strategic Rivalry



Authored by Sumaiyya Kainat

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ABOUT THE AUTHOR

Sumaiyya Kainat is an MPhil scholar at the National Institute of Intelligence and Security Studies (NISS), Quaid-i-Azam University (QAU), Islamabad. Her research interests include international relations, geopolitics, regional security, strategic affairs and emerging security challenges.

ABOUT SAT BRIEFS

SAT Briefs are the weekly original research of South Asia Times. Each brief examines a pressing question in regional and international affairs, advances an evidence-based argument and sets out policy options for decision-makers. The views expressed are those of the author.

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KEY ARGUMENT

South Asia's next security crisis may not begin with a border clash, but with a glacier, a monsoon or a missing flood warning. Climate change has become a non-traditional security threat in South Asia, especially for Pakistan, and is no longer just an environmental problem. Melting glaciers, along with water scarcity, floods, rising temperatures and declining agricultural productivity, threaten livelihoods, food security and economies across the region.

India's decision to hold the Indus Waters Treaty in abeyance, and wider disagreements over shared rivers, aggravate this pressure. Climate change acts as a force that magnifies existing geopolitical, political and economic vulnerabilities. Preventing environmental crises from turning into security crises therefore requires early warning systems, shared leadership on climate issues and cooperative water diplomacy, anchored in a Treaty that the Court of Arbitration has confirmed remains fully in force.

Water conflicts are not inevitable. They can be avoided by making the right decisions in time.

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EXECUTIVE SUMMARY

Climate change is turning into a strategic stressor for South Asia, not because it makes war a certainty, but because it intensifies shocks in a region marked by low political trust, uneven water governance and insufficient disaster-response capacity.

- **The water tower is changing.** The Hindu Kush Himalaya (HKH) is the source of the region's most significant river systems, which serve nearly two billion people. The International Centre for Integrated Mountain Development (ICIMOD) reported in 2026 that between 1990 and 2020, HKH glaciers lost approximately 12 percent of their area and 9 percent of their estimated ice reserves; the rate of ice loss has doubled since 2000, and seasonal snow persistence in 2026 was 27.8 percent below the long-term average. These figures do not imply a direct and steady decline in basin water, but they create unpredictability in the availability, timing and seasonality of water.
- **The legal position is clear; political compliance is not.** On 23 April 2025, India announced that it would hold the Indus Waters Treaty (IWT) in abeyance after the attack in Pahalgam. The Court of Arbitration established under the Treaty ruled on 31 August 2026 that the Treaty remains in full force and that India has no grounds to suspend or terminate it unilaterally. India rejects the tribunal's jurisdiction and decision, creating a gap between legal determination and political compliance, and a fragile environment for data sharing and crisis communication.
- **The 2025 floods show compound risk at home.** As of 30 September 2025, according to the International Monetary Fund (IMF), official records showed 6.9 million people affected, 1,037 deaths, more than four million people displaced or rescued and over 2.2 million acres of crops under water. A separate geospatial analysis by the Food and Agriculture Organization (FAO) estimates that 11.3 million people were affected and that 14,498 km^2 of farmland was submerged in Punjab, Sindh and Khyber Pakhtunkhwa.
- **The pathways are mutually reinforcing.** Cryosphere change and flow uncertainty feed into water-governance disputes, food-system shocks, and urban stress driven by internal displacement and heat-related health and productivity losses.
- **A further strategic dimension is upstream.** New infrastructure, scarce upstream data and shifting power dynamics, from China's Yarlung Tsangpo project to the India–Bangladesh Ganges Treaty that expires on 12 December 2026, add a regional layer of risk.
- **The core finding.** Climate hazards become security threats only when combined with political distrust, weak domestic water governance, exposed infrastructure and inadequate early warning. Water conflicts are not the biggest problem; they can be avoided by making the right decisions in time.

AT A GLANCE

A flood does not wait for a treaty dispute to be settled. The five actions below are where this brief would start, who should lead them and how progress can be measured, followed by four numbers that show why the clock is already running.

Priority Actions at a Glance

Five steps, who should lead them and the first result to look for

	ACTION	LEAD ACTORS	FIRST RESULT
1	**Restore a minimum humanitarian hydrology channel**	India and Pakistan, water and disaster agencies	**Time-stamped flood alerts and acknowledgements logged**
2	**Close Pakistan's last-mile warning gap**	NDMA, PDMAs, PMD and local governments	**District warning reach and lead time audited**
3	**Expand shared cryosphere observation**	ICIMOD with national meteorological and glacier agencies	**Common methods and open seasonal indicators**
4	**Reduce water demand and crop exposure**	Provincial and state agriculture and water departments	**Less water used per unit of crop output**
5	**Negotiate an adaptive Ganges renewal**	India and Bangladesh	**Renewed agreement with drought, data and review clauses**

NDMA is the National Disaster Management Authority, PDMAs the Provincial Disaster Management Authorities and PMD the Pakistan Meteorological Department. Based on the author's priority actions table (Kainat, 2026). Designed by SAT.

South Asia's climate-security pressures at a glance

27.8%	**2×**	**1,037+**	**Abeyance**
HKH seasonal snow persistence below the long-term average in 2026, the lowest in 24 years of monitoring (ICIMOD, 2026a)	Rate of Hindu Kush Himalayan ice loss relative to 2000, according to ICIMOD's March 2026 glacier assessments	Lives lost in Pakistan's 2025 monsoon floods, with about 2.9 million displaced at the peak (Islamic Relief, 2026)	Status of the IWT in India's declared position since April 2025, rejected by the Court of Arbitration on 31 August 2026

Data from ICIMOD (2026a), Islamic Relief (2026) and PCA (2026), as compiled in the author's indicator table (Kainat, 2026).

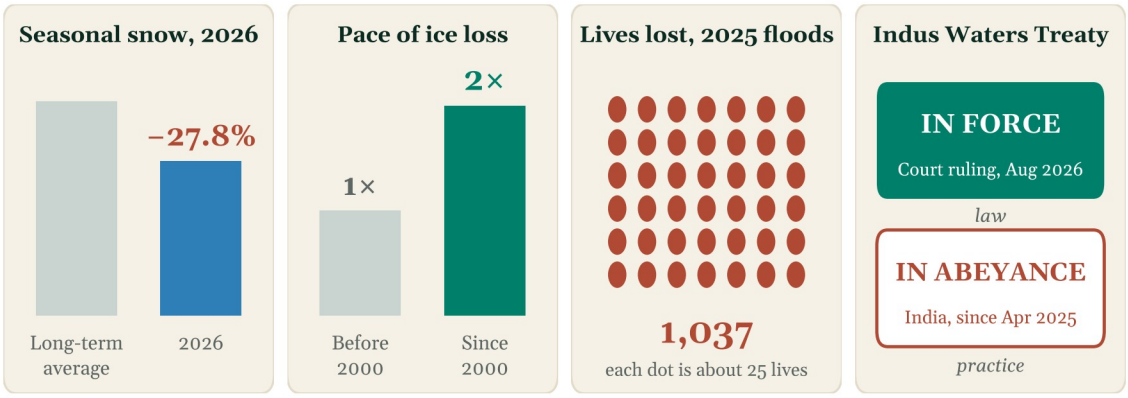
1. A THREAT THAT IGNORES BORDERS

Climate risk is now a strategic variable. Historically, the key elements of security strategy in South Asia have included territorial disputes, military rivalry, nuclear deterrence and internal conflict. Although that focus has not changed, the conditions affecting the stability of the state are changing. Climate change is imposing risks on river flows, agricultural output, urban water access, public health and disaster-response procedures. Because South Asia relies on shared river basins, climate phenomena are not confined to the political geography of any one country; they affect the whole region. [1]

Four numbers capture these pressures. Seasonal snow is far below normal, the ice is melting twice as fast as it did before 2000, more than a thousand people died in Pakistan's 2025 floods, and the region's most durable water treaty is in force in law but held in abeyance in practice (Figure 1).

Figure 1. Four Numbers Behind the Threat

Snow, ice, lives and law, the pressures that frame this brief

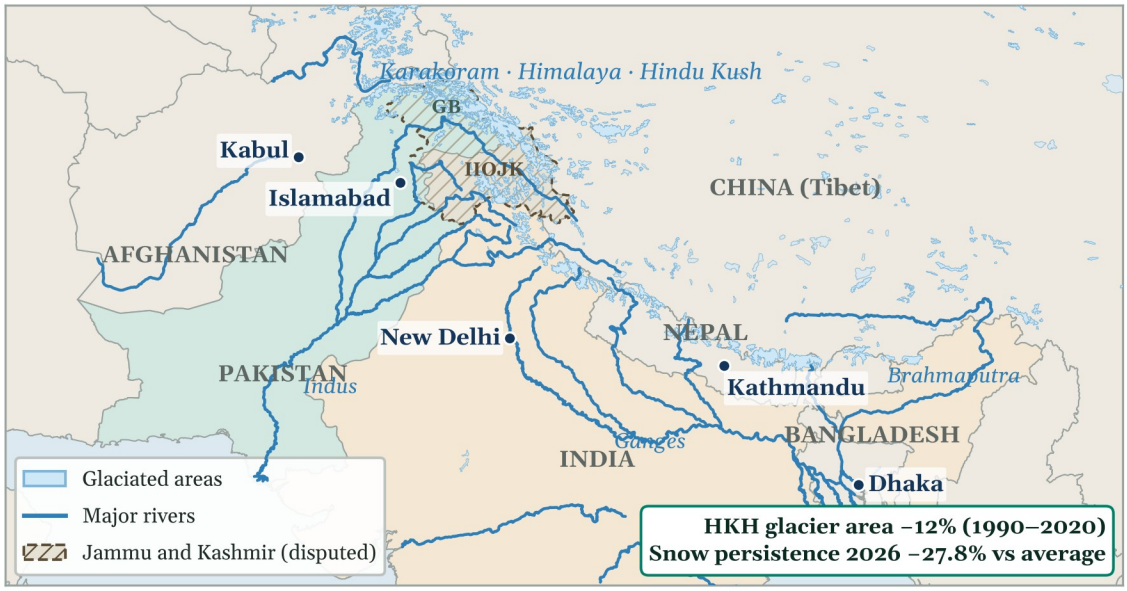


Data from ICIMOD (2026), Islamic Relief (2026) and PCA (2026). Based on the author's indicator table (Kainat, 2026). Designed by SAT.

According to the World Meteorological Organization (WMO) report *State of the Climate in Asia* 2025, Asia's average annual temperature in 2025 was about 0.96°C higher than the 1991–2020 average. The report also refers to extreme heat, flooding and drought across the continent, including catastrophic rains and floods in Pakistan. According to the WMO, the warming trend in Asia over 1991–2025 was almost double that of 1961–1990. [2] Extreme weather has become easily detectable, and it is occurring amid high population density, exposed infrastructure, vulnerability to food-price changes and limited means of response.

Figure 2. The Hindu Kush Himalaya at a Glance

Glaciated areas, major rivers and regional capitals



Source. Natural Earth (public-domain vector data) and ICIMOD (2026a–c), as used in the original. Map adapted by SAT. Jammu and Kashmir is disputed territory; its final status is to be determined in accordance with the relevant UN Security Council resolutions.

Selected regional indicators

2×	80%	218 m	40.5 m	+0.26°C
Glacier ice-loss rate vs 2000 (ICIMOD, 2026)	Share of Indus flow on the western rivers (treaty allocation)	Undernourished in South Asia, 2023–25 (GHI, 2026)	Possible climate migrants by 2050 (World Bank)	Per decade night-time warming in Pakistan (PMD, 2026)

Data from ICIMOD (2026), the Indus Waters Treaty, GHI (2026), the World Bank and PMD (2026). Original figure by Sumaiyya Kainat (2026), redrawn by SAT.

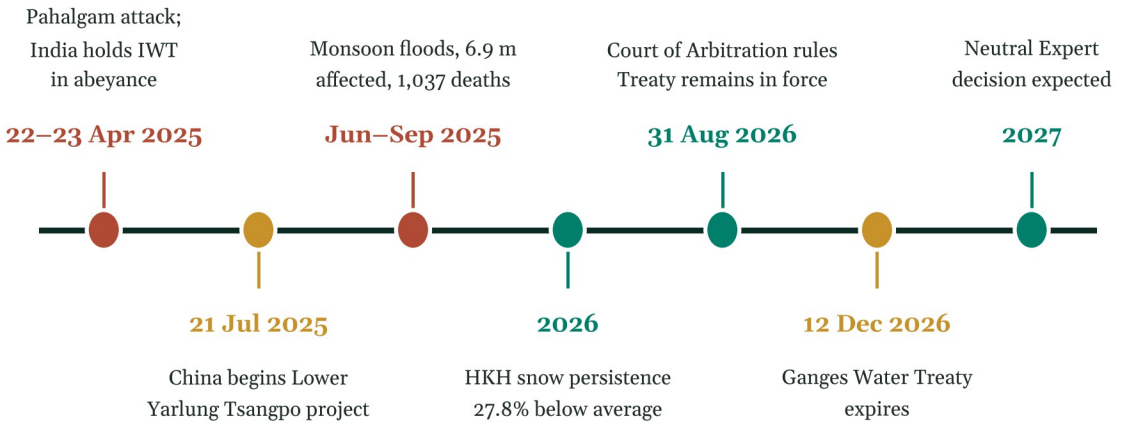
As argued by Ullman (1983), by Buzan, Wæver and de Wilde, [3] and in the wider climate-security literature, environmental pressure becomes a security risk when it endangers living conditions and people's safety, state performance and international relations. This does not mean that every disaster, whether a flood, a drought or a migration problem, should be treated as a military issue. Using a security framework does not mean treating development problems as emergencies; rather, it means recognizing cascading effects and protecting civilian stability. [4]

What does it actually mean to call climate change a security issue? In 1983, the American scholar Richard Ullman offered a simple test. A threat to national security, he argued, is not only a foreign army at the border. It is anything that, within a short span of time, sharply degrades the quality of life of a country's people, or that significantly narrows the choices open to its government and its citizens. [1] By that test, Pakistan's floods of 2022 and 2025 were security events. In 2022, the floods affected some 33 million people, [5] and in both years millions of families lost homes, harvests and incomes

within weeks, while the government had to divert scarce money from development to relief and reconstruction.

Figure 3. Shocks and Deadlines, 2025–2027

Key climate, water-governance and treaty events shaping the South Asian risk picture



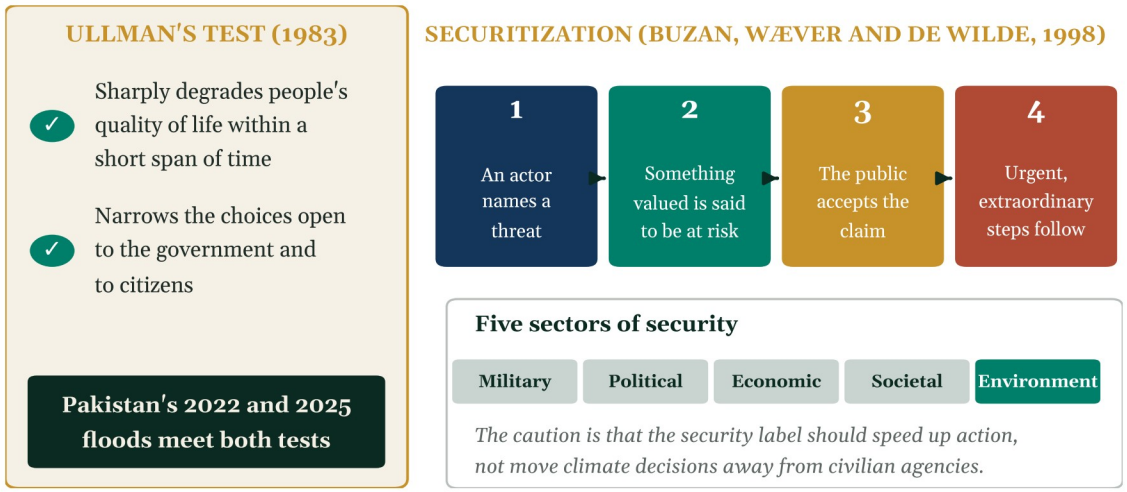
Data from PCA (2026), Reuters (2025, 2026), IMF (2025), ICIMOD (2026c), Government of India (2026) and Ranjan (2026). Original figure by Sumaiyya Kainat (2026), redrawn and adapted by SAT.

Fifteen years after Ullman, Barry Buzan, Ole Wæver and Jaap de Wilde, scholars associated with what came to be called the Copenhagen School, explained how an issue becomes a security issue in the first place. They called the process securitization. A leader or an institution declares that something valued, such as the state, the economy or the survival of a community, faces an existential threat. If the public accepts that claim, the issue moves out of ordinary politics and urgent, extraordinary measures become acceptable.[3] The same authors widened the idea of security beyond the military to four other sectors, the political, the economic, the societal and the environmental (Figure 4).

Pakistan has already taken this step in its own policy. Its first National Security Policy, launched in January 2022, sets out a citizen-centric idea of comprehensive national security, and its chapter on human security covers population and migration, health, climate and water stress, food security and gender.[6] The securitization literature also carries a warning. A security label can be misused to move decisions behind closed doors or to hand civilian tasks to security institutions. This brief therefore uses the climate-security lens to recognize cascading risks early and act on them faster, not to militarize the response.

Figure 4. When Does Climate Become a Security Issue?

Two classic answers, Ullman's test of harm and the Copenhagen School's idea of securitization



Based on Ullman (1983) and Buzan, Wæver and de Wilde (1998). Designed by SAT.

SAT DESK INSIGHT · CLIMATE AS A NATIONAL SECURITY THREAT, AND HOW IT CAN BE EXPLOITED

Climate change threatens national security in three direct ways. It damages the physical base of the state, its dams, canals, roads and power lines. It weakens the economy that pays for defense and development, as the 2022 floods did when damage and losses were assessed at more than US$30 billion.[5] And it erodes public trust when the state is seen to arrive late, opening space that others can use.

Experience points to four channels of exploitation. Upstream actors can turn water into leverage. India's Prime Minister declared in 2016 that blood and water cannot flow together, and in 2025 India placed the Indus Waters Treaty in abeyance.[7] Days after deadly border clashes in October 2025, the Taliban's supreme leader ordered dams on the Kunar River to be built as soon as possible.[8] Non-state groups can fill relief vacuums. During the 2010 floods, a charity that UN and Western officials linked to Lashkar-e-Taiba ran relief camps in Khyber Pakhtunkhwa and Punjab, a reminder that gaps in Pakistan's own preparedness can be exploited from within as well as from outside.[9] Pakistan has since banned the group. Information operations and economic pressure can follow any disaster.

Climate resilience is therefore also a form of deterrence. Every warning that reaches a village and every relief camp the state runs first narrows the space others can exploit.

How Climate Stress Can Be Exploited

Four channels, with documented examples and what blunts each one

1 UPSTREAM LEVERAGE

Water flows, data and dam operations used as pressure

SEEN IN PRACTICE

2016 "blood and water" remark, 2025 IWT abeyance, Oct 2025 Kunar dam order

Blunted by treaty law and own storage

2 RELIEF VACUUMS

Groups that arrive before the state win loyalty

SEEN IN PRACTICE

Militant-linked charity camps in the 2010 floods, since banned

Blunted by state relief that arrives first

3 INFORMATION OPERATIONS

Blame narratives spread faster than flood water

SEEN IN PRACTICE

Rumors of deliberate releases and fabricated flood footage

Blunted by verified data published fast

4 ECONOMIC PRESSURE

Disasters deepen debt and dependence on outside finance

SEEN IN PRACTICE

2022 floods, damage and losses above US$30 billion

Blunted by risk insurance and reserves

Based on Dawn, Daily Times, the Christian Science Monitor and the 2022 PDNA. Designed by SAT.

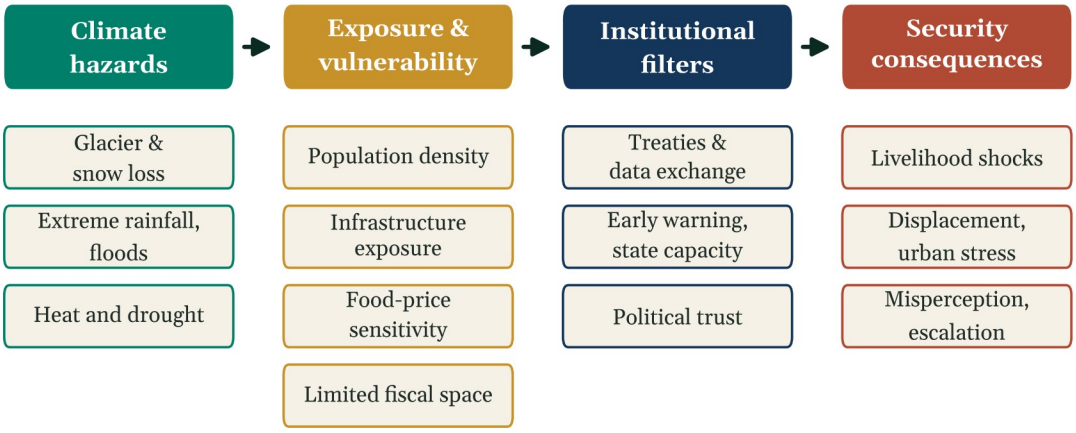
2. FROM CLIMATE HAZARD TO SECURITY CONSEQUENCE

Environmental scarcity is a useful starting point, but it is not enough. Homer-Dixon (1999) suggested that scarcity may intensify competition through resource capture and ecological marginalization,[10] but later studies suggest that scarcity does not lead directly to violence; institutions, inequality, political incentives and patterns of cooperation intervene.[11] The Indus Waters Treaty shows that cooperation can be institutionalized even amid rivalry.

A compound-risk model captures this more precisely. The physical hazards of climate change include shorter snow-cover duration, glacial lake outburst floods (GLOFs) and extreme precipitation and temperature; their impacts on livelihoods produce economic, social and political consequences. Between hazard and impact, two mediating filters intervene. The first is political, made up of distrust, legal ambiguity, nationalism, political signaling and restricted communication.[12] The second is institutional, made up of weak early warning systems, poor spatial planning, low land productivity, ineffective health monitoring and limited budgets. Security risk increases when both filters are weak.[13]

Figure 5. From Climate Hazard to Security Outcome

An analytical framework. The same hazard produces different outcomes depending on institutional filters



Original diagram by Sumaiyya Kainat (2026), based on Homer-Dixon (1999) and Buzan, Wæver and de Wilde (1998). Redrawn and adapted by SAT.

The two filters deserve a closer look, because together they decide whether a flood remains a flood or becomes a crisis between states (Figure 6).

The political filter is about trust, and about how governments read one another's actions. When neighbors share river data routinely, a sudden rise in flow is treated as a technical event. When they do not, the same rise can be read as a deliberate act. Legal disputes over a treaty, nationalist media coverage and the absence of working hotlines all thicken this filter. The August 2025 Tawi River alert

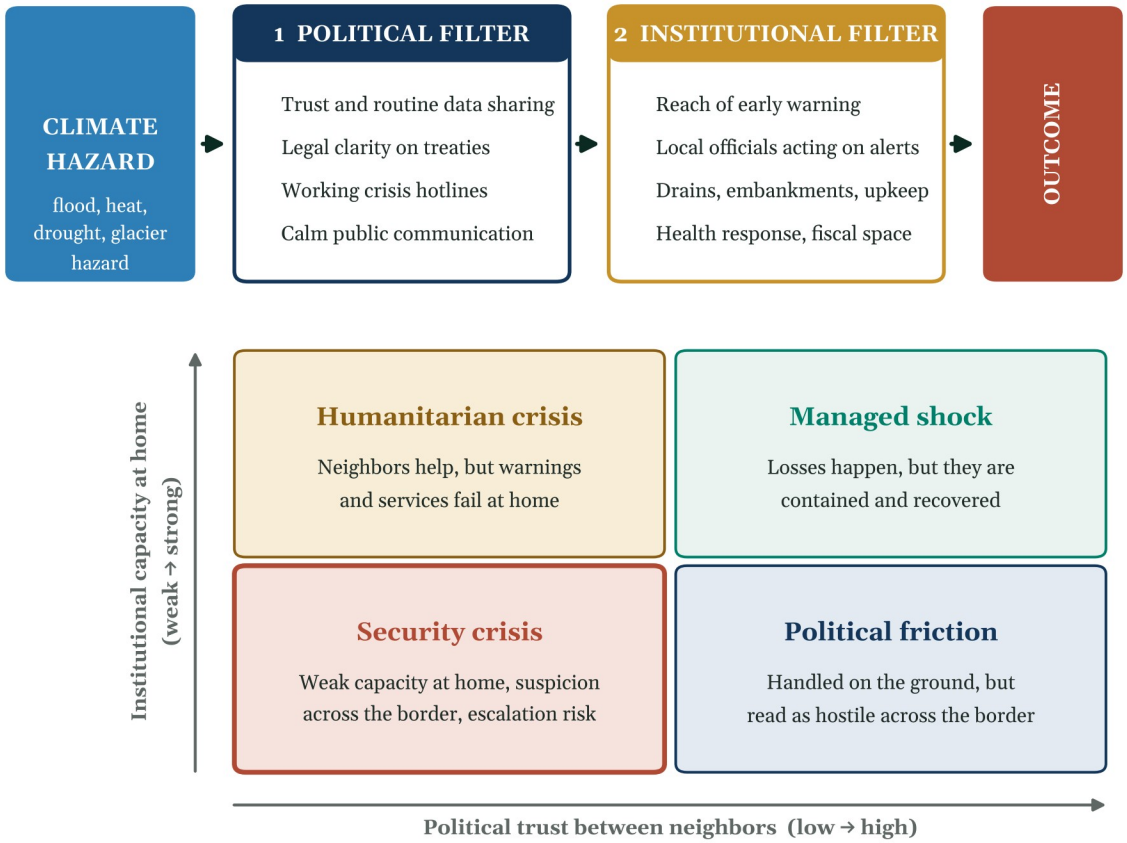
shows how. India warned Pakistan of a high flood, but did so through its High Commission and described the warning as humanitarian, while Pakistan's Foreign Office pointed out that the Treaty requires such data to pass through the Indus Waters Commission. [14] The water was the same either way. What changed was the channel, and with it the political meaning of the message.

The institutional filter is about what happens inside each country once a warning exists. It covers how far early warnings reach, whether district officials act on them, how well drains and embankments are maintained, how quickly hospitals respond, and how much fiscal space a government has for relief. The Swat River tragedy of June 2025, described later in this brief, showed that a warning issued is not the same as a warning received and acted upon.

Seen together, the two filters produce four broad outcomes. Where trust and capacity are both strong, a hazard becomes a managed shock. Where capacity is strong but trust is weak, a disaster handled well on the ground can still cause political friction across the border. Where trust exists but capacity is weak, the crisis is mainly humanitarian and domestic. Where both are weak, a climate hazard can become a security crisis. Much of South Asia today sits closer to that last quadrant than it should.

Figure 6. Two Filters Between Hazard and Harm

Political trust and institutional capacity decide whether a climate hazard becomes a security crisis



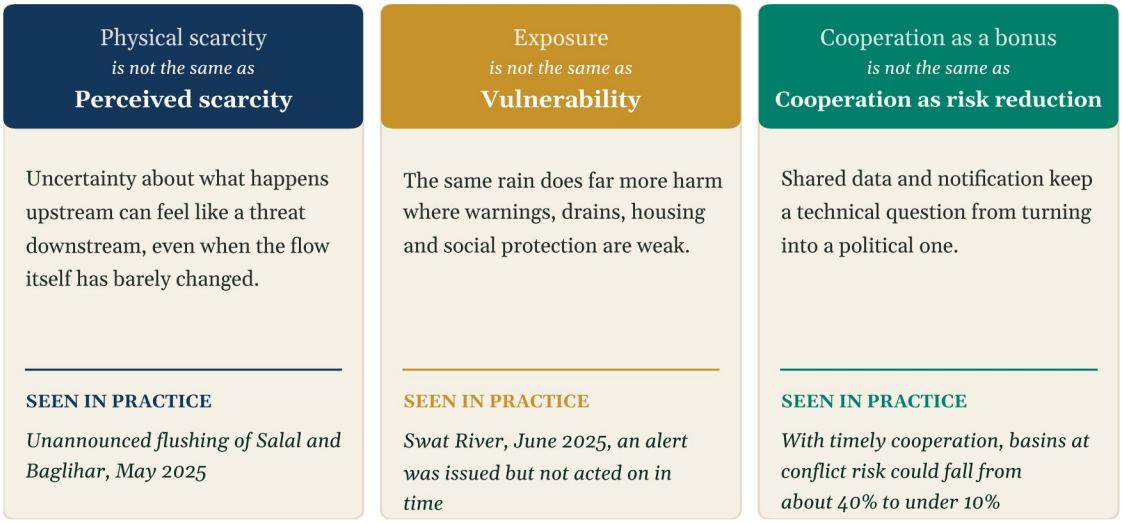
SAT elaboration of the two mediating filters in the author's compound-risk model (Kainat, 2026), after Adger (2006).

Recent peer-reviewed studies lend credibility to this institutional argument about transboundary water governance. A study published in *Nature Communications* projects that around 40 percent of transboundary river basins could face water-scarcity-related conflict during 2041–2050, depending on the extent of climate change and water use, a share that could fall below 10 percent through timely cooperation within basins. [15] This is a global pattern rather than a prediction for the Indus, but it is consistent with the argument that governance can dramatically reduce risk. Moreover, a 2025 study in *World Development Perspectives* states that rain adaptation and river-basin governance are critical for climate-resilient development in South Asia. [16]

This model rests on three distinctions. **First**, physical scarcity differs from perceived scarcity. Even if a state is not capable of diverting a major river, uncertainty about upstream operations can create a perception of threat downstream. **Second**, climate exposure is distinct from climate vulnerability, since the same rains lead to different outcomes depending on settlement patterns, warning time, drainage, building strength and social protection. **Third**, cooperation is not a diplomatic bonus; it is a risk-reduction mechanism that can keep technical ambiguity from escalating into political tension.

Figure 7. Three Distinctions Behind the Model

Why the same hazard can mean very different things for security



Based on the author's three distinctions, with examples from Reuters (2025), Dawn (2025) and Jiang et al. (2025). Designed by SAT.

SAT DESK INSIGHT · CLIMATE, FOOD AND HUMAN SECURITY ARE ONE CHAIN

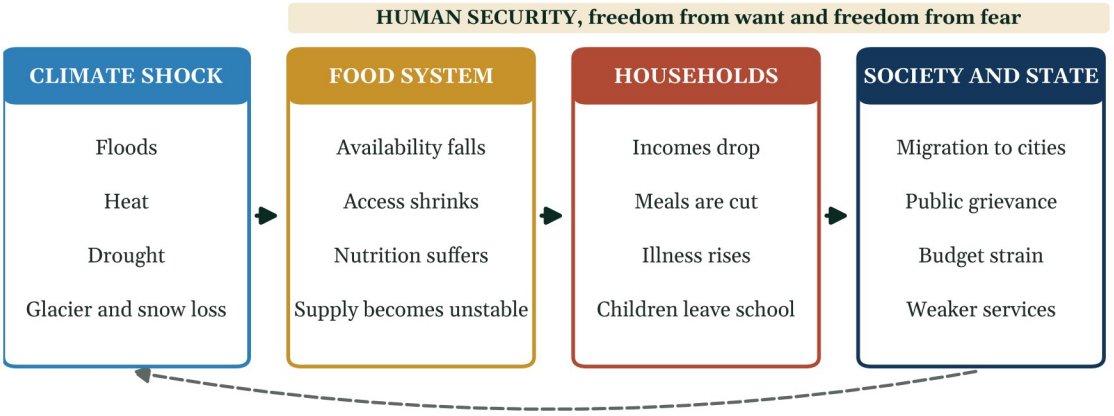
The case for treating climate as a security issue becomes clearest when it is traced through food and people. In 1994 the United Nations Development Programme (UNDP) described human security as freedom from fear and freedom from want, and named seven parts of it, economic, food, health, environmental, personal, community and political security. [17] Food security, as defined at the 1996 World Food Summit, exists when all people at all times have physical and economic access to sufficient, safe and nutritious food. [18]

Climate change touches every link in that chain. A flood or a failed snowmelt destroys a harvest, and food

becomes scarcer. Prices rise just as incomes fall, so families eat less, sell assets, take children out of school or move to cities. Each of these steps is a loss of human security, and when many households fall together the strain reaches the state through public anger, budget pressure and overstretched services. Pakistan's National Security Policy draws the same line when it links climate-resilient agriculture to food security in its human security chapter. [6]

Figure 8. From Climate Shock to Human Insecurity

How climate, food and human security form one chain



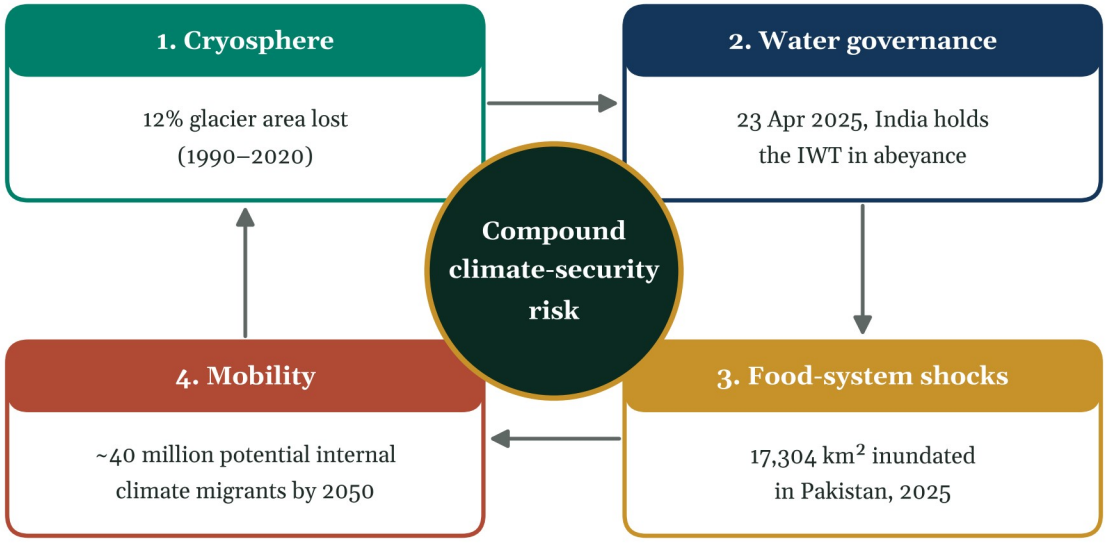
Feedback. Poorer households and stretched states are hit harder by the next shock.

Based on UNDP (1994), FAO (1996) and Pakistan's National Security Policy 2022–2026. Designed by SAT.

3. FOUR INTERLOCKING CLIMATE-SECURITY PATHWAYS

Figure 9. Four Interlocking Pathways

How cryosphere loss, water governance, food shocks and mobility compound one another



Data from ICIMOD (2026a), PCA (2026), FAO (2026), Rigaud et al. (2018) and Clement et al. (2021). Original figure by Sumaiyya Kainat (2026), redrawn and adapted by SAT.

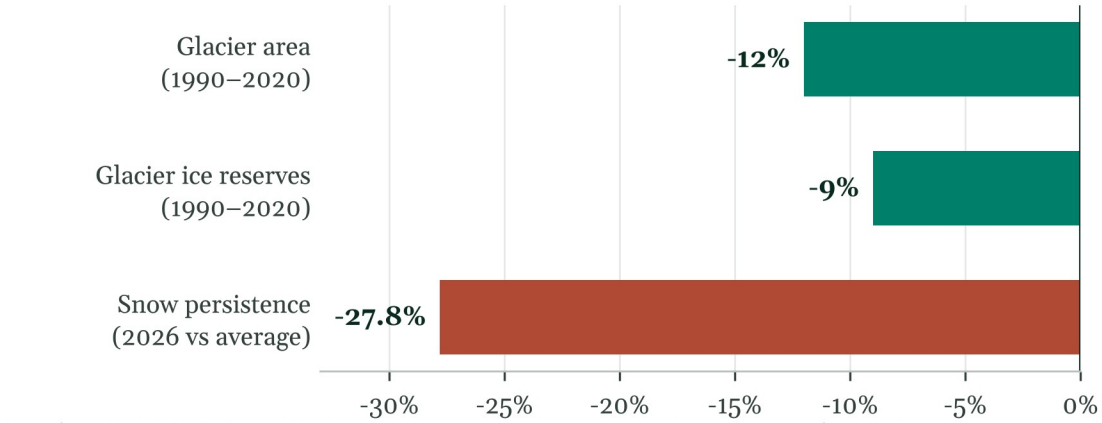
3.1 Glacier Retreat and the Loss of Hydrological Predictability

The HKH is home to over 63,700 glaciers covering almost 55,782 km^2, and feeds ten major river systems in Asia. [19] ICIMOD's 2026 assessment shows a reduction of approximately 12 percent in glacier area and approximately 9 percent in estimated ice reserves between 1990 and 2020. Long-term observations show ice-thickness loss of as much as 27 meters since 1975, and the rate of ice loss has doubled since 2000. Small glaciers with a surface area of less than 0.5 km^2, which ICIMOD reports make up about three-quarters of HKH glaciers, are particularly vulnerable. [20] Monitoring capacity is a significant gap. Of the 38 glaciers covered in the 2026 synthesis, only 7 meet the World Glacier Monitoring Service (WGMS) benchmark standard. [21]

Seasonal snow is also significant for near-term water availability. In 2026, snow persistence was 27.8 percent below average, with ten of the 12 basins below normal, marking the fourth consecutive year of below-normal snow. Snow deficits may affect early-season runoff and soil-moisture recharge, but the effects are basin- and season-specific. In 2026, the Ganges and Irrawaddy basins were both above normal, highlighting that regional averages are not a predictor for every river. [22]

Figure 10. The Shrinking Water Tower

Cryosphere change in the Hindu Kush Himalaya (percent)



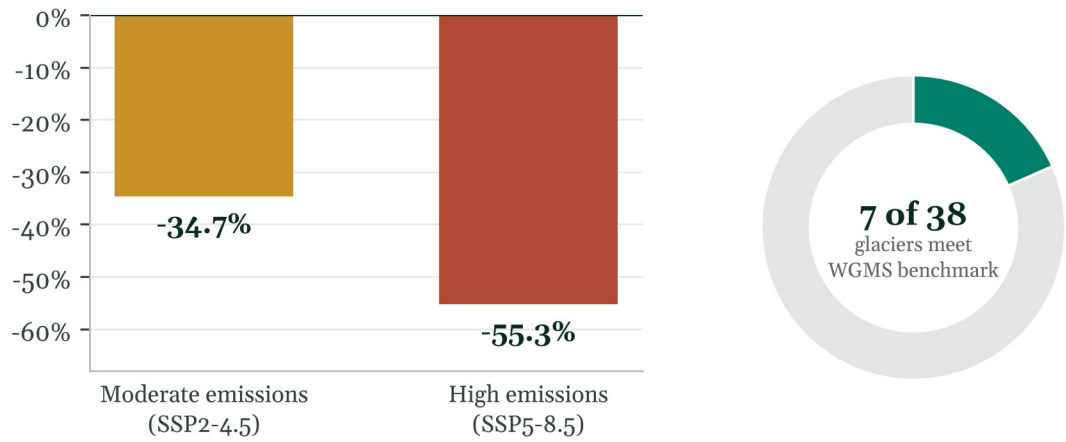
Data from ICIMOD (2026a–c). Values are not additive, glacier area and ice reserves refer to 1990–2020, snow persistence to 2026.

Original figure by Sumaiyya Kainat (2026), redrawn and adapted by SAT.

Basin-scale modeling demonstrates why regional averages are inadequate. According to an *iScience* study (Figure 11) using 13 bias-corrected models from the Coupled Model Intercomparison Project Phase 6 (CMIP6), glacier area in the Jhelum sub-basin is projected to shrink by approximately 34.7 percent and 55.3 percent by the 2080s under the SSP2-4.5 and SSP5-8.5 scenarios (Shared Socioeconomic Pathways) respectively, with noticeable implications for glacier-derived streamflow. These model outputs are scenarios, not deterministic predictions for the entire Indus system. [23]

Figure 11. The Jhelum Outlook and the Monitoring Gap

Projected glacier-area decline in the Jhelum basin, and HKH glaciers meeting the WGMS benchmark



Data from iScience (2025) and ICIMOD (2026a, 2026b).

Original figure by Sumaiyya Kainat (2026), redrawn and adapted by SAT.

The strategic message is not simply that rivers will dry up, but that they will become volatile. Some catchments will see temporary increases in flow and flood hazard during periods of increased melt; buffering capacity declines as ice cover shrinks. The timing of snowmelt and rainfall may become more

important for irrigation scheduling, hydropower and flood operations than annual average discharge. Glacial lake outburst floods are a further high-impact, low-frequency hazard that can strike roads, bridges, hydropower facilities and communities with little warning. [24]

The monitoring gap creates a security externality for India and Pakistan. A downstream authority that cannot independently verify upstream conditions may read unusual surges, shortfalls or reservoir operations strategically. Shared scientific observation and notification can reduce this uncertainty without disclosing sensitive military information. [25]

3.2 The Indus Waters Treaty Between Legal Continuity and Political Breakdown

The 1960 IWT allocates the eastern rivers (Ravi, Beas and Sutlej) mainly to India and the western rivers (Indus, Jhelum and Chenab) mainly to Pakistan, and specifies the limited uses India may make of the western rivers, including run-of-river hydropower, subject to the Treaty's design constraints. The Treaty established the Permanent Indus Commission and mechanisms for resolving disputes. Because it has endured through previous wars, it has served as a breakwater in an otherwise confrontational relationship. [26]

The Treaty was severely shaken on 23 April 2025, when, a day after the attack in Pahalgam, India declared that it would hold the Treaty in abeyance. Pakistan's response was unambiguous. On 24 April 2025, its National Security Committee stated that any attempt to stop or divert the flow of water belonging to Pakistan under the Treaty would be considered an act of war. [27] On 31 August 2026, in proceedings initiated by Pakistan, the Court of Arbitration ruled that the Treaty remains valid and that India has no grounds to suspend or terminate it unilaterally. [28] It also gave interim directions on the Ratle hydropower project. India responded that it does not accept the Court's jurisdiction and will not recognize the decision. [29] As recently as 20 November 2026, India's Ministry of External Affairs said there was "absolutely no change" in its position, while Pakistan has taken the issue to the United Nations Security Council. [30] A Neutral Expert appointed by the World Bank is reviewing project-compliance issues; the proceedings held their sixth meeting on 9–10 November 2026, and a decision is expected in July 2027. [31]

This has created a dual reality of legal clarity alongside political uncertainty. The arbitral tribunal has determined the legal position, but political implementation and practical cooperation remain contested. A legal decision does not by itself ensure that information is passed on in a timely fashion, that technical officials can communicate during a flood, or that public discourse does not preemptively assign blame. At the same time, India's existing infrastructure on the western rivers does not allow it to stop or divert their flows wholesale; the near-term risks therefore lie in data exchange, project interpretation, reservoir operations and crisis signaling. The first weeks of abeyance demonstrated this. In early May 2025, India flushed the Salal and Baglihar reservoirs on the Chenab without notifying Pakistan, for the first time since they were built, and Pakistan's Indus River System Authority (IRSA) warned of reduced inflows at Marala. [32] Unilateral reservoir operations of this kind, rather than a complete cutoff, are the most immediate instrument of pressure on downstream Pakistan. [33]

Figure 12. The Indus Waters Treaty Geography

Western and eastern river allocation, major dams and key sites



Source. Natural Earth (river and glacier layers) and PCA (2026) for treaty allocation, as used in the original. Site locations approximate. Map adapted by SAT.

Jammu and Kashmir is disputed territory; its final status is to be determined in accordance with the relevant UN Security Council resolutions.

KEY TAKEAWAY

The Court of Arbitration's award settles the legal question. The IWT remains in force and cannot be suspended unilaterally. The risk now lies in the space between law and practice, in withheld data, unannounced reservoir operations and crisis signaling. Closing that space is the core task of water diplomacy.

Annual water volume is not the only source of downstream vulnerability. Pakistan's irrigation system depends heavily on the Indus basin, and sowing programs are highly sensitive to the timing and reliability of water supply. Water stress is also a significant problem in India, with particular pressure on groundwater in agricultural areas. The competition is thus set against a shared structural problem, namely using water efficiently, planning for droughts more effectively and accessing hydrological data more reliably.[34]

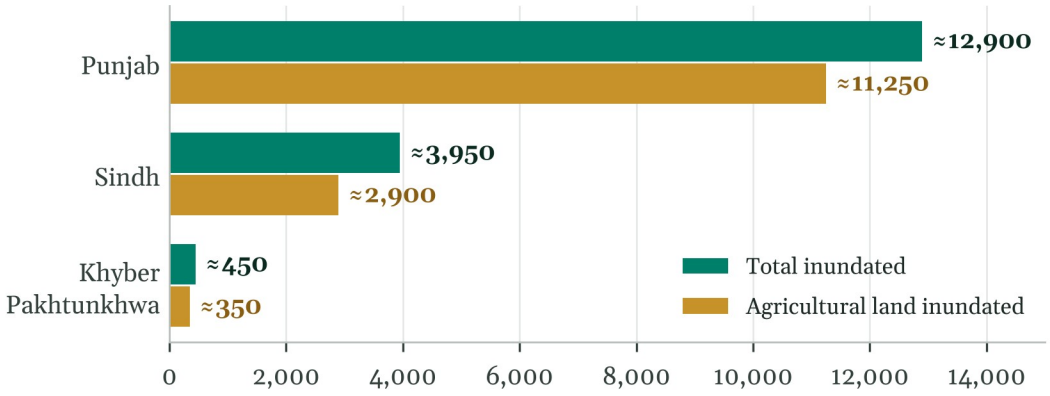
3.3 Floods, Agriculture and Food-System Security

Pakistan's 2025 monsoon disaster demonstrates how floods become major shocks to the nation's economy and people under conditions of heavy rainfall. IMF reporting shows that approximately 6.9 million people across the country were affected. Initial government assessments suggested economic losses of at least PKR 800 billion (Pakistani rupees), or around 0.6 percent of gross domestic product (GDP).[35]

The FAO undertook its own geospatial assessment of the floods using 10-meter-resolution Sentinel-1 satellite imagery. Around 14,498 km^2 of agricultural land was flooded across Punjab, Sindh and Khyber Pakhtunkhwa, within a total assessed flooded area of over 17,304 km^2. Approximately 11.3 million people were affected, around 6 million of them in rural settlements.[36]

Figure 14. Floods Hit Farmland Hardest

Total vs agricultural inundated area by province, 2025 (km^2, rounded)

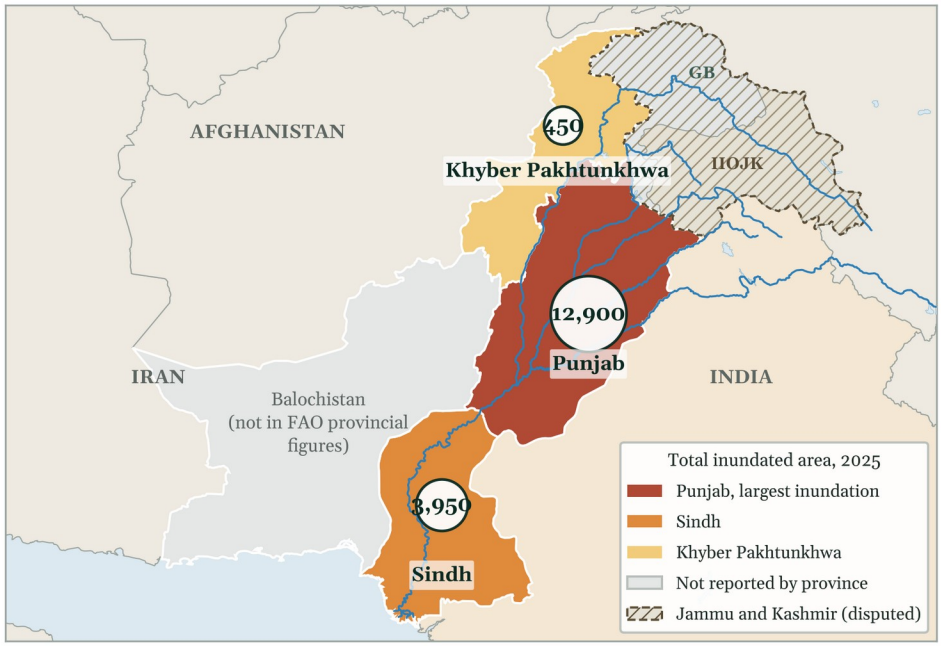


Data from FAO (2026) Sentinel-1 assessment, values rounded.
Original figure by Sumaiyya Kainat (2026), redrawn and adapted by SAT.

Rice was the most frequently affected crop across the flooded area, followed by cotton and sugarcane. The two sets of indicators, from the IMF and the FAO, are complementary rather than contradictory. The IMF provides indicators of national impact, while the FAO maps exposure and land inundation over specified provincial observation periods. Food insecurity results from a domino effect. Incomes fall due to crop and livestock losses, while poor roads and damaged storage complicate market access. Food prices rise because of market disruption, and consumption falls as households already face food inflation above the regional average.[37] The situation is also difficult at the regional level. According to the FAO, the International Fund for Agricultural Development (IFAD), the World Health Organization (WHO) and partners, about 40 percent of the world's hungry people live in Asia and the Pacific, 80 percent of them in Southern Asia, and a healthy diet cost US$4.77 per person per day in purchasing-power terms in 2024.[38]

Figure 13. Where the 2025 Floods Hit

Total inundated area by province, Pakistan 2025 monsoon (km²)



Source. FAO (2026) Sentinel-1 assessment, provincial values rounded, and Natural Earth boundaries (KP includes former FATA), as used in the original. Map adapted by SAT.
Jammu and Kashmir is disputed territory; its final status is to be determined in accordance with the relevant UN Security Council resolutions.

Figure 15. The Human and Economic Toll of the 2025 Floods

Pakistan, monsoon season 2025 (as of 30 September 2025)

6.9 m	>4 m	1,037	2.2 m
people affected	displaced or rescued	fatalities	acres of crops inundated

Data from IMF (2025), Country Report No. 25/332.
Original figure by Sumaiyya Kainat (2026), redrawn and adapted by SAT.

BEHIND THE NUMBERS · TWO FAMILIES, TWO VALLEYS

Swat, 27 June 2025. A family from Daska in Sialkot stopped for breakfast at the Fizagat picnic point on the outskirts of Mingora. Within minutes, the river rose around them. The Provincial Disaster Management Authority (PDMA) had already issued a flood alert, as the discharge at Khwazakhela surged to 77,782 cusecs, a very high flood level. Safety was barely 100 meters away, yet at least 13 people drowned as onlookers watched. [39] "Four women and six children from my family were swept away," a relative named Adnan told reporters. "We were having breakfast by the river when the flash flood struck, leaving no time to escape."

Buner, 15 August 2025. More than 150 millimeters of rain fell in a single hour in a cloudburst over Buner. In Qadir Nagar village, Noor Muhammad, 25, was two days away from his wedding. The flood killed

> his mother and 23 other family members and relatives. “The flood came, a huge flood came, it swept away everything, home, mother, sister, brother, my uncle, my grandfather and children,” he said. Buner alone accounted for more than 200 of the 310 deaths that the Khyber Pakhtunkhwa PDMA had recorded by the next day. [40]
>
> *These are the people behind the indicators in Figure 15. The warning gap described in Section 5.1 is, in the end, measured in lives like theirs.*

Climatic shocks can also trigger trade restrictions. India’s previous export bans on wheat and rice demonstrate how quickly such uncertainties can affect forecasting in the region. Politically, such moves can be justified as temporary measures to protect domestic markets; however, when taken unilaterally, they can cause supply and pricing problems for neighboring economies that rely on imported commodities. Security risk is therefore associated not only with harvest failure, but also with how countries behave, or fail to behave, through reserves, trade regulation and emergency procurement, before local shocks turn into regional market panic.

3.4 Climate Mobility, Urban Stress and Social Cohesion

Without additional climate and development action, the World Bank’s Groundswell report projects that up to almost 40 million people in South Asia could become internal climate migrants by 2050. [41] Water scarcity, declining agricultural productivity and rising sea levels are identified as key drivers. Projected movement is significantly lower under more inclusive, climate-friendly development pathways. These figures are a scenario, not a prediction of 40 million cross-border refugees.

Most climate migration is likely to be internal and temporary. The policy challenge is absorption, because migrants arrive in cities with already impoverished populations, where they continue to face inadequate sanitation, transport and jobs. Local authorities must therefore be adequately resourced and prepared if cities such as Karachi, Lahore, Delhi and Dhaka are to be resilient to climate shocks. Displacement can cost households their property, education and livelihoods, with adverse socio-economic effects that policymakers must address. The politicization of migration, however, is dangerous for the design of future policies to address it.

SAT DESK INSIGHT · BEYOND WATER, THE SMOG SEASON

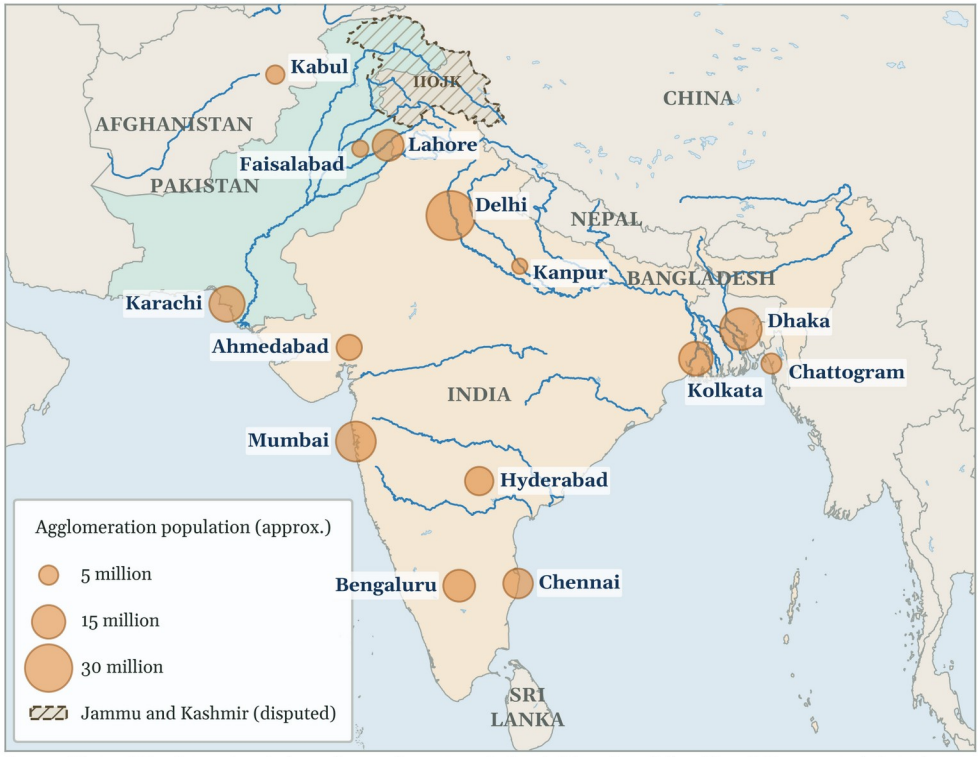
Water dominates this brief, but climate security in South Asia also has an air dimension. Every winter, smog settles over the Indo-Gangetic plain as cooler temperatures trap emissions from vehicles, industry, brick kilns and crop-residue burning close to the ground. As this brief went to press, Lahore was again ranked the world's most polluted major city, with an Air Quality Index (AQI) of 451 on 26 November 2026, while Sargodha recorded 595 and Multan 528 (Figure 17). [42] Readings above 300 are considered hazardous. Local emissions are the main source, but heat, drought and changing weather patterns can make smog episodes longer and harder to clear.

The human cost is heavy. In November 2024, the United Nations Children's Fund (UNICEF) warned that more than 11 million children under five were breathing toxic air in Punjab, that air pollution already accounted for about 12 percent of deaths among children under five in Pakistan, and that school closures had disrupted the learning of almost 16 million children. [43]

Smog, like water, crosses the border. Punjab's Chief Minister Maryam Nawaz has called for "climate diplomacy" with India, arguing that both Punjabs must act together. [44] In April 2026, environment ministers of the Shanghai Cooperation Organisation (SCO), a body in which both India and Pakistan sit, approved an Initiative on Improving Air Quality. [45] The same mix that this brief proposes for rivers, shared data and strong domestic action, applies to air.

Figure 16. Where Climate Migrants Are Likely to Go

Large South Asian urban agglomerations likely to receive climate-affected internal migrants

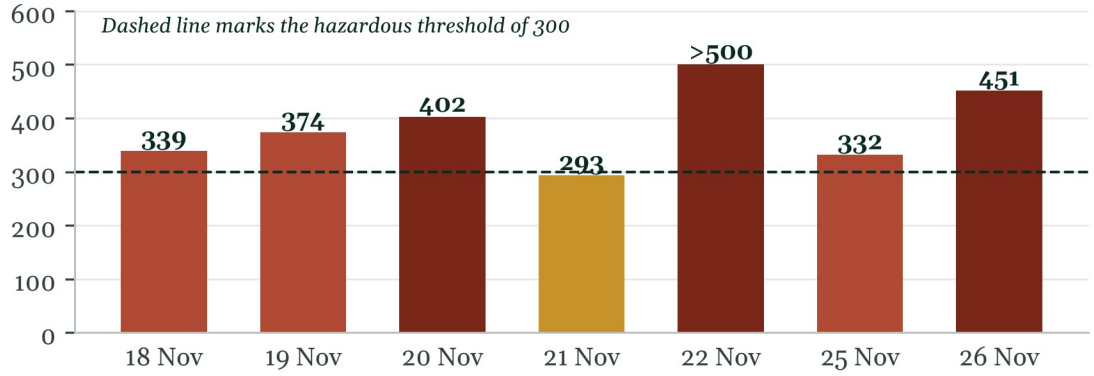


Source. Natural Earth populated places (approximate populations), Rigaud et al. (2018) and Clement et al. (2021), as used in the original. Map adapted by SAT.

Jammu and Kashmir is disputed territory; its final status is to be determined in accordance with the relevant UN Security Council resolutions.

Figure 17. Lahore's November Smog

Reported citywide Air Quality Index (AQI) readings, 18 to 26 November 2026



Readings as reported by Dawn (IQAir), 24NewsHD (Punjab EPA) and The Nation. Monitors and times of day differ, so values are indicative and not strictly comparable. Designed by SAT.

When Conflict Meets Climate

Three trigger patterns, and what they mean for Pakistan, the region and the world

TRIGGER 1
Crises overlap
May 2025 military crisis, then a monsoon in which flood alerts went by diplomatic note

TRIGGER 2
Conflict spills into water
Oct 2025 border clashes, then the Kunar dam order days later

TRIGGER 3
Distant wars hit prices
Disrupted shipping and energy routes raise fuel, fertilizer and food costs

↓ *implications*

PAKISTAN
- Water security is now a front-line national security issue
- Resilience narrows the space for coercion and militancy
- Defend the Treaty and use SCO, ECO and UN forums

THE REGION
- Overlapping crises raise the risk of misreading
- Treaty deadlines and new dams multiply flashpoints
- Smog and heat cross borders as easily as rivers

THE WORLD
- Nearly two billion people depend on HKH rivers
- Stress between nuclear-armed neighbors is a global risk
- COP31's collapse widens the adaptation gap

Based on Dawn (2025), Daily Times (2025), FAO et al. (2025) and UN News (2026). SAT assessment. Designed by SAT.

SAT DESK INSIGHT · WHEN CONFLICT BECOMES THE TRIGGER

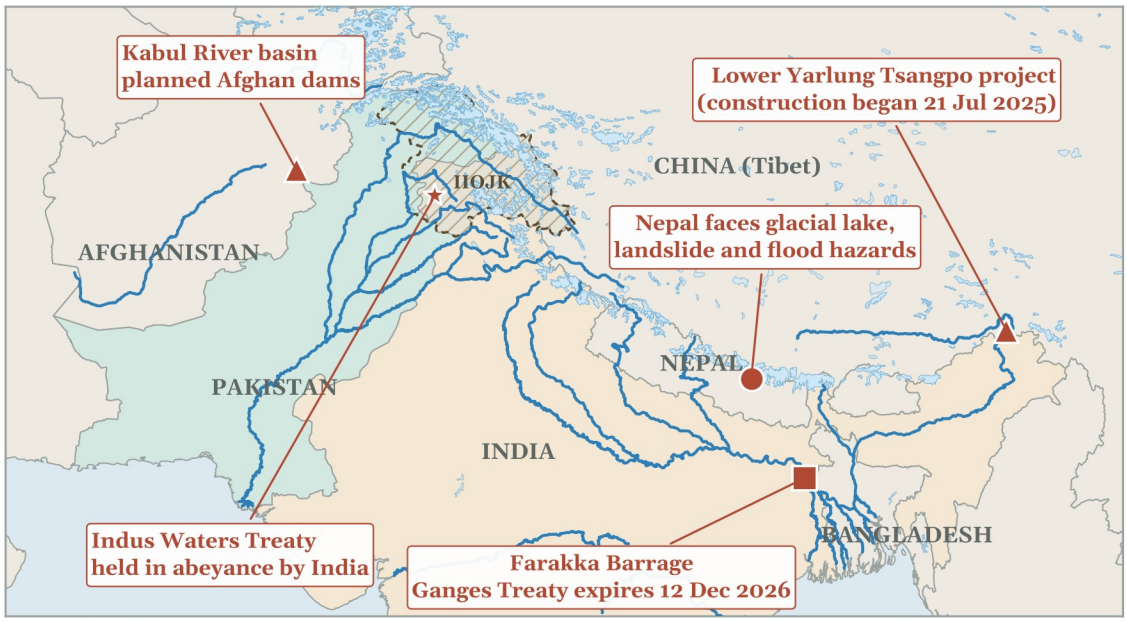
Climate stress rarely causes conflict on its own, but conflict can turn a climate event into a crisis. Crises overlap, as when the May 2025 India–Pakistan crisis was followed by a monsoon in which flood warnings travelled by diplomatic note. [14] Conflict spills into water, as when Kabul announced the Kunar dams days after the October 2025 border clashes. [8] And distant wars travel through fuel, fertilizer and food prices, which food-importing households in South Asia pay first. [37]

4. THE REGIONAL STRATEGIC LAYER ACROSS CHINA, BANGLADESH, NEPAL AND AFGHANISTAN

China is the upstream country for rivers such as the Brahmaputra and the Sutlej. On 21 July 2025, China began building a large-scale hydropower project on the lower Yarlung Tsangpo in Tibet. Reuters reported that the cascade will involve investment of about US$170 billion and produce some 300 billion kilowatt-hours a year once operational in the 2030s.[46] Chinese authorities state that the project will not materially affect downstream flows and have promised environmental safeguards. However, India and Bangladesh are concerned about transparency and potential downstream consequences.

Figure 18. The Regional Strategic Layer

Upstream infrastructure, downstream treaty deadlines and multi-basin hazards



Source. Natural Earth, Reuters (2025), Government of India (2026) and Ranjan (2026), as used in the original. Map adapted by SAT.

Jammu and Kashmir is disputed territory; its final status is to be determined in accordance with the relevant UN Security Council resolutions.

The project matters strategically not because China is assumed to be weaponizing water, but because of the asymmetry of information and infrastructure between upstream and downstream states. Credible data are needed on construction, reservoir operations, sediment, environmental impacts and emergency releases. Regional risk reduction lies in verifiable monitoring and emergency communication rather than speculation about intended diversion.

The Ganges Water Sharing Treaty between India and Bangladesh was signed in 1996 for 30 years and expires on 12 December 2026. Its survival remains uncertain. In February 2026, India's parliamentary response did not indicate any formal renewal talks; an analysis later that month noted the start of technical-level contacts but stressed the absence of political talks and Bangladesh's demand for a firmer guarantee. An October 2026 analysis indicated continuing uncertainty, with technical contacts

pursued but no formal negotiations. [47] In the final weeks before expiry, an Indian delegation was scheduled to attend the 91st Joint Committee meeting in Dhaka on 21–23 November 2026, with Bangladesh seeking a guarantee clause in any renewal. [48] The deadline matters because the treaty's allocation formula is based on historical flow regimes that are expected to differ significantly in the present and future. [49]

Nepal, at the center of the Ganges basin, faces glacial lake, landslide and flood hazards, while Afghanistan's planned water infrastructure on the Kabul River could affect downstream Pakistan. These cases highlight a lesson for the region. Bilateral treaties are essential but inadequate in the face of trans-basin climate risks, hydropower development and disaster hazards. A flexible regional dialogue should complement, rather than replace, existing legal arrangements.

What to watch

Indicator	Why it matters	Time horizon
Ganges Treaty renewal or lapse on 12 Dec 2026	Tests whether South Asian water treaties can adapt to changing flows, or lapse into uncertainty	Days–weeks
Notification of Indian reservoir operations on the Chenab and Jhelum	Unannounced flushing or filling is the main near-term instrument of pressure on downstream Pakistan	Pre-monsoon 2027
Flood-data exchange during the 2027 monsoon	Shows whether humanitarian hydrology survives the abeyance dispute	Jun–Sep 2027
Neutral Expert decision on Kishenganga and Ratle	Second legal ruling on project design; compliance will test India's posture	Jul 2027
ICIMOD snow and glacier updates	Confirms or weakens the trend toward volatile, less predictable flows	Annual

SAT assessment based on Sections 3 and 4.

5. POLICY RECOMMENDATIONS FOR MOVING FROM DIAGNOSIS TO IMPLEMENTATION

5.1 Pakistan should reduce exposure and improve state capacity

- **Establish a last-mile early-warning mechanism.** The World Bank's assessment of the 2025 flash floods found that 85 percent of families surveyed in Buner, Shangla and Swat received no warning, and that of those who did, about half had less than half an hour to respond.[50] Link PMD forecasts to district authorities, mosques, telecoms, media and local rescuers, and analyze message access by gender, disability and settlement type.
- **Prioritize water-use efficiency over supply expansion.** Regulate groundwater extraction (where appropriate); reform electricity pricing; revise crop-pricing rules; modernize irrigation; maintain canals in good condition; and promote crop choices based on water availability in the basin.
- **Build a national cryosphere and GLOF hazard framework.** Extend glacier, snow, lake and river monitoring in Gilgit-Baltistan and Khyber Pakhtunkhwa; adopt standard methods for seasonal outlooks; and map settlements and hydropower sites at risk.
- **Protect food systems from shocks and stresses.** Strengthen seed systems, sowing advisories, water-efficient agriculture and climate-resilient crops.[51]
- **Integrate climate-health surveillance.** The PMD, the National Disaster Management Authority (NDMA) and provincial health agencies should ensure that heat forecasts inform hospital readiness, worker-protection guidance, school notifications, and dengue and respiratory disease surveillance.

5.2 A minimum climate-security compact, bilateral and regional

- **Launch a technical hydrological hotline** among water regulators, flood-forecasting agencies and disaster-management bodies, so that warnings can be answered, identified and acknowledged.
- **Protect humanitarian cooperation.** Parallel public declarations should commit to preserving flood and glacial-hazard alerts, humanitarian assistance and disease monitoring, insulated from retaliatory cuts.
- **Use ICIMOD as a neutral science platform.** Conduct joint research on snow conservation, glacier mass balance, glacial-lake monitoring and seasonal forecasts, and publish a common annual risk dashboard for the HKH region.
- **Convene a multilateral meeting of China, India, Pakistan, Bangladesh, Nepal and Afghanistan.** Focus on technical facts first, then discuss climate-resilient infrastructure, avoiding politically sensitive allocation disputes.
- **Adopt public-communication protocols.** When rivers flood or unusual conditions arise, officials should provide accurate information, avoid speculative "may" and "might" claims, and make clear that routine releases are not hostile acts unless there is definitive evidence.

- **Mobilize adaptation finance for vulnerable populations.** Prioritize early warning, resilient schools and health facilities, drainage, urban water, climate-resilient agriculture and planned relocation where risk cannot be reduced on site.

> **SAT DESK INSIGHT · PLATFORMS THAT ALREADY EXIST**
>
> The author's call for a multilateral technical meeting does not require a new institution. South Asia and its neighbors already share several forums where the relevant states sit together, and some of them have climate mandates that are rarely used for South Asian problems. With SAARC summitry frozen since the 2016 Islamabad summit was postponed, these platforms offer Pakistan practical entry points, summarized below. [52]

Regional platforms and what Pakistan can push for

Platform	Who sits at the table	Climate hook already in place	What Pakistan can push for
Shanghai Cooperation Organisation (SCO)	China, India, Pakistan, Russia, Iran and Central Asian states	Standing environment ministers' meeting, an April 2026 Initiative on Improving Air Quality, and a planned SCO regional climate summit in Kazakhstan	A technical track on air quality and glacier monitoring that keeps India and Pakistan in contact
Economic Cooperation Organization (ECO)	Pakistan, Iran, Afghanistan, Türkiye, Azerbaijan and Central Asian states	Cooperation Framework on the Environment and Work Program on Climate Change, 2026–2030, with plans for climate-health early warning and a shared climate-data platform	Kabul River basin dialogue with Afghanistan, and dust-storm and glacier data on Pakistan's western flank
International Centre for Integrated Mountain Development (ICIMOD)	Afghanistan, Bangladesh, Bhutan, China, India, Myanmar, Nepal and Pakistan	The region's main science platform for snow, glaciers and glacial lakes	Joint seasonal snow outlooks and a common HKH risk dashboard
South Asian Association for Regional Cooperation (SAARC)	All eight South Asian states	Technical bodies on disasters and environment exist on paper	Reviving technical cooperation without waiting for a summit

Sources include SCO Secretariat (2026), E3G (2025) and ECO (2026). Compiled by SAT.

Implementation roadmap, who leads and how progress can be measured

Action	Lead institutions	Indicator of progress
Humanitarian hydrology protocol	India–Pakistan water and disaster agencies	Alerts acknowledged; time-to-notification published
Last-mile flood warning upgrade	NDMA, PDMAs, PMD, district administrations	Share of at-risk households reached; warning lead time
HKH monitoring network	ICIMOD, PMD, national glacier agencies	Number of glaciers/lakes monitored to common standards
Water productivity reform	Provincial/state irrigation and agriculture departments	Water used per unit of crop output; groundwater trends
Ganges treaty renewal	India and Bangladesh	Renewed text with review, data and drought clauses
Climate-health early warning	Health ministries, PMD, WHO regional partners	Heat-health alerts linked to hospital and local action
Climate-resilient urban planning	City and provincial/state governments	Funded risk-sensitive plans and resettlement safeguards

SAT DESK INSIGHT · AFTER ANTALYA, WHAT THE COLLAPSE OF COP31 MEANS FOR PAKISTAN, THE REGION AND THE WORLD

What happened. The UN climate conference in Antalya, COP31, closed on 22 November 2026 after more than 44 hours of overtime, the longest on record, without consensus on its main political decision, the proposed Antalya Pact. It was the first time since Copenhagen in 2009 that the summit failed to adopt an overarching decision. Around 90 countries, led by the European Union and joined by the United Kingdom, Norway, Panama and small island states, rejected a final text that had dropped any mention of fossil fuels and leaned on carbon capture instead. Saudi Arabia, speaking for the League of Arab States, defended those references, China backed the text, and Pakistan urged parties to keep working toward consensus. UN Secretary-General António Guterres called the result deeply disappointing, adding that "there may be no consensus in the negotiating room" but "there is no ambiguity in the science." [53]

What survived. Technical work went on. Parties set up a task force to refine the 59 adaptation indicators agreed at COP30, due by October 2027. But a first-draft figure of US$120 billion for adaptation finance was dropped, leaving only an agreement to discuss how to triple adaptation finance by 2035, with no baseline or delivery plan. The Adaptation Fund raised about US$50 million against a yearly target of US$300 million, while the overall climate finance gap is estimated at around US$840 billion a year. [54]

For Pakistan. Pakistan is among the countries least responsible for emissions and most exposed to their effects. Slower cuts mean that the glacier, flood and heat trends described in this brief are likely to intensify, while the missing finance baseline leaves recovery from disasters such as the 2022 and 2025 floods more dependent on borrowing. Pakistan, which helped bring loss and damage to the center of negotiations after 2022, will need to rebuild that coalition of vulnerable countries before the next conference.

For South Asia. The failure leaves shared problems without shared money. Glacier monitoring, flood

warning and heat-health systems that cross borders are exactly the kind of adaptation that a finance baseline would have paid for. It also pushes the region back on its own institutions, ICIMOD, the SCO, the ECO and its bilateral treaties, at the very moment when the Indus and Ganges arrangements are under strain.

For the world. The world is now on course to overshoot the 1.5°C limit, a fact the compromise drafts themselves acknowledged. [53] A collapse over fossil fuel language signals that consensus-based climate diplomacy is fraying, that voluntary coalitions such as the pledge by at least 75 countries to raise electricity to 35 percent of global energy use by 2035 may carry more of the load, and that the poorest and most exposed countries will pay for delay. COP32 meets in Addis Ababa from 8 to 19 November 2027 and inherits the unresolved questions on fossil fuels, finance and adaptation. [54]

COP31 in five numbers

0	44+ hrs	US$120 bn	US$50 m	US$840 bn
Overarching decisions agreed in Antalya	Overtime, the longest COP on record	Adaptation finance figure dropped from the final text	Raised for the Adaptation Fund, against a US$300 m yearly target	Estimated annual climate finance gap

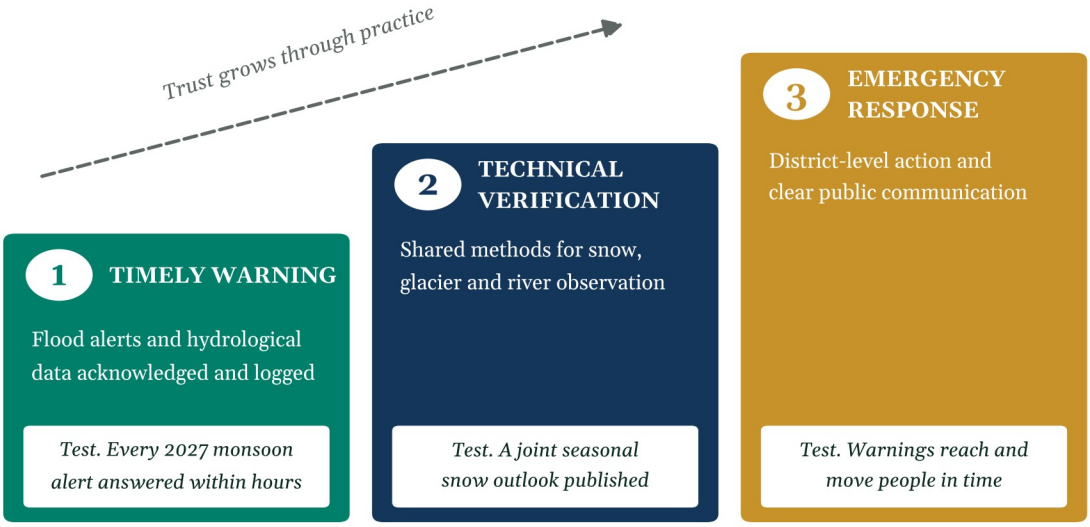
Data from UN News (2026) and Climate & Capital Media (2026). Compiled by SAT.

6. CONCLUSION AND THE CASE FOR PREVENTING THE POLITICAL ESCALATION OF CLIMATE STRESS

Rivers in South Asia do not only provide natural resources; they also underpin installations, energy networks, urban development and international relations. ICIMOD, the WMO, the FAO, the IMF and the World Bank have documented melting glaciers, low snow cover, extreme precipitation, heat and displacement. Pakistan's 2025 floods showed how a water disaster can translate into an economic and political crisis, and how a technical problem can become a geopolitical one. [55]

Figure 19. A Minimum Cooperation Ladder

Three steps that reduce shared costs without requiring trust on every issue



Cooperation does not require trust on every issue; it requires shared costs to be reduced.

Original figure by Sumaiyya Kainat (2026). Tests added, redrawn and adapted by SAT.

The right conclusion is not that global warming will cause a "water war," but that countries will have to make serious decisions in many unpredictable situations as the climate changes. Where trust in political institutions is lacking, uncertainty may be interpreted as hostility. The Indus requires legal and technical expertise, and respect for a Treaty that remains in force; the Ganges treaty expires in December 2026; and the HKH cryosphere needs continuous monitoring to avoid further losses and hazards that are increasingly difficult to manage.

A regional climate-security architecture does not have to start with a grand agreement ratified across the region. It may start with a phone call that is answered.

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