HJRS HEC Journal Recognition System Category Y

Vol 3 Issue 1 (July-Sep 2025)

ISSN (Online): 3006-4740

ISSN (Print): 3006-4732

Climate and Governance at Crossroads: Economic Lessons from Pakistan's 2025 Flood Crisis

Engr. Muhammad Arshad

HOD, Department of Construction Management, Federal Chartered Degree Awarding Institute for Art and Culture, Raiwind Road, Lahore, Punjab, Pakistan.

muhammad.arshad@iac.edu.pk

AR. M. Nasir Chaudhry

Assistant Professor, School of Architecture, Design & Urbanism, Federal Chartered Degree Awarding Institute for Art and Culture, Raiwind Road, Lahore, Punjab, Pakistan.

nasir.chaudhry1@gmail.com

Dr. Hafiz Ahmed Ullah

(Corresponding Author's) Assistant Professor, Department of Construction Management, Federal Chartered Degree Awarding Institute for Art and Culture, Raiwind Road, Lahore, Punjab, Pakistan.

ahmed.awan757@gmail.com

Muhammad Afnan Sahi

(M.Phil Scholar) Academic Coordinator, School of Architecture, Design & Urbanism, Federal Chartered Degree Awarding Institute for Art and Culture, Raiwind Road, Lahore, Punjab, Pakistan.

afnan.sahi@iac.edu.pk

Abstract

The 2025 floods across Pakistan revealed the compounded risks arising from climate stressors and governance failures. Severe impacts were recorded in Khyber Pakhtunkhwa, Gilgit-Baltistan, Karachi, and southern Punjab, where widespread displacement, loss of life, and destruction of infrastructure intensified existing socio-economic vulnerabilities. Beyond the human toll, the floods disrupted agricultural production, trade networks, and industrial activity, adding significant fiscal strain through reconstruction costs. This study adopts a secondary data analysis approach, drawing on government reports, economic assessments, academic literature, credible news outlets, satellite imagery, and official statistics to examine the disaster's multi-dimensional impacts. Data were systematically analysed to trace recurring patterns and drivers of vulnerability, with attention to the interaction between climate stressors—such as glacial melt, erratic monsoon rainfall, and deforestation—and governance challenges, including weak enforcement of regulations, unplanned urbanisation, and institutional fragmentation. A comparative analysis of the 2010, 2022, and 2025 floods highlights persistent structural weaknesses and their role in shaping

disaster outcomes. Findings underscore the framing of the 2025 floods as a climate–governance crisis, calling for integrated governance, stronger regulatory enforcement, and climate-resilient infrastructure to mitigate recurring cycles of loss and recovery.

Keywords: Pakistan floods 2025; climate change; governance failure; economic vulnerability; disaster resilience; deforestation; unregulated construction; sustainable development; early-warning systems; climate-resilient infrastructure

Introduction

Pakistan's plight as a climate change frontline state is a well-documented yet persistently unheeded reality. For well over a decade, the country has consistently ranked among the top ten nations on the Global Climate Risk Index, a sobering indicator of its extreme susceptibility to climate-induced disasters (Eckstein, Künzel & Schäfer, 2021). Unlike other states that face sporadic threats, Pakistan's vulnerability is deeply embedded in its geographical configuration and socio-economic fabric, making it both chronic and structural in nature. The northern territories of Pakistan constitute part of the "Third Pole," the largest reservoir of frozen water outside the Arctic and Antarctic, which contains more than 7,000 glaciers. These glaciers are melting at an accelerated pace due to rising global temperatures, giving rise to frequent and destructive Glacial Lake Outburst Floods (GLOFs; ICIMOD, 2021). Meanwhile, the agrarian economy—still the backbone of national livelihood—remains critically dependent on the Indus River basin. This basin, home to one of the densest populations in South Asia, is increasingly vulnerable to highly erratic and violent monsoon systems that now defy historical predictability (World Bank, 2022).

The catastrophic floods of 2010 first revealed the staggering consequences of this fragility. That disaster inundated one-fifth of the country, affecting 20 million people, destroying crops and infrastructure, and inflicting damages estimated at USD 10 billion (Mustafa & Wrathall, 2011). The 2010 super floods were described as among the worst in Pakistan's history, a supposed "wake-up call" for disaster management and climate resilience. Yet, the years that followed failed to produce the structural reforms needed to mitigate future risks. The floods of 2022 further reinforced the scale of Pakistan's vulnerability. One-third of the country was submerged, displacing 33 million people and leaving more than 8 million in need of urgent humanitarian assistance (World Bank, 2022; UNDP, 2023). The economic toll, exceeding USD 30 billion, dealt a devastating blow to an already fragile economy, while the humanitarian cost was incalculable. The United Nations Secretary-General described it as a "climate-induced humanitarian disaster of epic proportions" (UNDP, 2023). Policymakers, development partners, and global institutions pledged that this tragedy would serve as an indelible lesson—a moment of reckoning that would catalyse the adoption of resilience-based governance and climate-adaptive development.

The subsequent national pledges to "Build Back Better" raised hopes that Pakistan would move away from reactive crisis management toward proactive adaptation. Yet, despite international commitments and widespread acknowledgement of the urgency, the events of 2025 revealed that these promises were not meaningfully honoured. The country's inability to institutionalise the lessons of both 2010 and 2022 highlights a disconcerting cycle: disasters provoke short-term responses and donor-driven reconstruction, but long-term resilience and structural reforms remain elusive (Cui, Gao, & Shaw, 2025).

The 2025 Catastrophe: A Failure to Learn

The monsoon season of 2025 delivered a tragic case study in institutional amnesia and misplaced priorities. Despite clear scientific warnings and painful experiences from 2010 and 2022, the intervening years witnessed only fragmented, underfunded, and superficial resilience strategies. When confronted with record-breaking precipitation in the north and a cascade of GLOFs, the fragile preparedness systems collapsed with brutal efficiency (Cui et al., 2025). The physical impact was widespread and devastating. Flash floods ravaged the valleys of Khyber Pakhtunkhwa and Gilgit-Baltistan, sweeping away homes, roads, and livelihoods. Urban centres, particularly Karachi, were once again paralysed under stormwater, as drainage systems remained clogged, outdated, and unexpanded despite repeated warnings (Ali, Chaudhry, Butt, & Ataullah, 2025). Riverine flooding in southern Punjab repeated the tragic cycle of destruction, inundating villages and farmland that had been rebuilt in the same vulnerable floodplains (Dey, 2025; Reuters, 2025).

The human and economic toll was staggering. Hundreds of lives were lost, thousands of households displaced, and vital infrastructure—bridges, highways, irrigation networks—was destroyed. Preliminary assessments placed damages at USD 50 billion, a figure significantly higher than that of 2022 (Pakistan Today, 2025; Dawn, 2025; The Express Tribune, 2025; Reuters, 2025). Importantly, this devastation cannot be attributed solely to climatic extremes. Studies emphasise that governance failures, such as weak institutional capacity, inadequate floodplain zoning, unregulated construction, and a lack of integrated mitigation strategies, were central to the scale of destruction (Shah & Ali, 2021). What unfolded in 2025 was not merely the fury of nature, but a man-made amplification of natural hazards—disasters compounded by inaction, neglect, and systemic fragility.

The Convergence of Climate and Governance Failures

The 2025 monsoon season delivered a tragic case study in institutional amnesia. Despite the warnings etched by the 2010 and 2022 disasters, subsequent years saw only fragmented and superficial implementation of resilience strategies. Record-breaking precipitation in the north, combined with multiple GLOFs, exposed the lack of preparedness with devastating efficiency (Cui et al., 2025). Flash floods swept through the valleys of Khyber Pakhtunkhwa and Gilgit-Baltistan, while urban centres such as Karachi drowned under stormwater due to chronically clogged and unexpanded drainage systems (Ali et al., 2025). Riverine flooding in southern Punjab once again washed away villages and crops, rebuilt in vulnerable floodplains (Reuters, 2025).

The toll was severe: hundreds of lives lost, thousands displaced, and critical infrastructure destroyed. Beyond the human tragedy, early economic assessments placed the damages at USD 50 billion—far surpassing the costs of the 2022 disaster (Pakistan Today, 2025; The Nation, 2025; Reuters, 2025). Studies highlight that the disaster was not solely natural but exacerbated by governance failures, including inadequate floodplain zoning, weak infrastructure, and a lack of integrated mitigation strategies (Shah & Ali, 2021). These outcomes underscore that the catastrophe was a man-made amplification of climatic extremes, rooted in weak institutions, fragile infrastructure, and unregulated development. Against this backdrop, the present study aims to analyse the economic, social, and infrastructural impacts of the 2025 floods in comparison with earlier catastrophes such as the 2010 super floods and the 2022 climate disaster. It further seeks to examine how governance failures—particularly weak enforcement

of regulations, unplanned urbanisation, and institutional fragmentation—exacerbated the disaster's scale and intensity. In addition, the research evaluates the role of environmental factors, including glacial melt, deforestation, and erratic monsoon patterns, in amplifying vulnerability. By doing so, the study highlights key policy gaps and explores potential pathways for building climate-resilient infrastructure and integrated governance mechanisms that can reduce future disaster risks and protect socio-economic stability.

In sum, the recurring devastation of 2010, 2022, and now 2025 illustrates that Pakistan's vulnerability to flooding is not merely a product of geography but the outcome of systemic governance failures. Unless these structural weaknesses are urgently addressed, each new climatic shock will translate into avoidable human and economic tragedies. By investigating the dual forces of climatic extremes and governance shortcomings, this study underscores the urgent need for a decisive shift from short-term recovery efforts to long-term resilience building.

Literature Review

Historical Context of Flooding in Pakistan

Pakistan's vulnerability to floods has been extensively documented in both academic and policy research, positioning the country as one of the most flood-prone nations in South Asia. The 2010 "super floods" remain one of the most catastrophic events in the nation's history, inundating nearly one-fifth of the country, displacing around 20 million people, and causing over 1,700 fatalities (Kirsch et al., 2012; Mustafa & Wrathall, 2011). Scholars have argued that the scale of devastation was not solely the result of unprecedented rainfall but was amplified by weak governance structures, unregulated settlement in floodplains, and inadequate land-use planning, which transformed a climatic hazard into a full-blown humanitarian crisis. The post-2010 recovery phase further illustrated systemic weaknesses. Studies revealed that reconstruction was largely fragmented, short-term, and heavily donor-driven, with little emphasis on embedding resilience into rebuilding efforts (Lari, 2011). Instead of addressing root causes such as encroachment on riverbeds, deforestation, and weak institutional coordination, relief efforts prioritised immediate humanitarian needs while neglecting long-term adaptation. This failure to institutionalise lessons set a precedent for recurring vulnerabilities in subsequent flood events.

The 2022 floods reinforced this pattern of fragility. Submerging nearly one-third of the country, they displaced 33 million people and caused economic damages estimated at USD 30 billion (World Bank, 2022; UNDP, 2022). Literature on this episode emphasised the compounded risks arising from rapid urbanisation, clogged drainage networks, fragile rural housing, and weak disaster-preparedness mechanisms. Analysts also pointed out that despite the lessons of 2010, floodplain regulation remained unenforced, and institutional responses were reactive rather than preventive, leading to prolonged displacement and food insecurity across Sindh, Balochistan, and southern Punjab.

Viewed together, these historical experiences reveal an entrenched cycle of vulnerability, where each flood disaster exposes systemic weaknesses but is followed by limited reform. The recurrence of catastrophic flooding in 2010, 2022, and most recently 2025 illustrates how climatic extremes intersect with governance failures to perpetuate a cycle of neglect and devastation. Rather than being an unforeseen shock, the 2025 floods must be understood as a tragic continuation of unresolved structural problems in disaster governance and climate adaptation.

Figure 1. Timeline of Major Floods in Pakistan (2010–2025)

The figure illustrates the human and economic impacts of the 2010, 2022, and 2025 floods in Pakistan, highlighting both displaced populations and estimated economic losses. Governance lessons identified by scholars include weak planning and coordination in 2010, fragile housing and poor drainage systems in 2022, and institutional inertia and corruption in 2025 (Kirsch et al., 2012; Mustafa & Wrathall, 2011; World Bank, 2022; UNDP, 2022; Cui et al., 2025; Shah & Ali, 2021). The timeline presented in Figure 2 synthesises historical evidence from three of Pakistan's most devastating floods, reinforcing the recurring pattern of climatic shocks exacerbated by governance failures. The 2010 super floods displaced approximately 20 million people and caused USD 9.7 billion in damages, with weak land-use planning and poor relief coordination noted as key governance failures (Kirsch et al., 2012; Mustafa & Wrathall, 2011). The 2022 floods displaced 33 million people and inflicted losses exceeding USD 30 billion, exposing fragile rural housing and inadequate urban drainage as major drivers of vulnerability (World Bank, 2022; UNDP, 2022). The 2025 floods, still under assessment, are estimated to have displaced several million people and caused USD 50 billion in damages, with scholars attributing the crisis to institutional inertia, systemic corruption, and a lack of resilience measures (Cui et al., 2025; Shah & Ali, 2021). Together, the comparative evidence highlights that while the intensity of climatic extremes has grown, the persistent governance gap remains the constant variable perpetuating Pakistan's cycle of disaster and recovery.

Climate Change and Environmental Stressors

Climate change literature consistently underscores Pakistan's acute susceptibility to extreme weather events, identifying it as one of the countries most exposed to climate-induced hazards. Positioned within the Indus Basin and heavily reliant on glacial and monsoon-fed hydrological systems, Pakistan has repeatedly ranked among the top ten nations on the Global Climate Risk Index (Eckstein et al., 2021). This vulnerability is not accidental but is structurally embedded in both geography and economy. The northern mountain ranges, home to over 7,000 glaciers, constitute the world's largest glacial reserves outside the polar regions. Scientific research has established a strong correlation between rising global and regional temperatures and accelerated glacial retreat, which in turn increases the risk of Glacial Lake Outburst Floods (GLOFs; ICIMOD, 2021; IPCC, 2021). Such events are no longer rare anomalies but recurring hazards, with multiple GLOFs reported in Gilgit-Baltistan and Khyber Pakhtunkhwa over the past two decades.

In addition to glacial dynamics, the changing behaviour of the South Asian monsoon has further compounded Pakistan's exposure. Studies document increasingly erratic rainfall patterns, with both prolonged dry spells and sudden high-intensity downpours becoming more common (Hasson Böhner & Chishtie, 2019; Asian Development Bank, 2022). These climatic irregularities exacerbate flooding risk across the Indus River system, where water flows are highly sensitive to shifts in precipitation. When coupled with poor water management and inadequate forecasting infrastructure, such variability heightens the likelihood of both flash floods and prolonged inundations. Environmental degradation further magnifies the climate threat. Pakistan has one of the highest

rates of deforestation in South Asia, with forest cover falling well below global sustainability benchmarks (Ali et al., 2025). Deforestation destabilises soils, reduces natural water absorption, and accelerates surface runoff during heavy rains, contributing to both landslides in mountainous areas and intensified riverine flooding downstream. Soil erosion, overgrazing, and unsustainable agricultural practices in the Indus floodplains have similarly diminished natural resilience, leaving rural communities highly exposed to seasonal hydrological shocks. These findings collectively indicate that the floods of 2025 were not isolated climatic events but rather part of a broader trajectory of worsening environmental instability. The interplay of rising temperatures, glacial retreat, erratic monsoon cycles, and ecological degradation has created a chronic state of vulnerability. Importantly, this body of literature suggests that while climate change acts as the immediate trigger for disaster, it interacts with governance and land-use failures to transform environmental stressors into recurrent national crises.

Figure 2: Pakistan's deadly monsoon floods

Governance Failures and Institutional Weakness

A strong consensus exists in the literature that governance failures significantly amplify disaster risks in Pakistan. Research on disaster risk reduction (DRR) emphasises that poor enforcement of building codes, unregulated urbanisation, and encroachments on floodplains systematically increase vulnerability (Qureshi, Ahmed, & Khan, 2023; Alam, Collins, Islam, Paul, & Islam, 2024). Mustafa and Wrathall (2011) describe Pakistan's floods as "socially produced disasters," where weak state capacity and corruption allow hazard-prone development to persist. More recent studies argue that disaster management frameworks remain highly reactive, focusing on relief and rehabilitation rather than proactive mitigation and preparedness (Shah & Ali, 2021). Collectively, this body of work demonstrates that floods in Pakistan cannot be understood purely as environmental phenomena but must also be examined through the lens of institutional fragility and governance gaps.

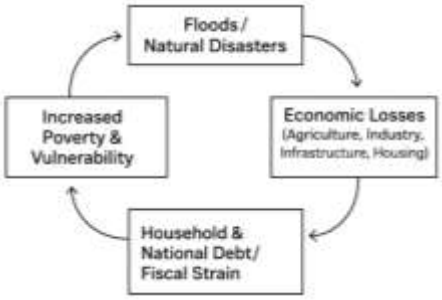
Economic Impacts of Floods

The economic literature highlights the profound and long-lasting effects of floods on Pakistan's development trajectory, with agriculture, infrastructure, and fiscal stability identified as the most vulnerable domains. Agricultural losses are consistently cited as the most devastating consequence, as repeated inundation destroys standing crops, erodes soil fertility, disrupts planting cycles, and undermines food security (Abid, Schilling, Scheffran, & Zulfiqar, 2016; Ahmad & Afzal, 2020). Pakistan's reliance on agriculture—which employs nearly 40% of the

labour force and contributes around 20% to GDP—renders the economy particularly sensitive to hydrological shocks. The 2010 "super floods," for instance, wiped out nearly one-fifth of the country's cultivated land and reduced GDP growth by two percentage points, creating ripple effects across rural labour markets and food prices (Haque, Kay, & Nicholls, 2018). Infrastructure damages compound these agricultural losses. Roads, bridges, schools, hospitals, and housing are repeatedly destroyed, requiring massive reconstruction expenditures that divert fiscal resources away from development investments. The 2022 floods inflicted estimated damages of over USD 30 billion, with housing and transport infrastructure bearing the largest share of losses (World Bank, 2022; UNDP, 2022). Similar trends were observed in the 2025 floods, where early assessments suggested damages exceeded USD 50 billion, pushing the government to seek emergency international assistance (Cui et al., 2025; Pakistan Today, 2025).

Indirect impacts have also received scholarly attention. Flooding disrupts trade routes, halts industrial activity, and reduces export competitiveness due to prolonged supply chain disruptions (Haque et al., 2018; Faraz & Bari, 2018). Financial institutions face heightened risks as borrowers in affected regions struggle with repayment, further weakening already fragile credit markets. Moreover, the fiscal stress of reconstruction deepens Pakistan's structural debt vulnerabilities, as the state repeatedly borrows to finance recovery efforts without investing adequately in long-term resilience. This cycle reflects what scholars describe as a "poverty–disaster trap," where fragile livelihoods are continuously undermined, forcing vulnerable households into deeper poverty and limiting their ability to adapt to future shocks (Hallegatte et al., 2017; Abid et al., 2016). Taken together, the economic impacts of floods in Pakistan extend far beyond immediate losses. They erode growth potential, perpetuate inequality, and exacerbate fiscal dependency on international aid, underscoring the urgent need for integrated resilience planning and climate-adaptive economic policies.

Figure 3: The Poverty Disaster Trap in Pakistan



Towards Resilience and Adaptation

The literature on resilience and adaptation in Pakistan is rich but reveals persistent implementation gaps. Scholars advocate for integrated flood management approaches that combine structural measures (e.g., embankments, drainage systems) with ecological solutions such as reforestation and wetland restoration (Ali et al., 2025; Alam et al., 2024). Others emphasise the importance of community-based disaster risk management and early-warning systems to build local preparedness (Shah & Ali, 2021). International policy frameworks, including the Sendai Framework for Disaster Risk Reduction, are frequently cited as guiding principles, yet their translation into practice within Pakistan remains inconsistent (UNDRR,

2015). Collectively, the literature suggests that while technical and policy solutions are available, the challenge lies in overcoming political inertia, institutional fragmentation, and short-term recovery mindsets.

Table 1: Climate–Governance Nexus of Flood Vulnerability in Pakistan

Climate Stressors	Governance Failures	Outcomes
Glacial melt	Weak enforcement	Large-scale displacement
Erratic monsoons	Corruption	Infrastructure damage
Deforestation	Floodplain encroachment	Agricultural loss
Soil erosion	Fragmented institutions	Economic slowdown

Table 1 illustrates the dual forces that interact to produce large-scale disaster impacts. On one side, climate stressors such as glacial melt, erratic monsoon rainfall, deforestation, and soil erosion are natural hazards intensified by global warming and environmental degradation. On the other side, governance failures—weak enforcement of environmental laws, corruption, floodplain encroachment, and fragmented institutions—act as risk multipliers. The interaction between these two dimensions results in catastrophic outcomes, including mass displacement, infrastructure destruction, agricultural collapse, and economic slowdown. The framework emphasises that floods in Pakistan are not solely "natural disasters" but are better understood as climate–governance crises, where institutional fragility amplifies the impact of environmental shocks.

Table 2: Key Findings from Literature on Floods in Pakistan

Year / Event	Key Impacts	Governance Lessons Identified	Sources
2010 Floods	20m displaced, 1,700+ deaths, GDP fell 2%	Weak land-use planning, poor relief coordination	Kirsch et al., 2012; Mustafa & Wrathall, 2011
2022 Floods	33m displaced, USD 30b losses, 1/3 country submerged	Poor drainage, unregulated settlement, fragile housing	World Bank, 2022; UNDP, 2022
2025 Floods	1000s displaced, USD 50b losses, urban + rural devastation	Institutional inertia, corruption, and lack of resilience measures	Cui et al., 2025; Shah & Ali, 2021

Table 2 provides a comparative overview of three major flood events—2010, 2022, and 2025—highlighting their impacts, governance gaps, and key scholarly lessons. 2010 Floods: With over 20 million people displaced and GDP contracting by nearly 2%, this event exposed Pakistan's weak land-use planning and inadequate coordination in relief efforts. Scholars (Kirsch et al., 2012; Mustafa & Wrathall, 2011) stressed that unregulated settlement in flood-prone areas and lack of preparedness magnified the crisis. 2022 Floods: Affecting 33 million people and causing USD 30 billion in losses, these floods demonstrated the compounded risks of fragile housing, clogged drainage systems, and unplanned urbanisation (World Bank, 2022; UNDP, 2022). Literature highlighted the failure to integrate climate adaptation into urban planning, particularly in Sindh and Balochistan. 2025 Floods: Early assessments estimate thousands displaced and damages approaching USD 50 billion. Unlike earlier floods, this crisis combined both rural devastation (crop and livestock loss) and urban flooding (Karachi, Lahore), making it a national-scale emergency. Studies (Cui et al., 2025; Shah & Ali, 2021) point to institutional inertia, systemic corruption, and absence of resilience planning as critical governance failures.

Together, these insights demonstrate that while climate extremes have grown more severe, governance weaknesses remain the constant variable across all flood episodes. This pattern reinforces the need for Pakistan to move from reactive relief to proactive resilience through integrated policies, stronger institutions, and long-term adaptation measures.

Methodology

This study adopts a secondary data analysis approach to examine the economic, social, and governance dimensions of the 2025 flood crisis in Pakistan. It draws on a wide range of publicly available sources, including government reports, economic assessments, academic literature, and credible news outlets, to assess the human, infrastructural, and fiscal impacts of the floods. Satellite imagery and official statistics were also reviewed to understand the geographic extent of flooding, land-use patterns, and environmental degradation. Data were systematically analysed to identify recurring patterns and key drivers of vulnerability, with a focus on the interaction between climate stressors (such as glacial melt, erratic monsoon rainfall, and deforestation) and governance failures (including weak enforcement of regulations, unplanned urbanisation, and institutional fragmentation). Comparative analysis of the 2010, 2022, and 2025 floods was conducted to highlight persistent structural weaknesses and their influence on disaster impacts. This secondary data approach enables a comprehensive assessment of the floods as a climate–governance crisis, while relying on verified and publicly documented information.

Results and Discussion

The 2025 floods in Pakistan once again exposed the country's vulnerability to climate-induced disasters and entrenched governance failures. The analysis of secondary data, including government reports, economic assessments, academic literature, credible news coverage, satellite imagery, and official statistics, demonstrates that the disaster's impacts extended far beyond the immediate destruction of homes and infrastructure. Rather, the floods deepened structural weaknesses across the economic, social, and governance dimensions, illustrating a crisis shaped as much by institutional neglect as by climatic extremes. This section presents the main findings in four interconnected areas: (1) human and social impacts, (2) infrastructural and economic consequences, (3) governance failures and institutional weaknesses, and (4) comparative patterns across the 2010, 2022, and 2025 floods.

Human and Social Impacts

Across multiple regions—most severely in Khyber Pakhtunkhwa, Gilgit-Baltistan, Karachi, and southern Punjab—the floods displaced hundreds of thousands of people. According to official statistics, entire communities were uprooted as riverbanks overflowed and flash floods swept away villages situated on steep mountain slopes or vulnerable floodplains. Mortality rates, though varying across regions, reflected not only the intensity of the floodwaters but also the limited availability of early-warning systems and evacuation protocols. Displacement led to cascading social challenges. Families in temporary shelters struggled with access to food, clean water, sanitation, and health services. Reports from humanitarian organisations documented the rapid spread of waterborne diseases, including cholera and diarrhoea, while the interruption of vaccination campaigns in affected districts posed risks of longer-term public health crises. Women and children bore disproportionate burdens, with increased exposure to violence, loss of schooling opportunities, and limited access to maternal and child healthcare. Secondary literature also highlights the psychological toll of repeated disasters. For many households affected in both 2022 and 2025, recurring displacement has created cycles of trauma, loss of

savings, and intergenerational poverty. The floods, therefore, represent not only a natural hazard but a social crisis that erodes the resilience of vulnerable populations year after year.

Table 3: Displacement and Mortality by Province (2025)

Province/Region	People Displaced (millions)	Villages Affected	Death Toll
Punjab	2.45	4,500+	100
Khyber Pakhtunkhwa	0.25	Many mountain villages swept	350+
Sindh	0.3	Agricultural villages submerged	80+
Karachi (Urban Sindh)	0.05	Major urban localities are inundated	50+
Gilgit-Baltistan	0.02	Remote valleys are cut off	40+
Total (national)	**2.5–3 million**	**Thousands**	**600+**

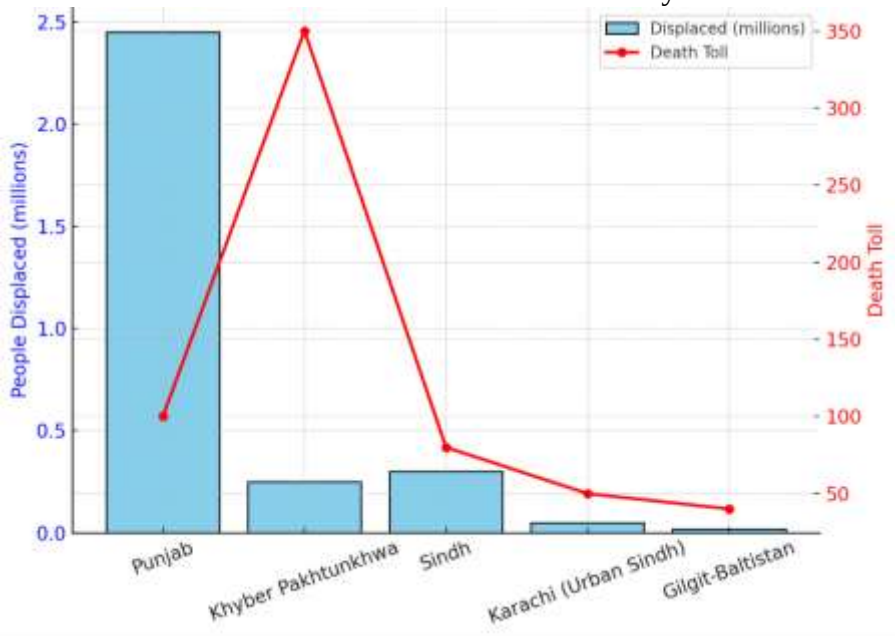


Figure 4: Displacement and Death Toll by Province-Pakistan Floods 2025

Infrastructural and Economic Consequences

The infrastructural impacts of the 2025 floods were extensive. Roads, bridges, and power supply lines in mountainous areas were swept away, isolating remote districts and delaying relief delivery. In Karachi, fragile drainage and sewerage systems collapsed under the weight of record rainfall, inundating major highways, disrupting industrial activity, and paralysing urban mobility for weeks. Official statistics indicate that dozens of energy and water infrastructure projects sustained damage, requiring billions in emergency repair expenditures.

The economic costs were equally staggering. Satellite imagery of affected agricultural regions shows large swathes of inundated farmland, with losses in cotton, rice, and wheat production. The destruction of standing crops triggered sharp rises in food prices, exacerbating inflationary pressures that had already destabilised Pakistan's economy. Livestock losses were also significant, particularly in Sindh and southern Punjab, further undermining rural livelihoods.

Trade and industry suffered disruptions as key transport corridors linking Karachi's ports to upcountry markets were blocked by floodwaters and landslides. Industrial estates in Karachi and Faisalabad reported prolonged closures, while small and medium enterprises faced bankruptcy due to destroyed inventories and supply-chain breakdowns. Economic assessments suggest that reconstruction costs will exceed several billion dollars, adding to Pakistan's already strained fiscal position and deepening reliance on international financial assistance.

Thus, while climate variability served as the immediate trigger, the floods aggravated pre-existing economic fragilities, intensifying fiscal stress and undermining prospects for sustainable growth.

Table 4: Infrastructural and Economic Consequences of Floods (2010, 2022, 2025)

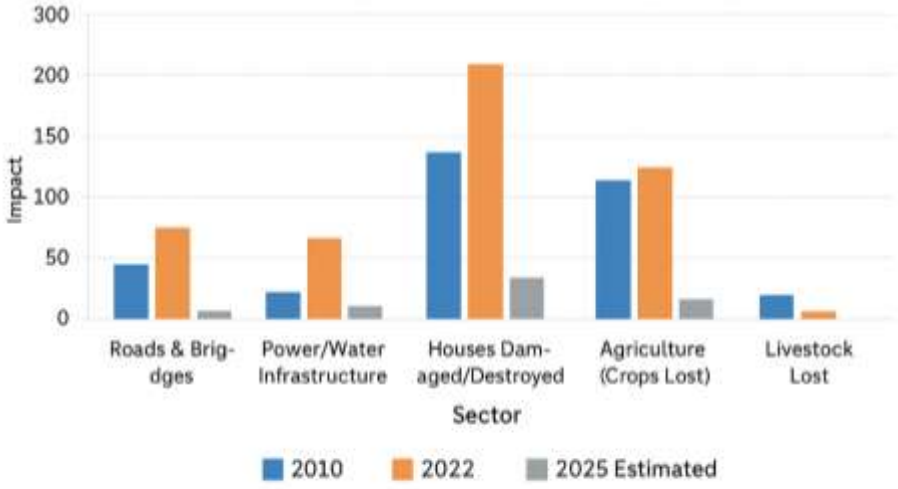
Sector	2010 Impact	2022 Impact	2025 Estimated Impact
Roads & Bridges	10,000+ km damaged	13,000+ km damaged	Thousands of km damaged
Power/Water Infrastructure	Hundreds of sites affected	280+ projects affected	Dozens of projects hit
Houses Damaged/Destroyed	1.7 million homes	2.3 million houses (897k destroyed + 1.39m damaged)	Hundreds of thousands
Agriculture (Crops Lost)	Cotton, rice, and wheat losses	Massive cotton, rice losses	Large swathes of cotton, rice, and wheat are submerged
Livestock Lost	Hundreds of thousands	1.16 million animals	Significant in Sindh & Punjab

Figure 5: Infrastructural and Economic Consequences of Floods in Pakistan

Governance Failures and Institutional Weaknesses

Perhaps the most consistent finding across the data sources is that governance failures amplified the disaster's severity. Satellite imagery revealed extensive unregulated construction on riverbanks and floodplains—areas that had also been rebuilt after the 2010 and 2022 floods despite repeated warnings. Weak enforcement of zoning and building regulations allowed vulnerable settlements to proliferate in high-risk zones, ensuring that predictable flooding events translated into widespread human tragedy. Institutional fragmentation further compounded the crisis. Responsibilities for flood management are divided between federal, provincial, and local authorities, yet coordination remains minimal. Interviews cited in secondary literature show that provincial disaster management authorities lacked both funding and technical expertise to implement preventive measures. Relief efforts were delayed due to bureaucratic bottlenecks and competing jurisdictional claims, leaving communities stranded for days without assistance.

Corruption and mismanagement were also evident. News outlets and watchdog reports documented irregularities in the allocation of relief supplies, with some resources diverted for political patronage. Reconstruction contracts were awarded without transparent bidding



processes, echoing patterns observed in 2010 and 2022. This cycle of weak accountability not only wastes scarce resources but also perpetuates public distrust in state institutions. Overall, governance failures acted as risk multipliers: transforming natural hazards into disasters of national scale by embedding vulnerability into planning, settlement, and recovery processes.

Comparative Patterns: 2010, 2022, and 2025 Floods

A key element of this study was the comparative analysis of the 2010, 2022, and 2025 floods. Despite differences in hydrological drivers—monsoon intensity in 2010, a mix of rainfall and glacial melt in 2022, and a combination of glacial outburst floods with erratic rainfall in 2025—the outcomes followed a remarkably similar trajectory.

1. **Repetition of Humanitarian Crises:** In all three cases, large-scale displacement, high mortality rates, and health crises were immediate outcomes. Humanitarian aid was mobilised but often delayed, and long-term resettlement remained inadequate.

2. **Economic Shocks:** Agricultural losses, damage to trade corridors, and industrial disruption were recurrent features, each time driving inflation and fiscal deficits higher. Post-disaster recovery required extensive borrowing, locking the state into cycles of debt.
3. **Governance Neglect:** Despite policy recommendations made after 2010 and reiterated in 2022—including floodplain zoning, improved drainage infrastructure, and community preparedness—implementation remained weak. The recurrence of the same institutional failures suggests a pattern of institutional memory loss, where lessons are acknowledged in reports but not translated into durable reforms.
4. **Environmental Degradation:** Across all three events, deforestation, poor watershed management, and unplanned urbanisation exacerbated the scale of flooding. Comparative satellite analysis highlights progressive land degradation, with reduced forest cover in northern Pakistan and encroachment of settlements into vulnerable riverine zones.

This comparative evidence reinforces the framing of Pakistan's flood crises as climate–governance crises. Climate change has undeniably increased hydrological risks, but the repeated reproduction of social and economic disasters stems from structural governance weaknesses that remain unaddressed.

Interplay of Climate Stressors and Governance Failures

The findings suggest that the 2025 floods cannot be understood in isolation from broader climate dynamics. Rising global temperatures have accelerated glacial melt in the Himalayas and Karakoram ranges, altering river flows and increasing the likelihood of glacial lake outburst floods. Similarly, erratic monsoon patterns—linked to changing atmospheric circulation—have intensified seasonal flooding. These stressors are projected to worsen in the coming decades, heightening Pakistan's exposure. Yet climate stressors alone do not determine outcomes. The comparative analysis shows that governance failures consistently transform climatic hazards into humanitarian and economic catastrophes. Unregulated settlement on floodplains ensures that floods displace thousands; poorly maintained drainage systems guarantee urban inundation; and corruption in relief delivery exacerbates suffering. In other words, climate hazards provide the trigger, but governance failures define the scale of disaster. The results highlight a troubling cycle of disaster, response, and repeated vulnerability. Each major flood triggers an outpouring of humanitarian relief, donor pledges, and policy recommendations. Yet once immediate recovery is achieved, momentum for reform dissipates, and communities are allowed to rebuild in hazard-prone areas. By the time the next flood arrives, the same weaknesses produce similar devastation. This cycle reflects deeper structural issues: short-term political incentives, weak regulatory institutions, and reliance on external aid rather than domestic resilience-building. Without systemic reforms, Pakistan risks remaining in a perpetual "poverty–disaster trap," where each flood erodes developmental gains and deepens dependency. At the same time, the comparative analysis provides important lessons. The persistence of similar outcomes across 2010, 2022, and 2025 demonstrates that solutions are not unknown—they have been repeatedly identified but rarely implemented. Enforcing floodplain zoning, investing in resilient infrastructure, strengthening early-warning systems, and building institutional capacity remain critical but unrealised priorities.

Conclusion

The analysis of the 2025 floods, in comparison with the 2010 and 2022 disasters, reveals that Pakistan's vulnerability is not the product of climate hazards alone but of systemic governance failures that convert hazards into humanitarian and economic catastrophes. Secondary data

drawn from government reports, economic assessments, satellite imagery, and credible news sources consistently show recurring patterns of displacement, infrastructural collapse, and fiscal stress. The comparative evidence demonstrates that despite repeated floods, institutional responses remain reactive, fragmented, and short-term, producing what may be described as a cycle of *institutional amnesia*. While climate stressors such as accelerated glacial melt, erratic monsoon rainfall, and deforestation undeniably increase hydrological risks, the persistence of similar outcomes across three major flood events confirms that weak regulation, unplanned urbanisation, corruption, and institutional fragmentation are the decisive multipliers of disaster impacts. Unless these governance weaknesses are addressed, Pakistan will remain trapped in a costly cycle of *disaster → relief → reconstruction → renewed disaster*, with each episode eroding developmental gains and deepening socio-economic fragility. The evidence thus frames the 2025 floods as a climate–governance crisis: triggered by climate variability but amplified by human decisions, institutional neglect, and policy inertia. Breaking this cycle requires a paradigm shift—from reactive disaster management toward proactive, integrated, and climate-resilient governance.

Drawing on the findings of this study, five interlinked domains of reform are essential for addressing Pakistan's recurring flood crises. First, institutional capacity and governance must be strengthened by establishing a permanent, empowered national authority with enforcement powers and technical expertise to oversee flood risk reduction across provinces. Disaster risk reduction should be integrated into urban planning, housing, agriculture, and fiscal strategies, with strict enforcement of floodplain zoning and penalties for illegal construction in hazard-prone areas. Second, investment in climate-resilient infrastructure and land management is critical, including the modernisation of urban drainage systems in cities such as Karachi, Lahore, and Faisalabad, the promotion of flood-resilient housing and embankments adapted to local conditions, and the adoption of ecosystem-based solutions such as afforestation, watershed restoration, and wetland conservation to regulate runoff and enhance natural resilience. Third, early warning systems and community preparedness must be enhanced through expanded satellite-based monitoring and hydrological modelling, the development of mobile-based dissemination tools capable of reaching both remote mountain villages and dense urban neighbourhoods, and the institutionalisation of community-based disaster preparedness programs that ensure local ownership of risk reduction strategies. Fourth, building economic and financial resilience is vital to break the cycle of donor dependency; this requires the establishment of a sovereign disaster resilience fund, the expansion of crop and livestock insurance schemes to protect vulnerable households, and the promotion of climate-smart agriculture and adaptive water management practices to secure livelihoods and food supplies against future hydrological variability.

Finally, international cooperation and climate diplomacy should be deepened, with Pakistan advocating strongly for loss and damage financing under global climate agreements, pursuing technology transfer partnerships for flood modelling and resilient infrastructure design, and leveraging regional platforms for transboundary watershed management, particularly in the Indus basin. Together, these reforms offer a pathway from reactive crisis management toward anticipatory, climate-resilient governance. The comparative evidence from 2010, 2022, and 2025 confirms that Pakistan's flood crises are not acts of fate but outcomes of choice—shaped by governance decisions, institutional neglect, and missed opportunities for reform. While climate change will continue to intensify hydrological extremes, disasters of the scale witnessed

in 2025 are not inevitable. With decisive reforms, Pakistan can move from a reactive, donor-dependent disaster management model toward a proactive climate-resilient governance framework. The choice, ultimately, lies in whether the state treats floods as cyclical emergencies or as catalysts for systemic transformation.

References

Abid, M., Schilling, J., Scheffran, J., & Zulfiqar, F. (2016). Climate change vulnerability, adaptation and risk perceptions at the farm level in Punjab, Pakistan. *Science of the Total Environment, 547*, 447-460.

Ahmad, S., & Afzal, M. (2020). Governance challenges in disaster management: Lessons from Pakistan. *Journal of Disaster Risk Studies, 12*(1), 1–10. https://doi.org/10.4102/jdrs.v12i1.734

Asian Development Bank (ADB). (2022). *Pakistan flood damages and needs assessment 2022*. Manila: ADB. Retrieved from https://www.adb.org

Ali, N. Z., Chaudhry, K. T., Butt, S., & Ataullah, R. (2025). Climate Change as a Threat Multiplier: Impacts on South Asian Political Stability. *ACADEMIA International Journal for Social Sciences*, *4*(3), 4553-4564.

Alam, E., Collins, A. E., Islam, A. R. M. T., Paul, A., & Islam, M. K. (2024). Change in cyclone disaster vulnerability and response in coastal Bangladesh. *Disasters*, *48*(2), e12608.

Cui, Y., Wen, Y., Gao, Y., & Shaw, R. (2025). Disaster Law in China. In *Disaster Law: Implications to Governance and Implementation* (pp. 89-108). Singapore: Springer Nature Singapore.

Dey, A. (2025). Punjab: Floods Ravage Indian state, killing 30 and submerging 1,400 villages. Retrieved from https://www.bbc.com/news/articles/cvg4g95y7pjo

Dawn. (2025, August 12). Sherry blames institutional failure, climate change for destruction in KP. *Dawn*. Retrieved from https://www.dawn.com/news/1931511

Dawn. (2025, September 3). Not just a disaster, the 2025 floods are a call to reimagine resilience. *Dawn*. Retrieved from https://www.dawn.com/news/1940947

Eckstein, D., Künzel, V., & Schäfer, L. (2021). *The global climate risk index 2021*. Bonn: Germanwatch.

Glacial Lake Outburst floods. (2021). Retrieved from https://www.icimod.org/mountain/glacial-lake-outburst-flood/

Hasson, S. U., Böhner, J., & Chishtie, F. (2019). Low fidelity of CORDEX and their driving experiments indicates future climatic uncertainty over Himalayan watersheds of Indus basin. *Climate Dynamics*, *52*(1), 777-798.

Haque, A., Kay, S., & Nicholls, R. J. (2018). Present and future fluvial, tidal and storm surge flooding in coastal Bangladesh. In *Ecosystem Services for Well-Being in deltas: Integrated assessment for policy analysis* (pp. 293-314). Cham: Springer International Publishing.

Hallegatte, S., & Rozenberg, J. (2017). Climate change through a poverty lens. *Nature Climate Change*, *7*(4), 250-256

IPCC. (2021). *Climate Change 2021: The Physical Science Basis*. IPCC. https://www.ipcc.ch/report/ar6/wg1/

Kirsch, T. D., Wadhwani, C., Sauer, L., Doocy, S., and Catlett, C. (2012). Impactof the 2010 Pakistan Floods on Rural and Urban Populations at six Months. PLOSSCurrentsDisasters,doi:10.1371/4fdfb212d2432

Mustafa, D., & Wrathall, D. (2011). Indus basin floods of 2010: Souring of a Faustian bargain?. *Water Alternatives*, *4*(1), 72.

Pakistan Today. (2025, August 28). New floods hit Pakistan while 2022 aid pledges largely unfulfilled. *Pakistan Today*. Retrieved from https://www.pakistantoday.com.pk/2025/08/28/new-floods-hit-pakistan-while-2022-aid-pledges-largely-unfulfilled

Pakistan Today. (2025, September 8). Pakistan's 2025 floods inflict $1.4 billion damage, agriculture sector hardest hit: Report. *Profit by Pakistan Today*. Retrieved from https://profit.pakistantoday.com.pk/2025/09/08/pakistans-2025-floods-inflict-1-4-billion-damage-agriculture-sector-hardest-hit

Qureshi, A., Ahmed, S., & Khan, M. (2023). Quantifying the influences of land use and rainfall dynamics on probable flood hazard zoning. *NUST Journal of Engineering Sciences, 16*(1), 55–66. Retrieved from https://journals.nust.edu.pk/index.php/njes/article/view/739

Shah, F. A., & Ali, M. (2021). Floodplain mapping for Indus River: Chashma–Taunsa reach. *Pakistan Journal of Engineering and Applied Sciences, 28*(1), 11–20. Retrieved from https://journal.uet.edu.pk/ojs_old/index.php/pjeas/article/view/1099

The Express Tribune. (2025, August 29). Poor governance blamed for flood losses. *The Express Tribune*. Retrieved from https://tribune.com.pk/story/2566125/poor-governance-blamed-for-flood-losses

The Express Tribune. (2025, September 6). The waters rise & the lessons sink. *The Express Tribune*. Retrieved from https://tribune.com.pk/story/2566652/the-waters-rise-the-lessons-sink
The Nation. (2025, July 8). KPK bears brunt as Pakistan's most vulnerable to monsoon floods. *The Nation*. Retrieved from https://www.nation.com.pk/08-Jul-2025/kpk-bears-brunt-as-pakistan-s-most-vulnerable-to-monsoon-floods
United Nations Development Programme (UNDP). (2023). *Pakistan human development report: Climate change and inequality*. Islamabad: UNDP Pakistan.
UNDP Annual Report 2022. (n.d.). Retrieved from https://www.undp.org/publications/undp-annual-report-2022
UNDRR. (2015). *Sendai Framework for Disaster Risk Reduction 2015-2030*. UNDRR. https://www.undrr.org/publication/sendai-framework-disaster-risk-reduction-2015-2030
World Bank. (2022). *Pakistan flood emergency 2022: Damage, loss, and needs assessment*. Washington, DC: The World Bank.
Retrieved from https://www.reuters.com/sustainability/climate-energy/punjab-floods-washed-away-thousands-villages-farms-now-devastation-threatens-2025-09-01/
Pakistan floods 2024 Situation Report - September 03, 2024 - Pakistan. (2024). Retrieved from https://reliefweb.int/report/pakistan/pakistan-floods-2024-situation-repor