

Escalating Flood Hazard in Pakistan: causes and implication

Outlines

- 1- Introduction
- 2- Statistical overview of flooding in Pakistan

The 2025 flash floods have claimed 706 lives, 965 injured and 3.8 million people displaced

[The Guardian]

- 3- System analysis ^{causes of} escalated flooding in Pakistan

1- climatic drivers of flooding

a- Intensified monsoon rains.

case in point: rainfall from June to August have exceeded 21% above normal, with 36% increase in Punjab having recurrent cloudbursts.

b- cryospheric process with accelerated glacial melt.

2

Environmental and land use causes of flooding

a-

Deforestation and catchment
degradation

b-

Loss of wetlands and siltation
of rivers and canals.

3-

Structural and infrastructure causes of escalated flooding

a-

Urban drainage deficiencies

b-

Weak and aging embankments

4-

Urbanization and Human settlements

a-

Encroachment on floodplains

Case in point: settlements on
Ravi bed washed away by
rising Ravi waters.

b-

Increased population density
in flood-prone areas.

5-

Weak early warning system and transboundary challenges

4-

Implications of escalating flood hazard in Pakistan

a-

Humanitarian and social implications

b-

Economic and livelihood implications

c-

Infrastructure and developmental implications

d-

Environmental implications

5

Measures to prevent flood hazard in Pakistan

a-

Ecological restoration as natural flood defense.

b-

Modern infrastructure and urban planning

c-

Institutional reforms and governance strengthening

d-

Leveraging international support and climate finance.

b-

Conclusion

The Essay

"When rivers rise, nations tremble."

This timeless observation finds its most haunting reality in Pakistan, a country where the waters of blessing repeatedly turn into waves of destruction. From the great deluge of 2010 to the devastating floods of 2022 and, most recently, the unprecedented inundations of 2025, Pakistan has endured cycles of misery that erode its social fabric. The persistence of such catastrophe is a mix of climatic factors like excessive rainfall with melting of glaciers, coupled with urbanization, encroachments on river banks, deforestation and governance inefficiencies, all of which jeopardize developmental aspirations of Pakistan. These, in reverse, have gruesome implications at

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Social, economic and environmental scales. Pakistan has to face these precarious implications every other years. It is firm liability of government to take substantial steps, within no time, including governance reforms to save the state from such future vulnerabilities.

Before delving into analysis of causes of escalated flooding hazard, it is imperative to understand statistical picture of flooding in Pakistan. Pakistan has witnessed severe overflow of waters in form of 2022 and 2025 flooding. In case of **2025** Flooding, nationwide flash floods since June claimed 706 lives, 965 injured with 123 death in Punjab and 323 in KPK, with 3.8 million displaced in Punjab. Apart from these, Pakistan has borne the loss of

Thousands of acres ^{bottom} land ^{cropping} rice, wheat and vegetables and livestock loss. These losses in various forms have wreaked havoc on country.

The essay sheds light on the detailed analysis of causes of escalating flood risk in Pakistan in subsequent section.

First of all, climatic drivers of flooding encompassing intense monsoon and cryospheric process, plays a significant role in flood disaster in country. Pakistan in 2025 received torrential rains in Punjab, KPK and Sindh, swelling the Ravi, Chenab and Sutlej ^{tribes} beyond dangerous level. Rainfall from June to August 2025 have exceeded to 21% above normal with 36% increase in Punjab, having various cloud bursts [Dawn News]. Apart from this, cryospheric process which

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includes melting of glaciers was rampant in same period. This huge snowmelt and glaciers adds huge water volumes to rivers. Pakistan hosts 7000 glaciers many retreating due to intense warming.

In 2025, glacial lake outburst floods were reported in Gilgit-Baltistan, exacerbated river flooding downstream. Thus, these climatic drivers are one of the major causes of intense flooding.

Furthermore, environmental degradation including deforestation, loss of wetlands and siltation of rivers and canals are the significant factors behind water surge. deforestation and catchment degradation in areas such as Swat, Dir and Punjab has stripped away natural protective cover of hillside and greenland. It reduced water absorption and increased soil erosion. As result, water rushed more in deforested

areas and triggers more heavy flooding in those deforested areas.

Similarly, the loss of wetland and the problem of siltation in rivers and canal further exacerbate the problem. These wetlands destruction has eliminated vital ecological buffers. For instance, the large part of delta wetland in Sindh which absorbed extra water, have been converted into farmlands. Heavy soil erosion deposits silt in rivers and reduce carrying capacity. In 2025, NDMA reported heavy siltation in the Sutlej and Ravi rivers. Resultantly, these rivers swelled with heavy water.

In addendum, structural and infrastructure factors also caused ^{or} escalating flood hazard in Pakistan. These factors include weak drainage systems

in urban areas in particular. These clogged drainage system and encroachment on these water channels cause urban flooding, even moderate rainfall paralyzed urban centres due to poor washaway capacity of drainage system. Alongside, weak and aging embankments breakdown in face of surging water. These are poorly maintained and constructed decades ago. In September 2025, breaches at Panjnad headwork led to inundation of 2000 villages in Punjab. Thus, Pakistan's infrastructure vulnerabilities have multiplied the devastations of deluge.

Furthermore, Urbanization and human settlement pattern have also intensified flooding hazard in Pakistan. With Pakistan's population exceeding **24 million**, pressure on land pushed million into high risk areas, informal settlements and housing societies on water channels

have accelerated over the years. Settlements on Ravi river beds and ^{lake} encroachments on nullahs in Islamabad were washed away due to heavy outflow by 2025 floods [Express Tribune]. These expansion has paved over natural drainage paths, converting rainfall into surface runoff.

The streets in cities turned into temporary rivers during flood-prone period. This shows how poor infrastructure amplify flood vulnerabilities.

Finally, weak early warning systems and transboundary challenges have magnified the flood hazard in Pakistan. These failures have allowed the hazard to persist despite of lessons of the past. Early warning systems do exist but are poorly and haphazardly maintained. Many flood areas receive no prior warning as result families have very little to move

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household goods and livestock and evacuate themselves. The sudden arrival of waters result in huge loss of lives. Pakistan also vulnerable + transboundary challenge owing to aqartheid India. The sudden release of water in Chenab, Sutlej and Ravi rivers by India reflects extreme geopolitical hostilities and unpreparedness of Pakistan give rise to devastating flood in country.

After having analyzed the causes, it's pertinent to highlight the implications of flooding in Pakistan.

First implication is the humanitarian and social catastrophe due to escalating floods. every flood results in millions of casualties and tear away social fabric. in 2025, 700 people lost their lives, 2 million displaced in Punjab and 3.8 millions affected nationwide (Reliefweb). thousands of families

sects sheltered in emergency camps, while many are forced to live in embankment with little fuel and clean water. The loss of sanitation system triggers the risk of waterborne diseases. Dengue cases also spike in stagnant water pools. Disruption of social systems deepened the cost of disaster.

Moreover, the economic and livelihood implications after flooding also terrifies. economic instability, due to loss of farmland and destruction of rice, wheat, maize and cotton impact various sectors across the country. This devastation results in heavy income loss for small poor families and farmers. Pakistan's textile industry is impacted directly. At national level, it pushes inflation further, and reduction in GDP

of country. loss of livestock, disrupt rural lives and dairy supply chains

Additionally, escalated flooding leads to infrastructure and developmental implications. Cutting off roads access, collapsing of bridges and damage to irrigating canals ^{led to} supply chain blockage and paralyzing life completely. Schools, health centres and power lines also wash away due to heavy outflow. The diversion of funds for affected infrastructure strained already fragile fiscal position of Pakistan

Lastly, the environmental implications of floods are horrifying. As floods stripped fertile top-soil from vast tracts leaving behind silt and sand deposits. In Sindh, Kutchi areas, flood waters damaged forests and habitats critical for

biodiversity during 2022 Flood. This stagnant water flood form, pollute groundwaters with sewage and industrial waste. This environmental degradation further brings perilous situations for people.

Pakistan, at present, is grappling with risks posed by flooding. However, as every tunnel has light at its bottom, Pakistan can overcome this disastrous state by taking certain robust measures.

First and foremost is the ecological restoration as natural flood disaster defense. Pakistan must restore its lost ecological buffers. Large scale afforestation campaigns in KPK and Punjab particularly would stabilize slopes, reduce soil erosion and slow runoff. Protecting wetlands and natural floodplains in Sindh can provide "sponges" that absorb excess

Water. Hence ecosystem restoration must be prioritized not as charity but as climate security.

Secondly, modernizing infrastructure and urban planning must be prioritized. embankments, canals and bridges must be strengthened with modern engineering, while safety audits should be mandatory. urban flooding requires rethinking city planning, unclogging stormwater drains, preventing encroachments on nullahs, rivers, and introduction of permeable pavements that allow rain water absorption.

Thirdly, institutional reforms and governance strengthening must be key focus. Institutions like **NDMA and PDMA** must be given greater autonomy, resources and training. Disaster preparedness

should not be limited to issuing warnings but must include pre-positioning relief supplies, rehearsing evacuation operations and involving local governments. Repeated breaches at same embankment highlight corruption; therefore transparent auditing mechanism must be established to ensure floods must be allocated in right direction.

Lastly, international support and climate finance must be actively pursued. The country must pursue funds from the **Loss and Damage Fund** established at COP 27, as Pakistan's case for climate justice has grown stronger after 2022 and 2025 floods. Pakistan must ensure that financing is directed to resilience projects rather than short-term relief alone. Partnership with international agencies for flood casting, satellite monitoring

and resilient infrastructure design can help in elaborating mitigating strategies.

To conclude, escalated flood hazard in Pakistan has brought manifold climatic situation in various areas. This disaster comes nearly every year, yet unprepared response of government turns this into perilous and highly devastating event. Various socio-environmental factors are responsible alongside climatic drivers. Natural events encompassing intensive rainfall, glacial outburst beset with man-made situations like human settlements and encroachment and deforestation make country highly vulnerable to deluge in region. Consequently, Pakistan has to bear the brunt of socio-economic and environmental losses with each passing. It is the necessity of the time that

Government adopt robust measures with mitigation strategies to descend the geo-hazardous impacts of flooding in Pakistan. As million of people have lost lives, so pragmatic mechanism must be developed to save the country and its assets.