Review Article

# The 2025 Cloudburst Crisis in Pakistan: A Narrative Review of Impacts on Human Lives and Livelihood

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## Abstract

In mid 2025, Pakistan experienced a series of catastrophic cloudburst-driven flash floods and unprecedented monsoon flooding, particularly affecting Khyber Pakhtunkhwa (KP) and Punjab. Rapid deluges, exceeding 100 mm per hour in mountainous locales like Buner and Swabi, triggered severe flood surges, landslides, and mass destruction. In KP, more than 320 deaths were recorded, with Punjab enduring its worst floods in decades, affecting up to 2 million people, displacing over 150,000, and causing substantial crop loss and infrastructure collapse. Underlying this crisis were climate-amplified monsoon unpredictability, land-use mismanagement, debilitated infrastructure, and inadequate early warning systems. The human suffering manifested not only in fatalities and economic disruption but also in disease outbreaks, emotional trauma, and food insecurity. This review synthesizes the scientific, social, and policy dimensions of the 2025 cloudburst crisis and sketches imperative approaches for climate-resilient preparedness

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## Introduction

Pakistan, in the summer of 2025, was struck by cloudburst-induced flash floods and monsoon overflows that depicted the weakness of its disaster management systems. These events devastated landscapes, terrains, and human lives, underscoring the confluence of climate drivers, environmental depletion, biodiversity loss, and infrastructural inadequacies. This narrative review archives the progression of the crisis, explores its current effects on populations, and recommends pathways toward adaptability.

## The Events and Their Magnitude

### Flash Floods Triggered by Cloudbursts in KP Region

In mid-August, a sudden deluge—exceeding 150 mm per hour—in Buner District led to fierce flash floods and landslides, claiming at least 204 lives in Buner and 327 in KP overall. KP's Provincial Disaster Management Authority (PDMA) later confirmed over 320 fatalities province-wide, highlighting Buner as the epicenter of destruction. The same month, a cloudburst in Swabi resulted in 25 fatalities, with more than 33 missing and widespread operational breakdowns.

Earlier in July, urban sectors like Islamabad and Rawalpindi were subjected to intense downpours—145 mm over three hours and 449 mm over a few hours, respectively—illustrative of systemic shortfalls in urban drainage and zoning despite not fully coinciding with technical "cloudburst" criteria[4].

### Monsoon Flooding Ravages Punjab

Simultaneously, eastern Punjab grappled with its worst floods in over 40 years. Overflow from rivers Sutlej, Chenab, and Ravi—compounded by India's dam releases—submerged 1,400+ villages and affected an estimated 1.2 to 2 million people.

Death toll estimates for Punjab varied, with one report citing over 15 deaths and more than 167,000 displaced. Nationwide, since late June, 849 fatalities and 1,130 injuries have been recorded in rain-related disasters[7].

## Summary of Overall Impacts

- National death toll: Exceeded 800 (some reports estimated it to be 819–849)[8].
- Displacement: Punjab alone had more than 150,000 evacuations; the total displaced population likely exceeded 1–2 million individuals.

Agricultural losses: KP lost 31,596 acres of farmland—including 26,141 acres in Buner— devastating maize, rice, vegetable, and orchard yields.

- Infrastructure damage: Roads, bridges, schools, and power systems were destroyed; in some areas, rescue operations were further disrupted by helicopter crashes.

## Drivers Behind the Devastation

### Climate Change as a Catalyst

Cloudbursts are defined as more than 10 cm of rainfall within an hour over small geographical areas. They are becoming more frequent and intensive across the globe. Scientists attribute this drift to climate change, which increases atmospheric dampness and disrupts monsoon systems[10]. One attribution study estimates that **rainfall was 10–15% heavier** due to human-induced warming[11]. Warmer air and glacier melt further feed instability in the Himalayan region[12].

### Urban Poor Planning and Environmental Degradation

Swift, inadvertent urban development—with meager drainage, blocked cesspits (e.g., in Sialkot), and construction in flood-susceptible areas—augmented flood-linked demolition in both urban and rural territories[13]. Forest clearing and desertification in mountainous regions of KP and Gilgit Baltistan (GB) eliminated dynamic natural blockades and hence escalated the probability of landslide and flood threats[14].

### Insufficient Disaster Preparedness

Despite preliminary alerts and precautionary information, several societies lacked access to consistent early-warning systems. In far-flung districts, alerts and warnings were only restricted to mosque announcements[15]. A rescue helicopter crash in Bajaur emphasized the encounters and hazards in emergency response operations.

## Impacts on the Population

### 4.1 Loss of Life and Displacement

The human cost was immense:

- **Deaths**: Over **800 fatalities** have been reported nationwide, many of them clustered in KH and Punjab[5].
- **Displacement**: Punjab evacuation reached over **150,000 people**, while total displacements were approximately **1–2 million**.

### 4.2 Economic and Agricultural Desolation

Farm losses in Khyber Pakhtunkhwa (KP) alone included tens of thousands of acres of basic crops, which endangered food security and rural livelihoods. The cropland deterioration and structure demolition in Punjab compromised wheat yields and sparked apprehension of scarcity[16].

### 4.3 Health and Social Consequences

Numerous communicable diseases like hepatitis, cholera, malaria, dengue, and skin infections were attributed to stagnant and contaminated floodwater. healthcare facilities provided by the government and Non-Governmental Organizations (NGOs) could not fulfill the requirements of the affected population. Many families were found deprived of the basic life necessities that further aggravated the humanitarian crisis[17].

## Response, Reflections & Future Strategies

### Emergency Response

Apart from the National Disaster and Management Authority (NDMA), Rescue 1122, the army, Non-Governmental Organizations (NGOs), and local communities did stringent efforts to help the flood the flood-affected population by means of boats and drones.

### Identified Weaknesses

Key limitations acknowledged were:

- Nonexistence of early-warning infrastructure and non-readiness to manage a crisis.
- Unsatisfactory urban planning, including risky buildings in unprotected sectors.
- Sluggish response, constrained resources, and communication gaps.

## Building Resilience

Strategic planners and representatives identified the need for a multifaceted and integrated approach for fostering adaptability in a calamity that includes:

- **Early-warning systems**: Take advantage of radar, satellite, Short Message Service (SMS) alerts, and community-level notification methods[14].
- **Urban and environmental planning reforms**: Enforce building regulations, halt riverine encroachments, reforest mountain slopes, improve drainage, and develop retention infrastructure[13].
- **Climate adaptation funding**: Prioritize financing for flood-resilient infrastructure, especially given Pakistan's minimal contribution to global emissions but high climate vulnerability[11].
- **Holistic policy integration**: Embed climate risk into national and provincial development planning.
- **Community engagement**: Strengthen local volunteer networks and regional preparedness capacities.

## Conclusions

The mounting challenge of cloudbursts in Pakistan is strongly correlated with climate change. The massive damage to infrastructure, loss of lives, and extensive displacement of humans and animals direct the need for adaptation measures and an early warning system in addition to disaster preparedness and response capacity.

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