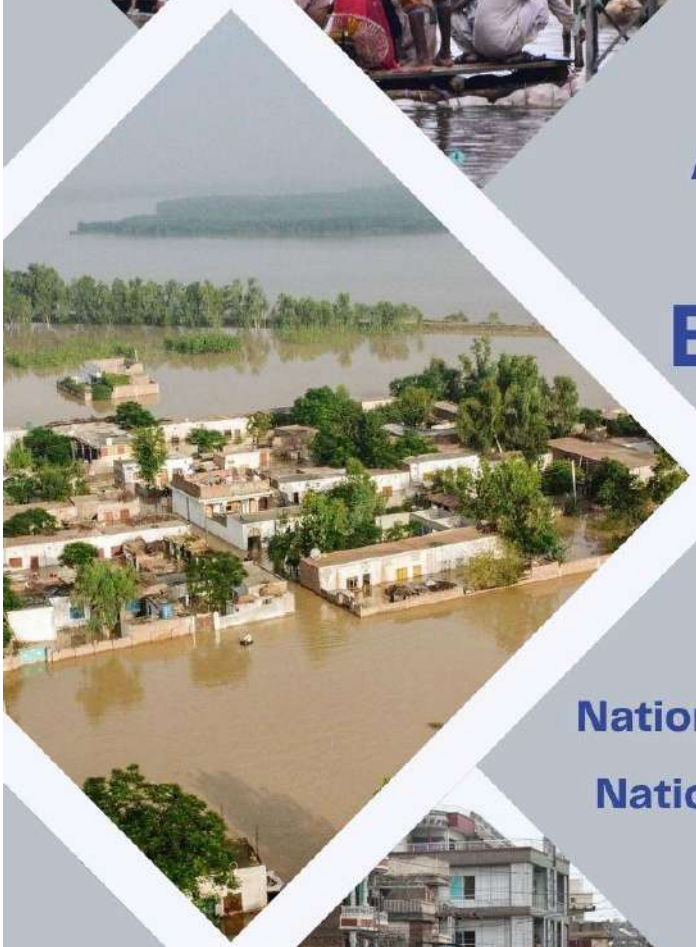

A Comprehensive Study of Flood Events in Pakistan 1950-2025

National Institute of Disaster Management

National Disaster Management Authority

This document has been prepared under the patronage of

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1. Background:

Floods are the most common natural disaster, occurring when water overflows onto typically dry land. They are primarily caused by heavy rainfall, rapid snowmelt, or storm surges from tropical cyclones or tsunamis in coastal areas. Floods can cause significant damage, including loss of life, property destruction, and harm to public health infrastructure. Between 1998 and 2017, floods affected over 2 billion people globally. Those living in floodplains, vulnerable buildings, or areas lacking warning systems are most at risk.

There are following types of floods as shown in figure 1:

- **Flash floods**: Result from heavy rainfall, causing rapid water rise in rivers, streams, or roads. Mainly these are due to heavy rainfall over top of hills.
- **River floods**: Occur when persistent rainfall or snowmelt causes a river to overflow. They are also called as Fluvial floods
- **Coastal floods**: Caused by storm surges from tropical cyclones or tsunamis. They occur when water is forced ashore by the storm surges.
- **Urban floods:** Result from excessive rain over urban paved areas. The city drainage system, owing to certain design limitations, cannot absorb the excessive rain and as such water flows out into the streets.
- **Pluvial floods:** Caused by the excessive lingering rain over flat plain areas. Flat areas can't absorb the rainwater, causing puddles and ponds to appear
- **Man-made floods:** Caused due to dam break, embankment break or due to ill operation of dam/reservoir spillway gates for the purpose of releasing excessive inflows. Water and debris flow down extremely fast by virtue of such situations.
- **GLOF:** Glacial Lake Outburst Flood - Refers to the sudden/abrupt and catastrophic release of water from a glacial lake, often due to the failure of a dam formed by moraines or ice releasing, at times, millions of cubic meters of water and debris, causing significant damage and loss of life in downstream areas

Floods, along with droughts, cyclones, heat waves, and severe storms, account for 80-90% of all natural disasters in the past decade. As climate change intensifies, the frequency and severity of floods and extreme precipitation are expected to rise (WHO,2025).

Rising global temperatures are causing significant shifts in weather patterns worldwide. Human-driven climate change is increasing the frequency and intensity of extreme climate and weather events, such as heatwaves, heavy and uncertain rainfall, unprecedented floods, prolonged droughts, and frequent cyclones. Over the past decade, instances of heavy rainfall and flooding have surged, with some studies showing a 50% global increase. According to the European Academics Advisory

Panel, extreme rainfall and floods are now occurring four times more often than in 1980s (Qasim, 2019).

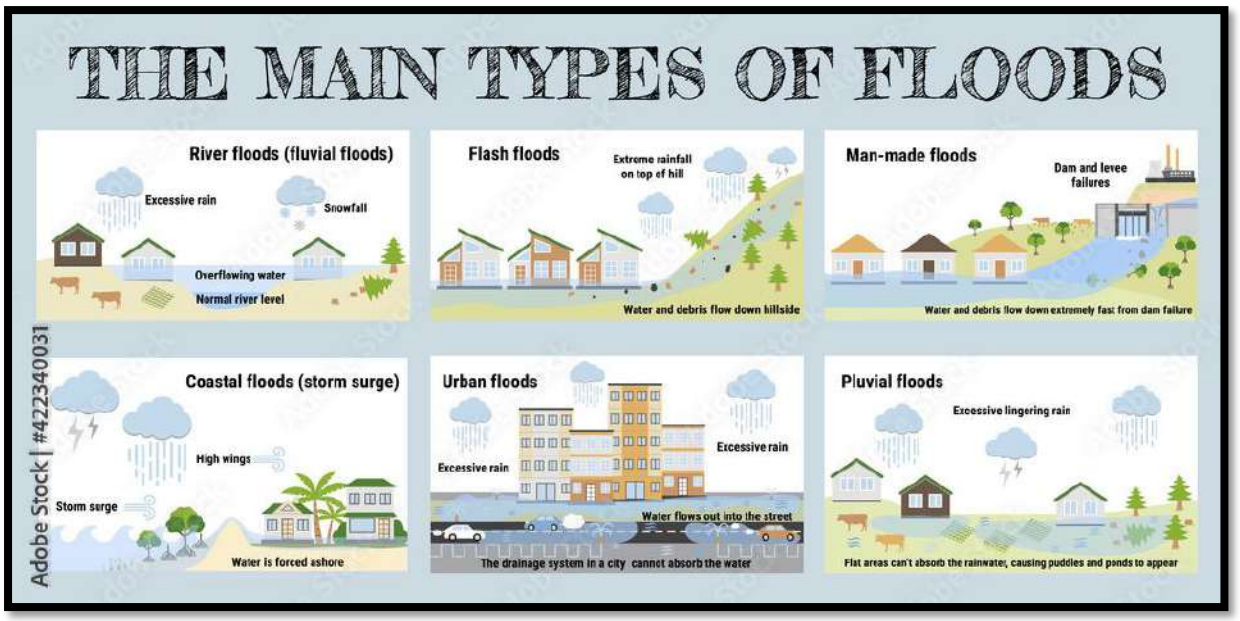


Figure 1: Main Types of Floods

Floods are the most common natural disaster globally, affecting 1.4 billion people and causing around 100,000 deaths in the 20th century. Each year, the cost of responding to floods is approximately $50-60 billion, placing a significant burden on the global economy. A United Nations report states that floods annually claim 22,800 lives, with economic losses in Asia estimated at $136 billion. Climate change is increasingly impacting Asia, leading to more frequent and severe weather events that cause widespread suffering. South Asia, home to 25% of the world's population, makes up 3.2% of the world's land and 10% of Asia. It also contains 40% of the world's poor. According to the International Disaster Database, 332 flood events occurred in South Asia between 1979 and 2005 (Memon, 2014)

Increased flooding globally is primarily driven by climate change and unsustainable land use practices. Climate change leads to more frequent and intense rainfall, higher sea levels, and increased storm surges, all contributing to flooding. Additionally, human activities like deforestation and urban development in floodplains exacerbate the problem by reducing the land's ability to absorb excess water.

As the atmosphere warms due to climate change, it can hold more moisture, leading to heavier downpours and increased risk of flooding. Melting glaciers and thermal expansion of water are causing sea levels to rise, increasing the vulnerability of coastal areas to flooding from storm surges and high tides. Climate change is increasing the frequency and intensity of extreme weather events like hurricanes and cyclones, which often bring heavy rainfall and flooding.

Global warming from climate change means more evaporation and more moisture in the atmosphere, which means rainfall can be intensified. And intense rainfall and changing landscapes make for more disastrous floods.

Every 1-degree F rise in temperature can mean 4% more water vapor in the air. And since average surface temperature was more than 2 degrees F warmer in 2020 than it was a hundred years ago, there can be nearly 9% more moisture in the air — and clouds. Recent research shows that in the future, hot, wet conditions (as opposed to hot, dry conditions) are expected to be more common. Heatwaves occurring before heavy rain will dry out the soil, making it less able to absorb water when it rains, increasing the likelihood of flooding.

Unsustainable Landuse Practices: Removing trees reduces the land's ability to absorb rainwater, leading to increased surface runoff and higher flood risks. Paving over natural surfaces with concrete and asphalt reduces water infiltration into the ground, causing more rainwater to flow into rivers and increasing flood potential. Building in areas prone to flooding, like riverbanks and coastal areas, puts more people and infrastructure at risk when floods occur (Memon, 2014).

1.1. Coming Flood Season in Pakistan 2025 by NEOC Tech Wing:

The 2025 monsoon season in Pakistan is forecast to begin around 26–27 June, earlier than usual, and continue until 15 September. Influenced by neutral ENSO and IOD conditions, reduced snow cover, and rising temperatures, the season is expected to bring above-average rainfall and temperatures, with regional variations. North-eastern, central, southern, and south-eastern areas may experience significantly higher precipitation, while northern KP and Gilgit-Baltistan may see below-normal rainfall. Elevated temperatures, especially in early monsoon, could accelerate snowmelt, increasing river flows and the risk of flooding. There is also an elevated threat of GLOFs, landslides, flash floods, and urban flooding in several vulnerable regions.

1.1.1. Gilgit Baltistan

1.1.1.1. Gilgit Baltistan Monsoon Projection:

Gilgit-Baltistan is expected to receive normal to below-normal rainfall, with precipitation likely in districts like Astore, Skardu, Hunza, and Gilgit during late July and August. This may trigger glacial lake outburst floods (GLOFs) in some areas.

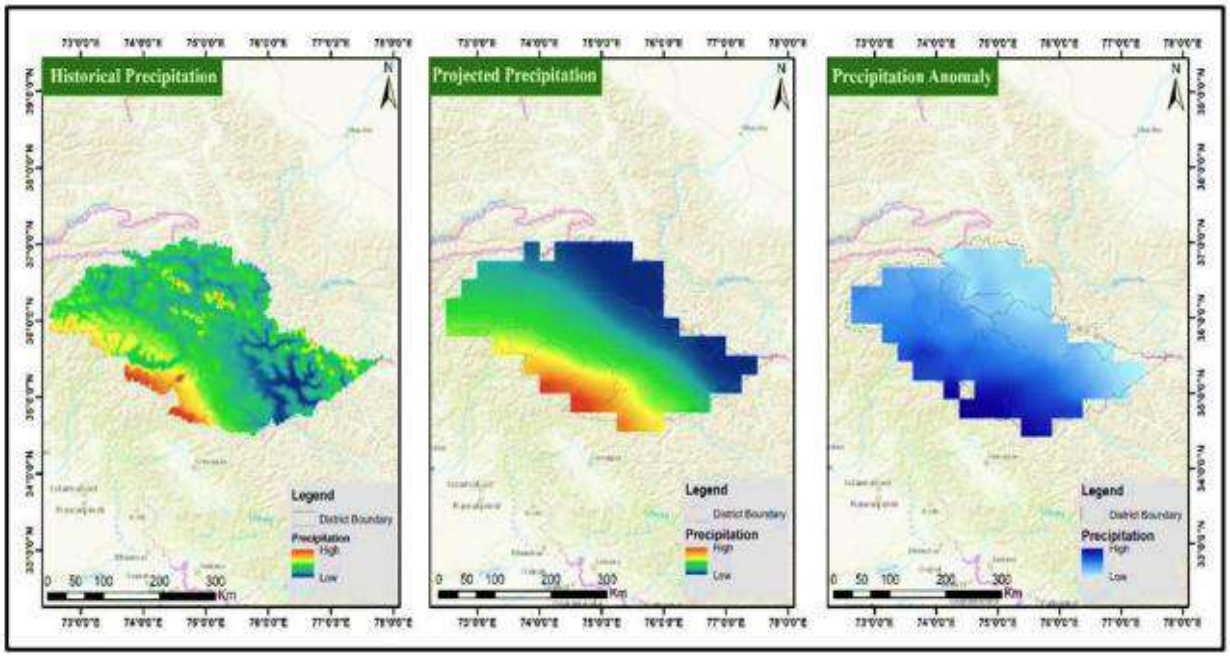


Figure 2: GB Comparative Analysis for Average Precipitation (July, August, September). (NDMA, 2025)

1.1.1.2. Flood Projection:

During the 2025 monsoon season, Gilgit-Baltistan is forecasted to receive normal to below-normal rainfall, particularly in districts like Astore, Skardu, Gilgit, and Hunza. Despite limited precipitation, the combination of above-normal temperatures and existing snowpacks and glaciers may accelerate glacial melt. Even isolated rainfall events in late July and August could trigger Glacial Lake Outburst Floods (GLOFs), especially in vulnerable valleys such as Hunza, Shigar, and Ghizer. Historical trends and satellite data highlight a continued risk of localized flooding in glaciated basins, emphasizing the need for proactive monitoring.

1.1.1.3. Snow Cover Projections:

Snow projections for March to August 2025 highlight a key region in northern Pakistan with potential hydrological and flood risk implications.

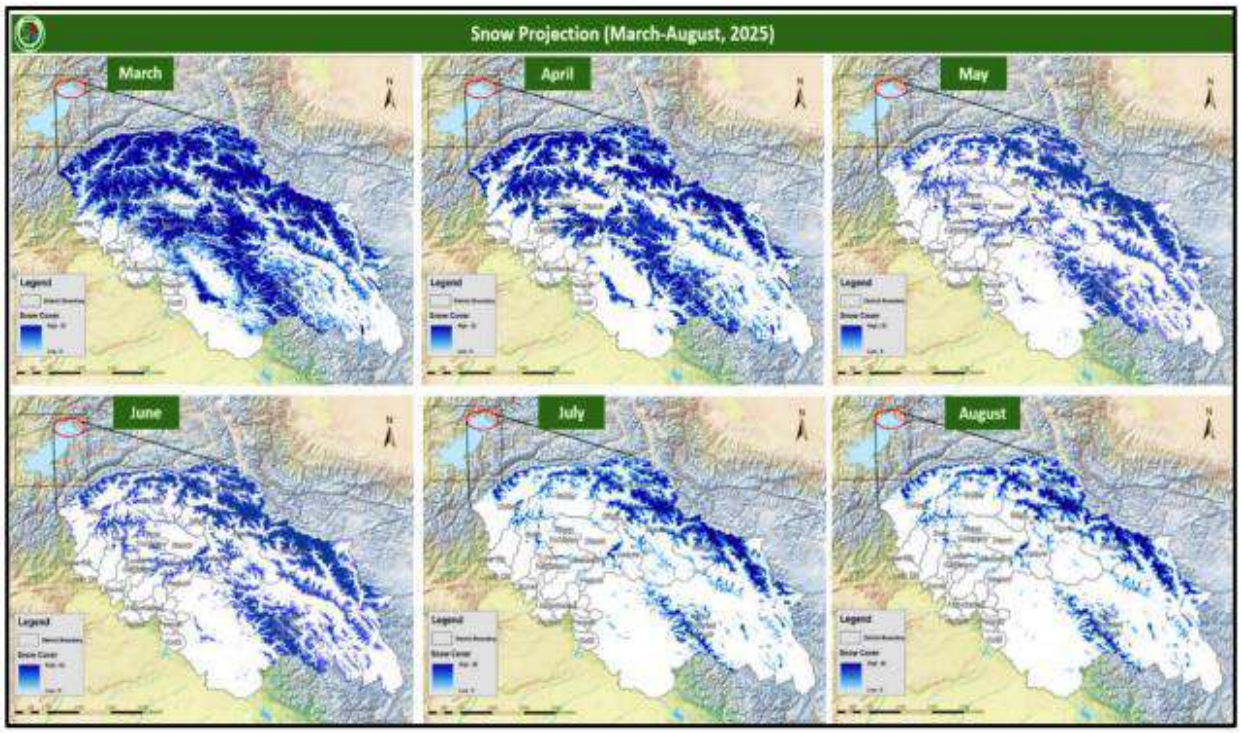


Figure 3: March-August Snow 2025 (NDMA, 2025)

1.1.1.4. Temperature Projections:

Temperatures are projected to rise from -13.13°C in January to a peak of 45.66°C in June, with lows turning positive by July at 11.66°C.

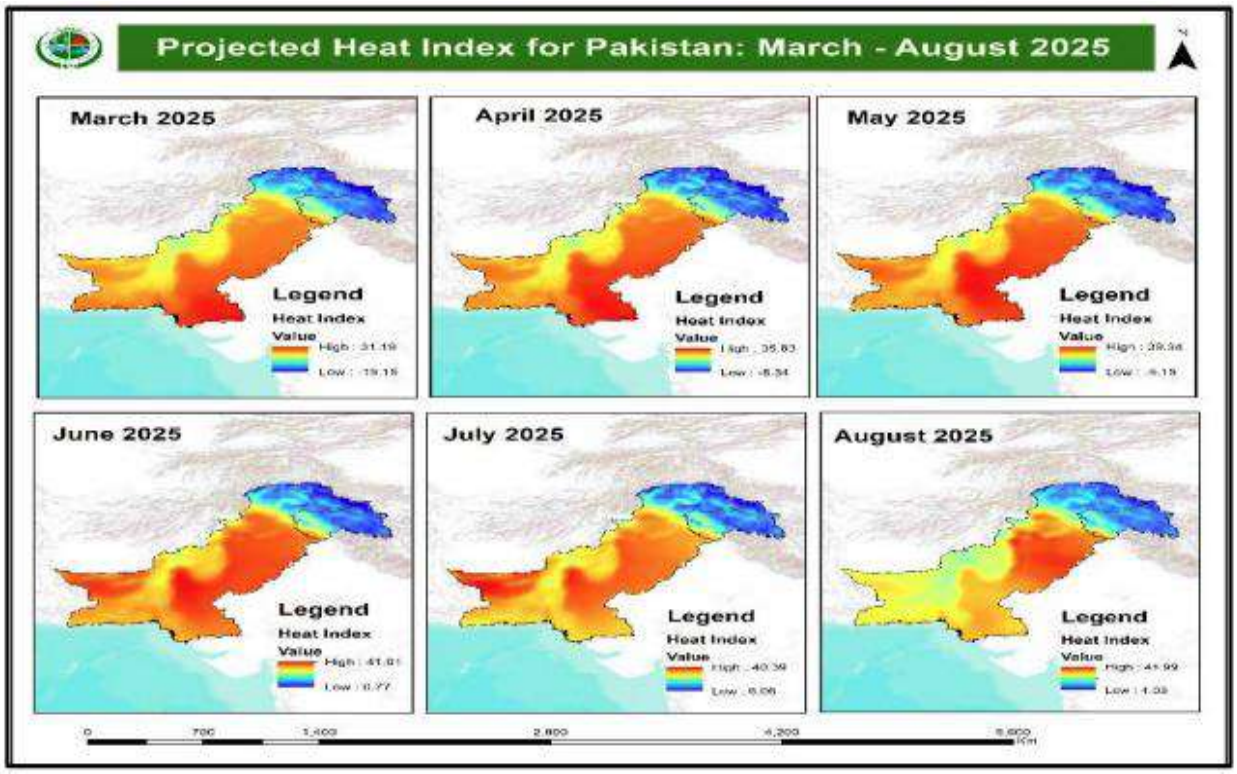


Figure 4: Projected Heat Index (March-August 2025) (NDMA, 2025)

1.1.2. Azad Jammu & Kashmir (AJK)

1.1.2.1. Monsoon Projection

In AJK, including Muzaffarabad, Neelum Valley, and Rawalakot, isolated heavy rains may trigger landslides and riverine flooding, impacting downstream flows in Punjab.

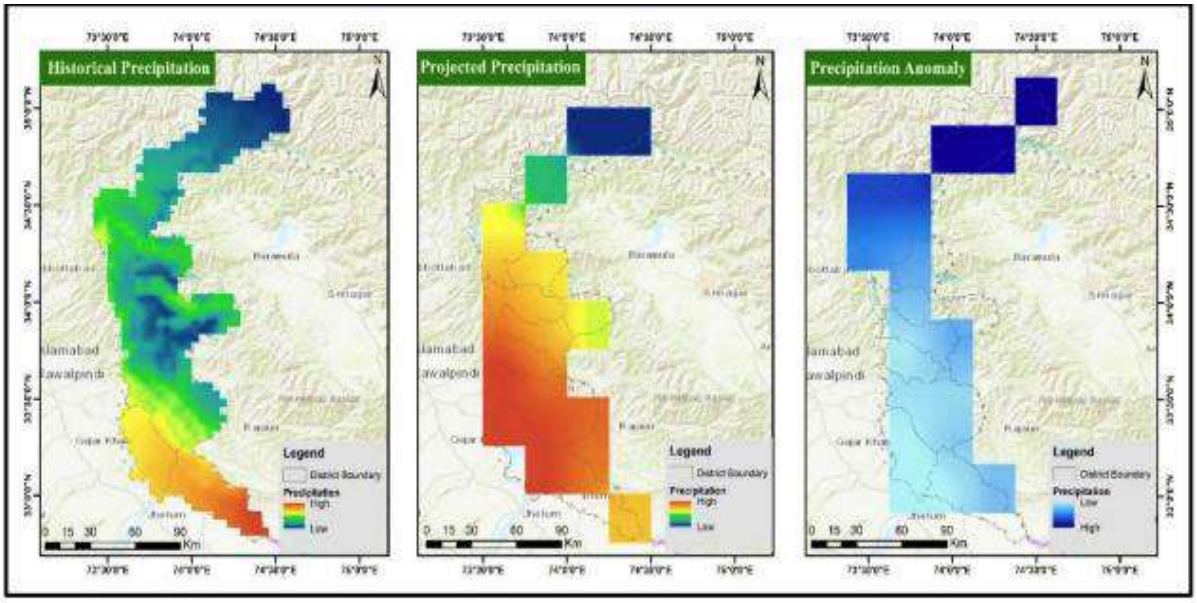


Figure 5: AJK Comparative Analysis for Average Precipitation (July, August, September (NDMA, 2025)

1.1.2.2. AJK Flood Projection

Azad Jammu & Kashmir (AJK) is expected to face heightened hydrometeorological risks during the 2025 monsoon, with slightly above-normal rainfall, especially in northeastern districts like Muzaffarabad, Neelum, and Poonch. The region's steep terrain and glacial melt may intensify flash floods, landslides, and riverine flooding. Vulnerable infrastructure and accelerated runoff increase the risk of severe impacts, particularly from landslides, flooding in the Jhelum catchment, and overflow of tributaries.

1.1.2.3. Flood Susceptibility Zonation

The Jhelum River Basin is highly vulnerable to flooding, with flood susceptibility mapping covering 50,897 sq. km. Around 12% (6,210 sq. km) is classified as low risk, while the largest portion—34% (17,548 sq. km)—falls under moderate susceptibility, indicating significant flood potential across much of the basin.

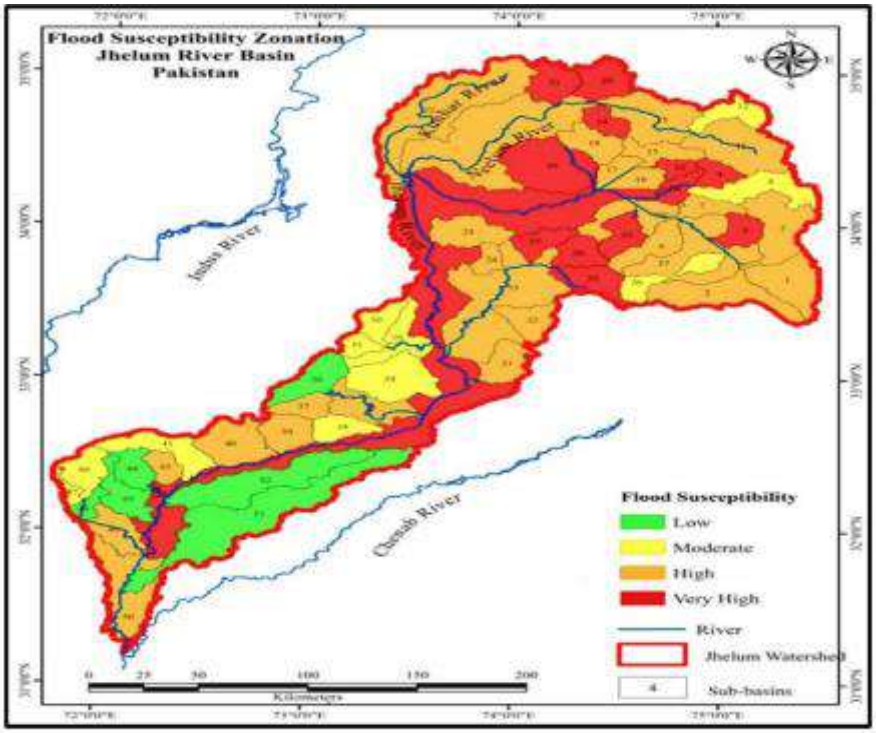


Figure 6: Flood Susceptibility Zonation of Jhelum River Basin (NDMA, 2025)

Table 1: Flood Susceptibility Zonation on the Basis of Area.

Flood Susceptibility	Area (sq.km)	Percentage (%)
Low	6,210	12%
Moderate	17,548	34%
High	14,719	29%
Very High	12,419	24%
Total	50,897	100%

(NDMA, 2025)

1.1.3. Punjab

1.1.3.1. Monsoon Projection

Punjab is expected to face significant monsoon impacts, with northern, northeastern, central, and southwestern districts likely to receive above-normal rainfall. Areas including Lahore, Rawalpindi, Sialkot, Gujranwala, and Dera Ghazi Khan may see increased flood and waterlogging risks. Hill torrent regions near the Sulaiman Range, especially Dera Ghazi Khan and Rajanpur, are particularly vulnerable to flash floods in late July. Potential impacts include crop damage and infrastructure strain in urban centers.

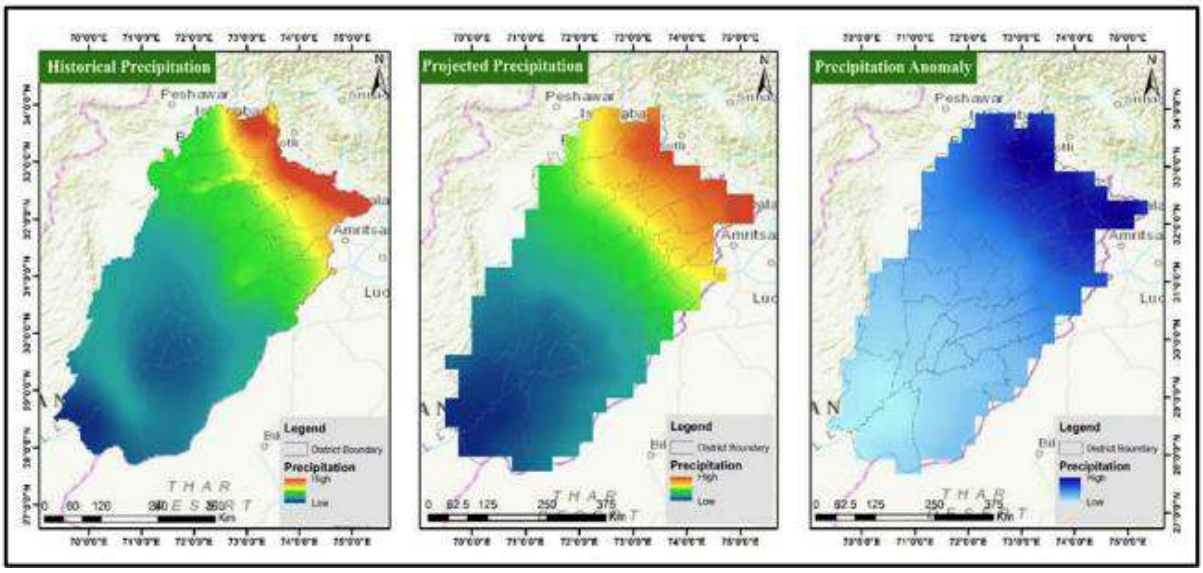


Figure 7: Punjab Comparative Analysis for Average Precipitation (July, August, September) (NDMA, 2025)

1.1.3.2. Flood Projection

Increased precipitation may lead to rain emergencies in low-lying areas, crop losses, and pressure on infrastructure in densely populated urban centers of northern and central Punjab, especially in Gujranwala and Lahore Divisions. In northeastern Punjab, along the Pir Panjal Range, streams and nullahs are likely to overflow due to the anticipated rainfall anomaly.

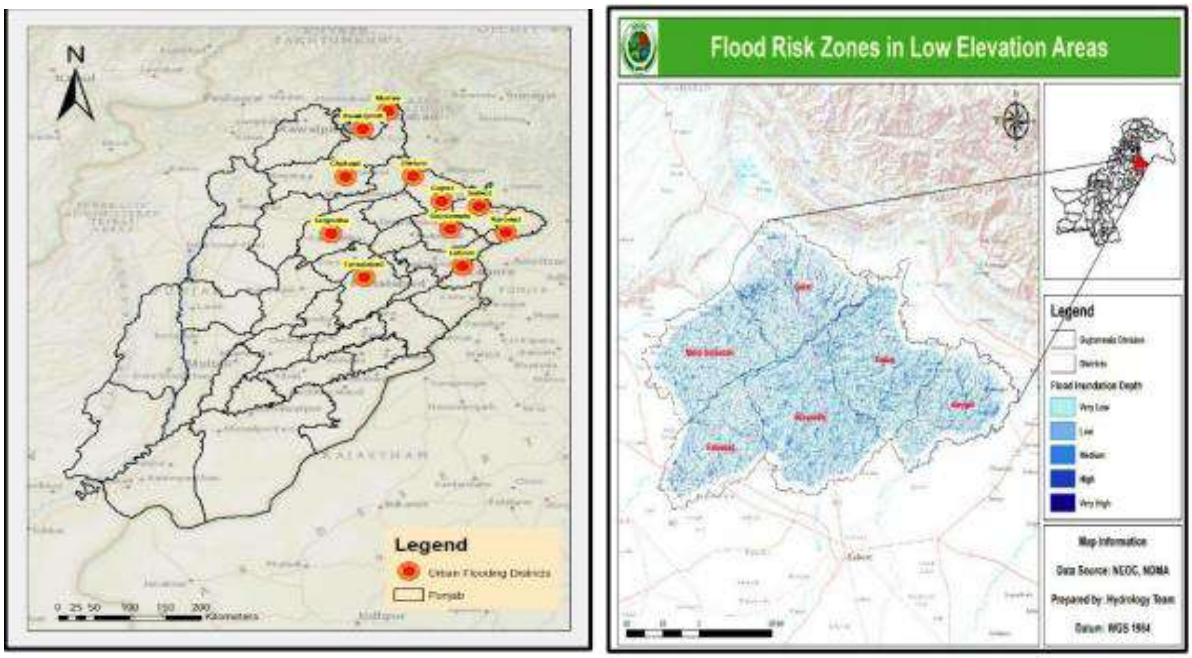


Figure 8: Map showing Vulnerable Districts for Urban Flooding (NDMA, 2025)

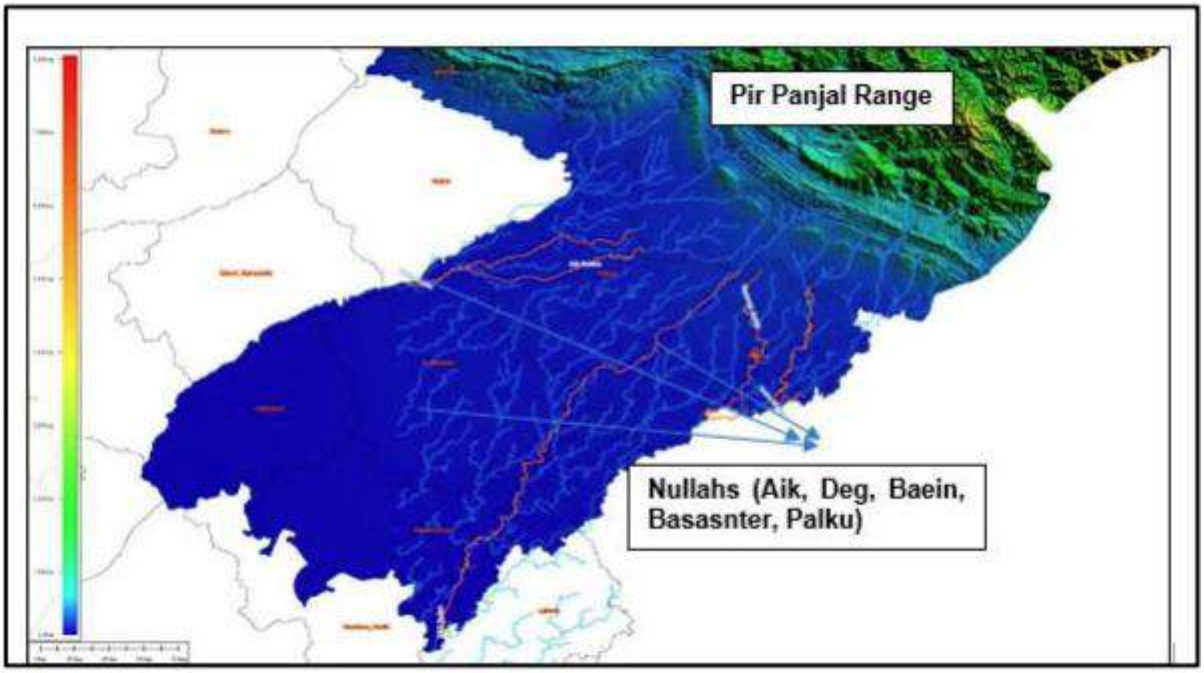


Figure 9: Map showing Vulnerable Districts for Urban Flooding (NDMA, 2025)

Southwestern Punjab, particularly Dera Ghazi Khan and Rajanpur along the Sulaiman Range, is at high risk of flash flooding in late July and August due to above-normal monsoon rainfall. Orographic effects and intensified monsoonal activity may cause major hill torrents to reach medium to high levels. Low-lying areas, identified through hydraulic modelling, are especially vulnerable as shown in figure…

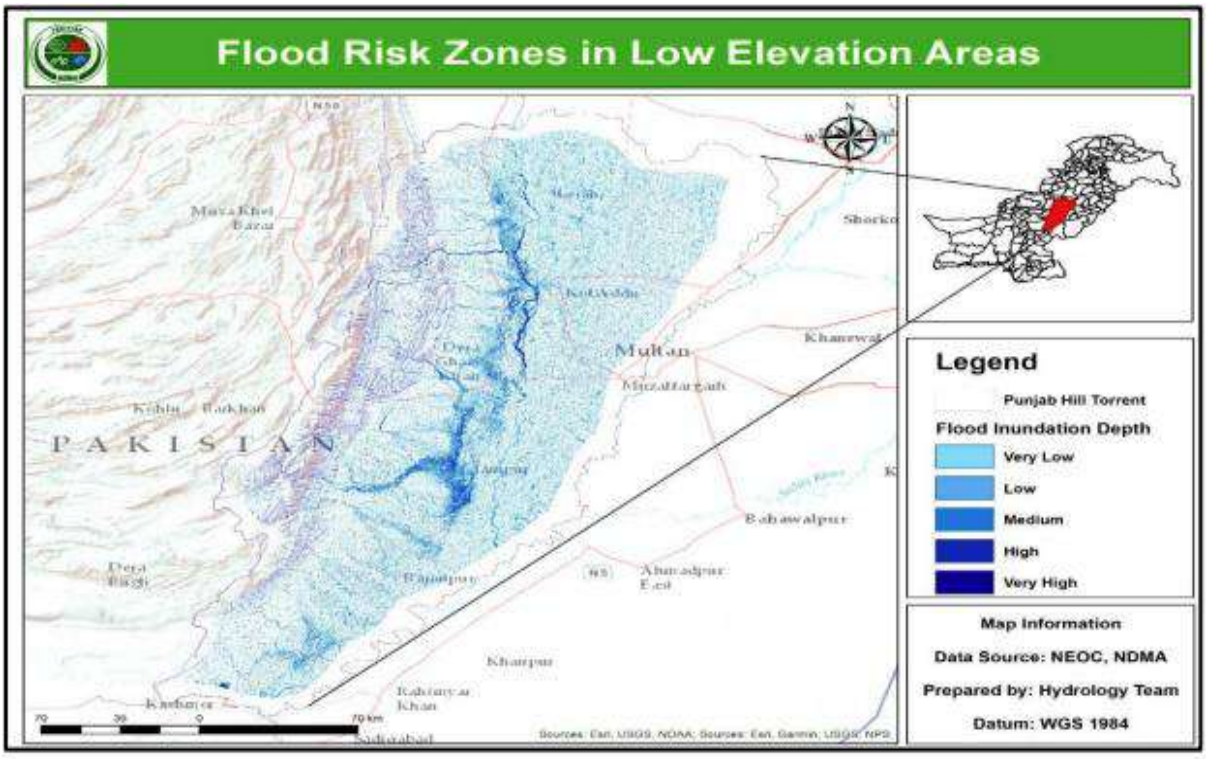


Figure 10: Map showing Vulnerable Low-Lying Areas identified (NDMA, 2025)

1.1.4. Khyber Pakhtunkhwa

1.1.4.1. KP Monsoon Projection

In Khyber Pakhtunkhwa, northern districts like Chitral, Swat, and Mansehra may receive normal to below-normal rainfall but remain vulnerable to flash floods due to steep terrain. Central and southern areas, including Peshawar and Dera Ismail Khan, are expected to see normal to slightly above-normal rainfall in late July. Higher temperatures may accelerate snow and glacier melt, increasing river discharge and risks of landslides, road damage, and river overflows.

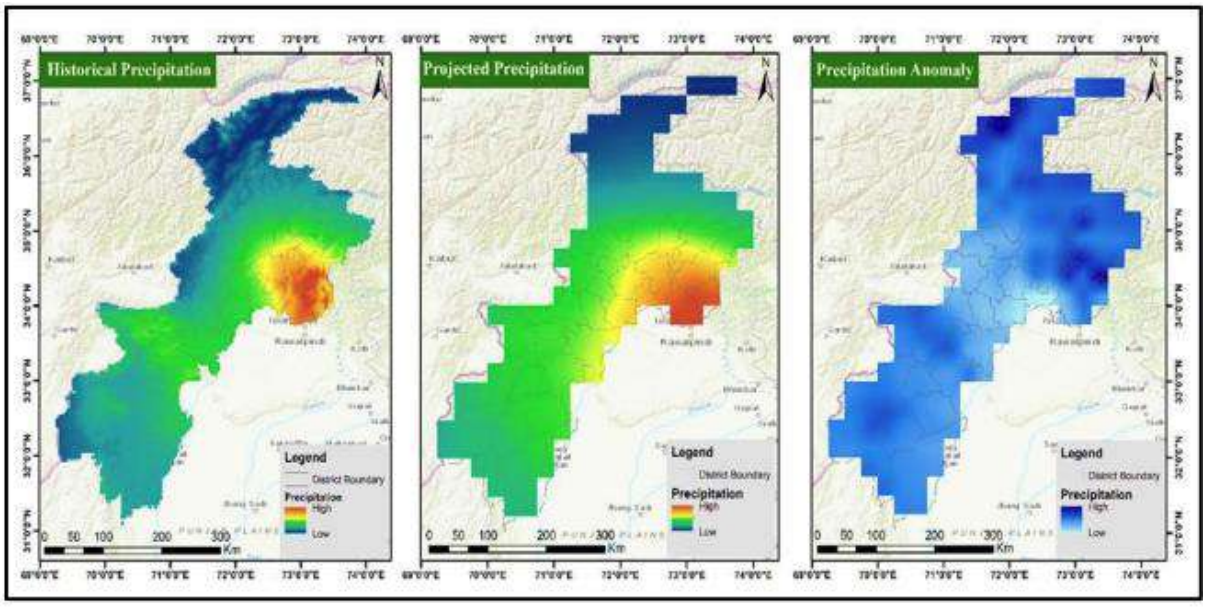


Figure 11: KP Comparative Analysis for Average Precipitation (July, August, September) (NDMA, 2025)

1.1.4.2. KP Flood Projection

The flood risk mapping for monsoon 2025 highlights vulnerable streams, rivers, and urban flooding hotspots as shown in figure…. Districts such as Peshawar, Mardan, Charsadda, Kohat, and Dera Ismail Khan are identified as high-risk due to their location near rivers, dense drainage networks, and past flood incidents. With expected normal to slightly above-normal rainfall, the risk of urban flooding in these already vulnerable areas is significantly increased.

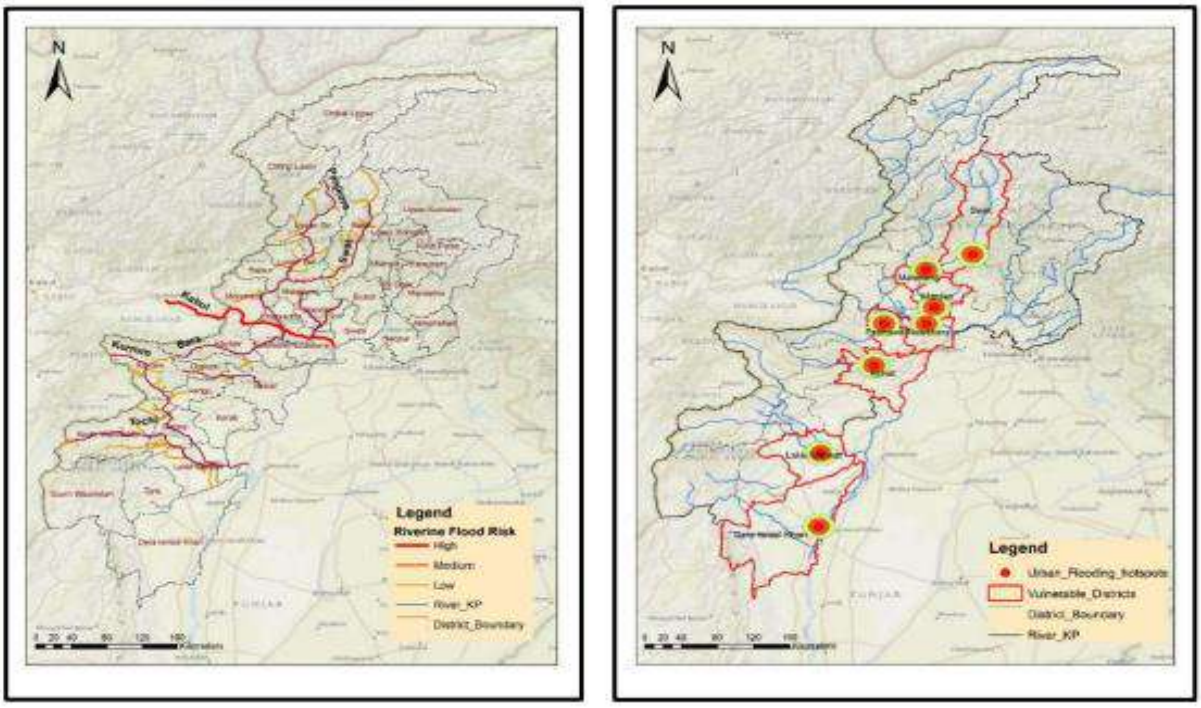


Figure 12: Flood Risk Mapping and Urban Flooding Hotspots (NDMA, 2025)

1.1.5. Sindh

1.1.5.1. Monsoon Projection

Sindh is expected to experience a varied monsoon, with upper districts like Sukkur, Larkana, and Jacobabad receiving above-normal rainfall in late July. Lower Sindh, including Karachi and Hyderabad, may see slightly above-normal rainfall, raising the risk of urban flooding, particularly in Karachi. While rains may ease dry conditions, they could strain city drainage systems, and pre-monsoon heatwaves may further stress energy and water resources.

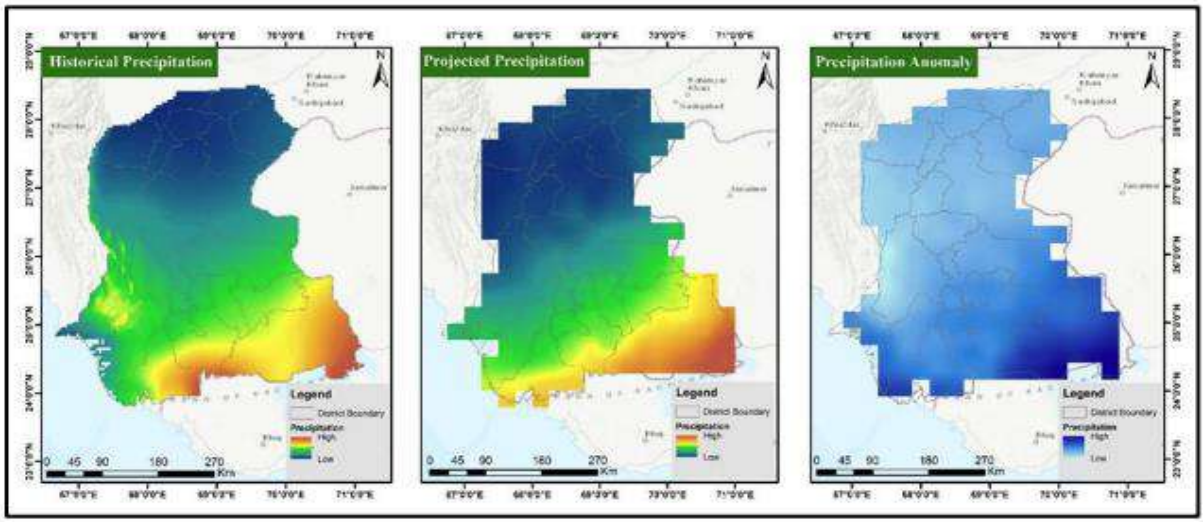


Figure 13: Sindh Comparative Analysis for Average Precipitation (July, August, September) (NDMA, 2025)

Sindh usually sees low to moderate monsoon rainfall, with coastal areas like Karachi, Thatta, and Badin receiving more than interior regions such as Jacobabad and Sukkur. For monsoon 2025, above-normal rainfall is expected in lower Sindh, while upper Sindh may see near to slightly above-normal rain. Southeastern Sindh is projected to receive positive rainfall anomalies, improving water availability but increasing the risk of urban flooding in low-lying coastal cities.

1.1.5.2. Flood Projection

The projected rainfall increase may cause localized flooding and excess runoff in low-lying, arid areas with poor soil absorption. The Indus River is expected to reach medium to high flood levels in Sindh during the monsoon.

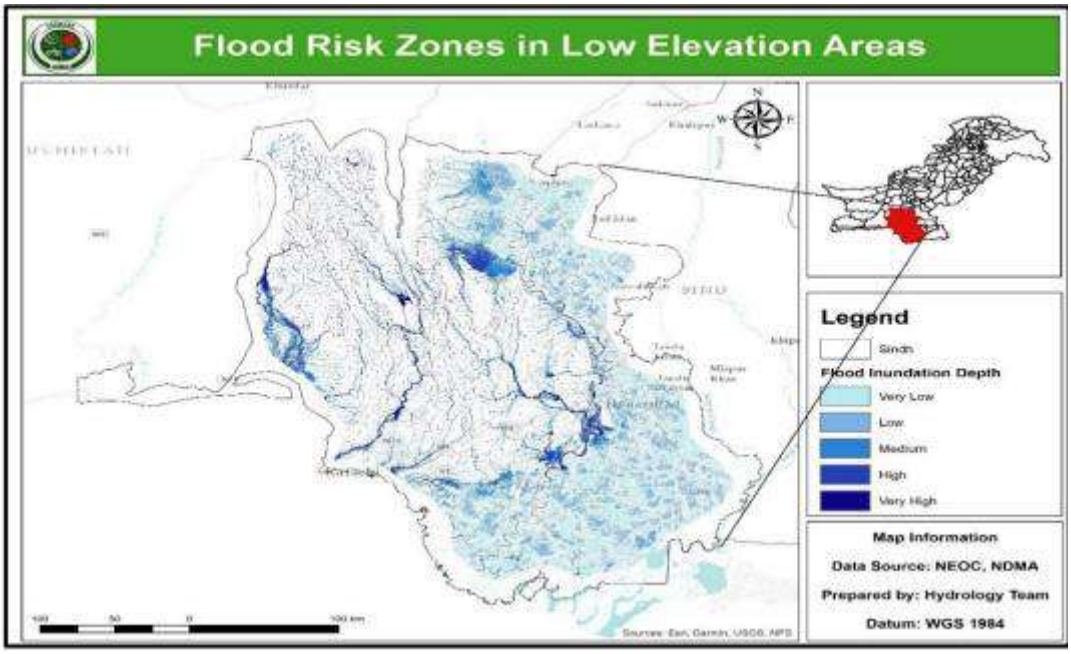


Figure 14: Maps showing Flood Risks Zones in Low Lying Areas of Sindh (NDMA, 2025)

1.1.6. Balochistan

1.1.6.1. Monsoon Projection

Balochistan's rainfall will be uneven, with eastern and central districts like Khuzdar and Lasbela expecting slightly above-normal rain, especially later in the monsoon. Western areas such as Quetta and Zhob may see near to below-normal rainfall. While arid conditions may persist, sudden heavy rains could trigger localized flash floods.

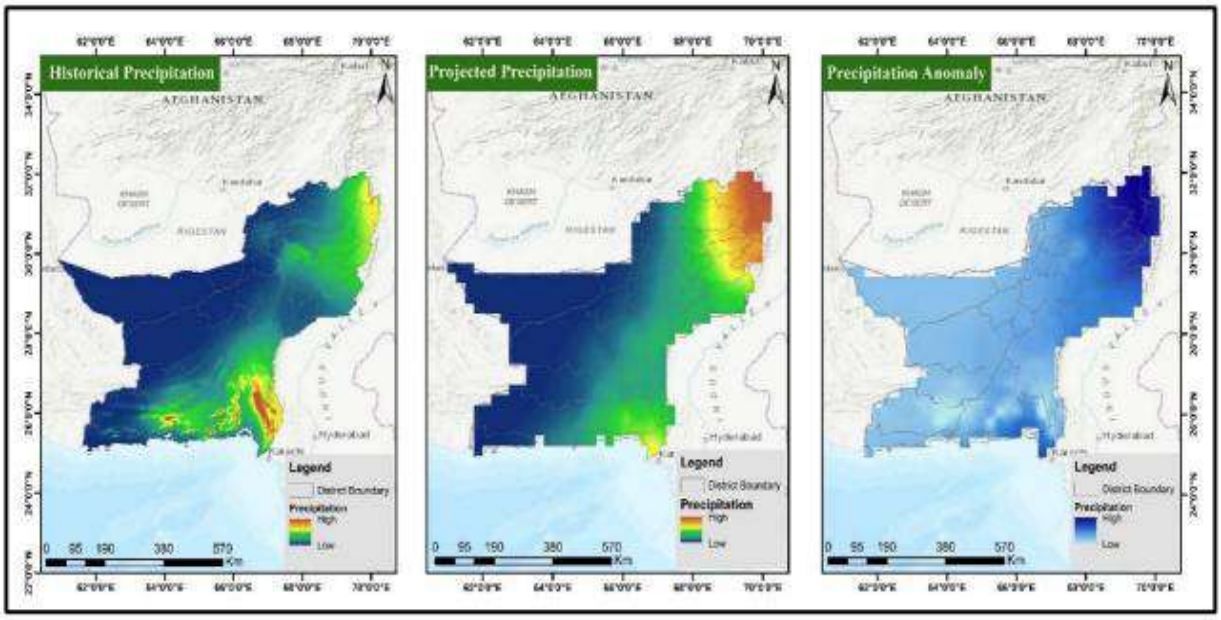


Figure 15: Balochistan Comparative Analysis for Average Precipitation (July, August, September) (NDMA, 2025)

Balochistan historically receives low monsoon rainfall, with slightly higher amounts in southeastern areas like Lasbela and Khuzdar. Future projections indicate a modest increase in rainfall, particularly in the southeast and northeast, though overall levels will remain low compared to national averages.

1.1.6.2. Flood Projection

Balochistan is expected to experience a mixed hydrometeorological pattern during the upcoming monsoon, with southeastern districts like Lasbela, Khuzdar, and Washuk likely receiving slightly above-normal rainfall in the latter half of the season. While this increase may offer some benefits, it also heightens the risk of flash floods due to poor soil absorption, limited vegetation, and inadequate drainage. Eastern Balochistan remains particularly flood-prone because of its terrain and proximity to major river systems, making it vulnerable to hydrological hazards during intense rainfall events (NDMA, 2025)

Table 2: Most Vulnerable districts in Balochistan

District	Topographical Features	Flood Vulnerability
Jaffarabad	Extremely low lying; acts as a natural basin for floodwaters from the north and west	Severely impacted in major flood events (2010, 2011, 2012, 2022); high floodwater accumulation
Naseerabad	Similar low-lying topography to Jaffarabad	Regularly affected by floods from hill torrents and Indus River overflows
Sibi	Located at the mouth of the Bolan Pass	Prone to intense flash floods from mountainous

		runoff in the Bolan River Basin
Kachhi (Bolan)	Comprises the flat Kachhi Plain, catchment for Bolan River floodwaters	Wide floodwater dispersion due to low gradient; exposed to riverine and hill torrent floods
Jhal Magsi	Downstream location in the Bolan River system	Vulnerable to overflow from Bolan River and its tributries
Dera Bughti (East)	Low-lying areas bordering Sindh	Susceptible to Indus River overflow and spillovers from adjacent hill torrent channels

(NDMA, 2025)

1.2. Global Mega Floods in 2025

In early 2025, various regions worldwide experienced significant flooding events. Notably, Malaysia, Iraq, and Argentina faced severe inundations. In Nigeria, a major flood in Mokwa LGA caused numerous fatalities and displacements in May. Later, in March, Iraq suffered widespread flooding across multiple governorates due to heavy rainfall. Around the same time, Argentina's Buenos Aires province, particularly Bahía Blanca, was hit by intense flooding, causing significant damage. These events highlight the increasing frequency and intensity of extreme weather events linked to climate change.

1.2.4. Nigeria:

On May 29, 2025, catastrophic flooding hit Mokwa LGA in Niger State, Nigeria, severely affecting Tifin Mazda Anguwan Hausawa and Unguwan Hausawa communities. The disaster left 159 dead, 98 missing, and over 3,000 people impacted, with 1,590 displaced. Around 265 homes were destroyed, roads and bridges were washed away, and farmland with key crops like maize and millet was submerged. Access to clean water and sanitation was disrupted, and several health facilities, including Mokwa General Hospital, were damaged. Emergency response efforts included mobile clinics and hygiene support from WHO and UNICEF to prevent disease outbreaks (Davies, 2025).

Nigeria Floods (2025)

Nigeria Floods (2025)

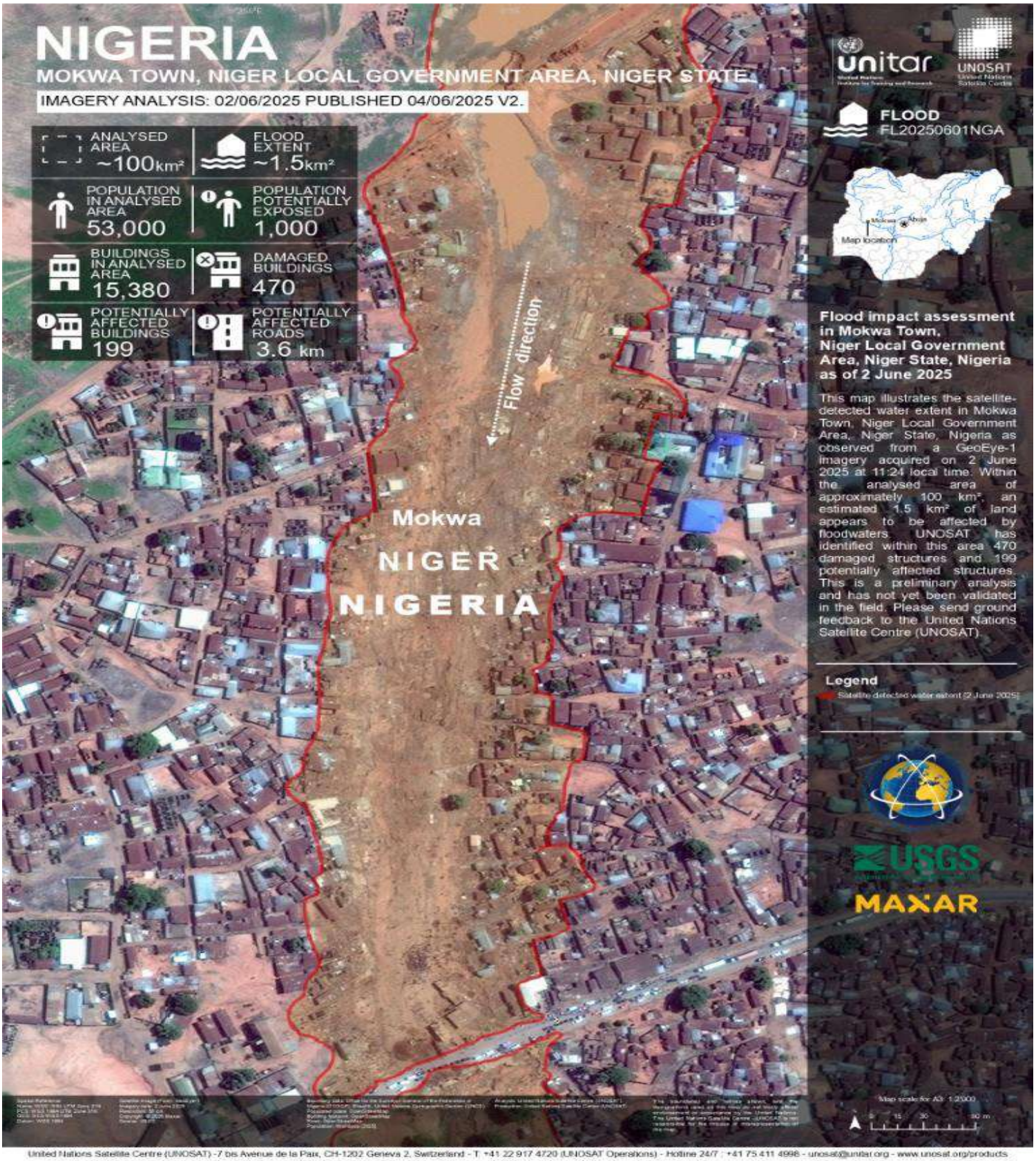


Figure 16: A map illustrating satellite-detected water extent in Mokwa Town, Nigeria, as observed from a GeoEye-1 imagery acquired on 02 June 2025. Credit: United Nations Satellite Centre (UNOSAT).

1.2.5. Malaysia

Between November 2024 and March 2025, Malaysia experienced a series of severe floods triggered by the Northeast Monsoon. Beginning on November 29, heavy rains displaced around 148,000 people across 10 states, including Kelantan, Terengganu, and later Johor, Pahang, and others during a second wave in December. In January, floods hit Johor and Borneo, displacing over 10,000 people, followed by further severe rainfall in February–March, with Bintulu in Sarawak recording 900 mm of rain in a single day. By May 8, over 15,000 people had been displaced and eight deaths reported, with Johor, Sabah, and Sarawak being the worst affected regions (Ho, 2025).

Malaysia Floods (2025)

1.2.6. Iraq

On March 7, 2025, Iraq was hit by exceptionally heavy rainfall that lasted three days, causing widespread flooding across several governorates. Cities like Al Anbar, Erbil, Diyala, Al Qadisiyyah, and Thi Qar saw streets inundated and basic services disrupted, including power, water, and communications. Baghdad recorded over 72 mm of rain in one hour—far exceeding its drainage capacity—leading to severe road and residential flooding. The Kurdistan Region also reported significant damage to homes and businesses. In Babil and Karbala, major roads were submerged, severely affecting mobility. As a safety measure, many schools and universities were closed, while emergency services struggled to cope with the scale of the disaster (Relief Web, 2025).

1.2.7. Argentina

In early March 2025, catastrophic flooding hit Bahía Blanca in Buenos Aires Province, Argentina, after record-breaking rainfall of 210 mm in just 24 hours. The flooding, intensified by the overflow of the Maldonado Canal and Napostá Stream, caused widespread damage, power outages, and disruption to transport, schools, and hospitals. Over 2,700 people were displaced, and around 169,000 residents were affected. Thousands of homes were damaged, with many seeking shelters in evacuation centers. The provincial government provided financial aid to support 33,000 affected households with repairs and essential purchases (Davies, 2025).

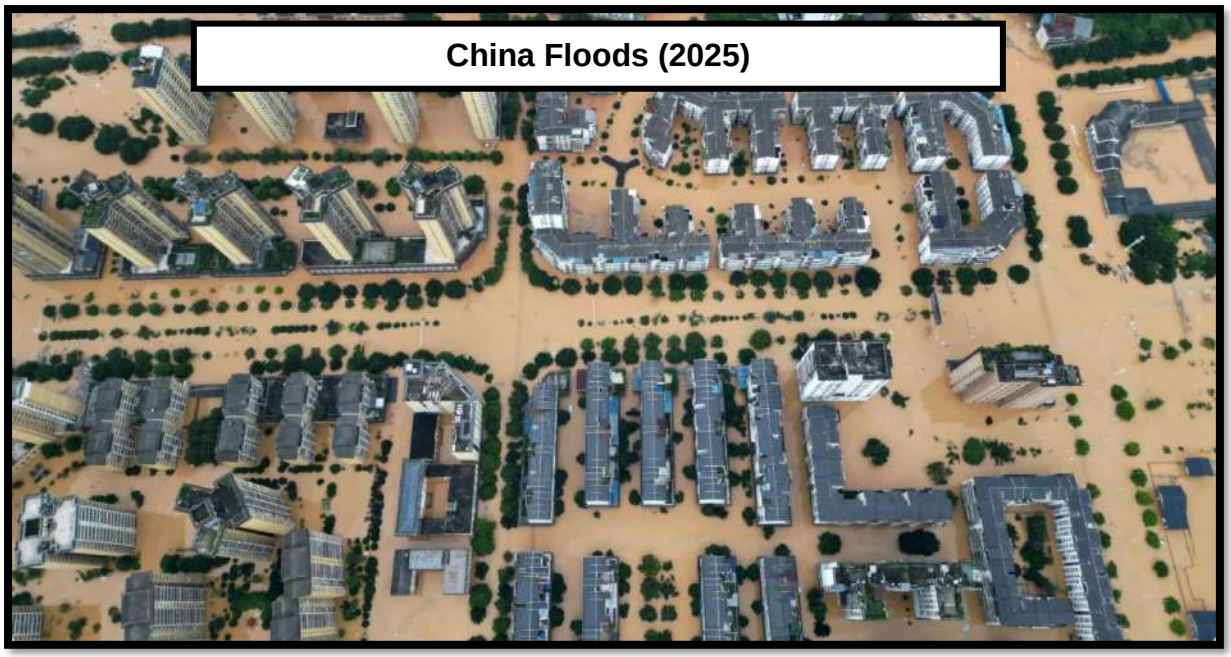
1.2.8. Jakarta, Indonesia

In early March 2025, torrential rains triggered severe flooding across Jakarta and surrounding areas, submerging over 1,000 homes and reaching depths of up to 3 meters. The Jakarta governor raised the flood alert to its second-highest level, activating water pumps and weather modification efforts to reduce rainfall. Evacuations were carried out in flooded neighborhoods, including a hospital in Bekasi where patients had to be relocated due to rising water and power outages. The national weather agency forecast continued heavy rainfall until March 11, prompting the government to establish temporary shelters and distribute aid. Local reports described the situation, especially in Bekasi, as the worst since the devastating 2020 floods that killed 60 people (Reuters, 2025).

Indonesia Floods (2025)

1.2.9. China

Severe flooding struck Rong Jiang County in Guizhou province, China, leading to the evacuation of around 80,900 residents. Triggered by a tropical depression, the floods caused extensive damage to infrastructure, disrupting transportation and communication networks. Low-lying areas were submerged, and several individuals became trapped. Authorities responded by issuing the highest-level flood emergency alert. At least six fatalities have been reported due to the disaster (Aljazeera, 2025).



1.3. Global Best Practices

1.3.4. Rain Gardens

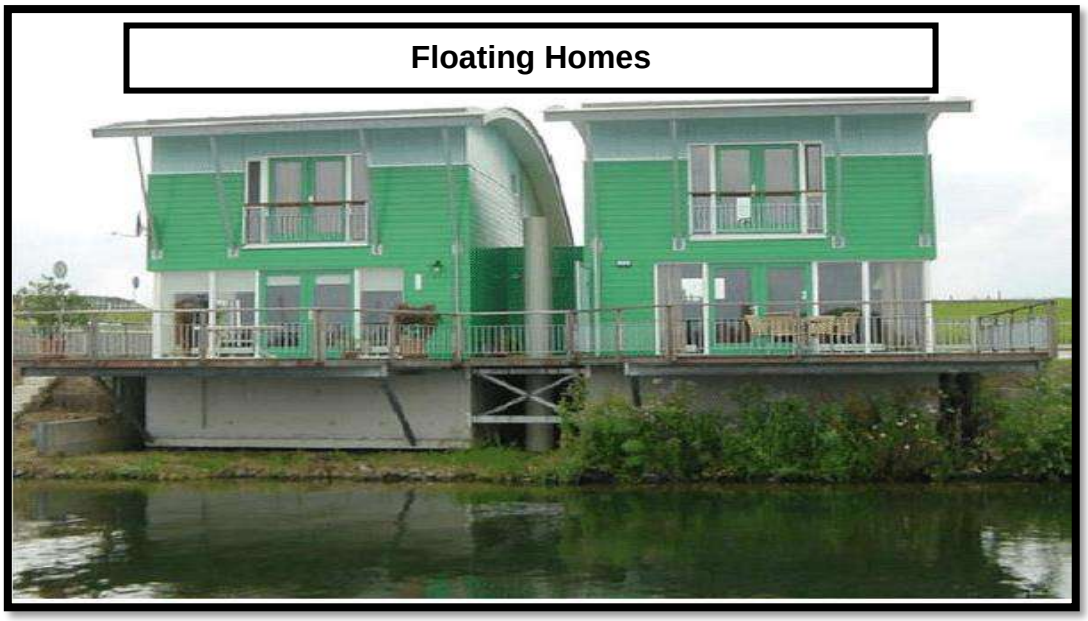
Rain gardens are shallow, vegetated areas designed to collect and absorb stormwater runoff, allowing it to naturally infiltrate into the soil. These gardens help minimize localized flooding, filter out pollutants before they reach rivers and streams, and support water conservation. Additionally, they offer habitat for pollinators and other beneficial wildlife, making them an eco-friendly and cost-effective flood management solution (Kenworthy, 2022).

1.3.5. Sponge Cities

Sponge cities aim to manage flooding and stormwater through the use of green infrastructure rather than depending solely on traditional drainage systems. By incorporating urban parks, gardens, wetlands, green spaces, and permeable surfaces, these cities can help reduce flash flooding, address water scarcity, and mitigate urban heat. Such features also enhance biodiversity by creating habitats for urban wildlife while effectively capturing and absorbing excess rainwater (Wilson, 2019).

1.3.6. Floating Homes/ Amphibious Architecture

In flood-prone regions, consider adopting amphibious housing solutions as a resilient design strategy. This involves constructing homes on buoyant, hollow concrete bases anchored to vertical steel guideposts. During normal conditions, the homes rest securely on the ground. However, in the event of a flood, the buoyant foundations allow the structures to rise with the water level, floating like the hull of a boat while remaining stabilized by the guideposts. Once floodwaters recede, the homes return to their original positions without structural damage. This adaptive approach has been successfully implemented in the Netherlands and is ideal for areas with frequent or unpredictable flooding (Anthes, 2018).

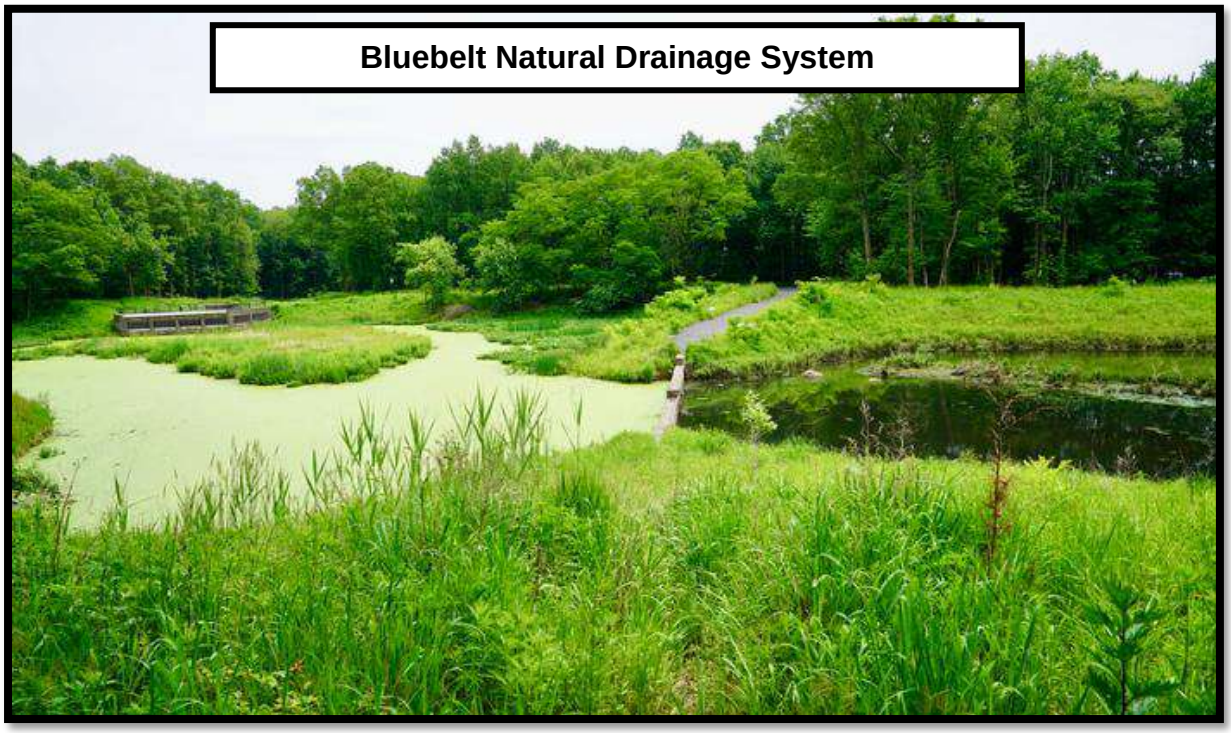


1.3.7. Green Climate Screens

In urban areas vulnerable to both flooding and environmental stressors, implement integrated infrastructure like the Green Climate Screen. This multifunctional solution, developed in Denmark, combines flood mitigation with urban enhancement. It channels rooftop stormwater to the top of a vertical noise barrier constructed with water-absorbent materials. These materials retain runoff and gradually release it through evaporation, effectively managing the water load from a 10-year storm event. Excess water is safely diverted to nearby green buffer zones, reducing flood risk while also improving noise reduction, urban aesthetics, and residential privacy. This approach is ideal for dense urban settings seeking sustainable, space-efficient flood solutions (Landers, 2024).

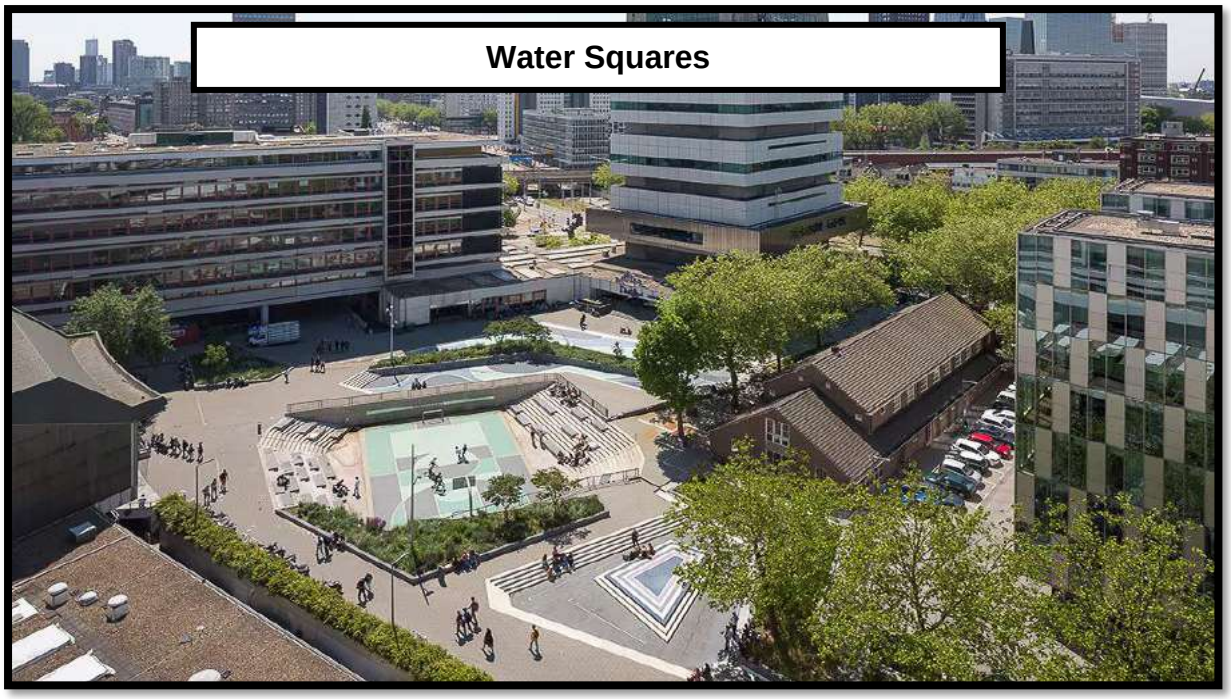
1.3.8. Bluebelt Natural Drainage Systems

For sustainable urban flood management, implement Bluebelt systems—an ecologically rich and cost-effective alternative to traditional storm sewers. First adopted in Staten Island, Bluebelts preserve and enhance natural drainage corridors such as streams, ponds, and wetlands. These systems are designed to convey, store, and filter stormwater runoff from streets and sidewalks using open, natural landscapes rather than enclosed pipes. Bluebelts not only reduce urban flooding and improve water quality, but also offer additional community benefits, including public green space and wildlife habitat. As climate change increases the risk of sea level rise and extreme rainfall, Bluebelts provide a resilient, scalable solution for cities seeking long-term, nature-based stormwater management strategies (NYC Environmental Protection, 2025)



1.3.9. Water Squares

In dense urban areas with limited space and high groundwater levels, water squares provide multifunctional public spaces that double as stormwater buffers. Designed with lower-lying zones that temporarily store runoff during heavy rain, these squares manage large water volumes while serving as recreational or green areas when dry. Proper design, waterproofing, and regular maintenance are essential to ensure their effectiveness and usability (Urban blue green belts, 2025).

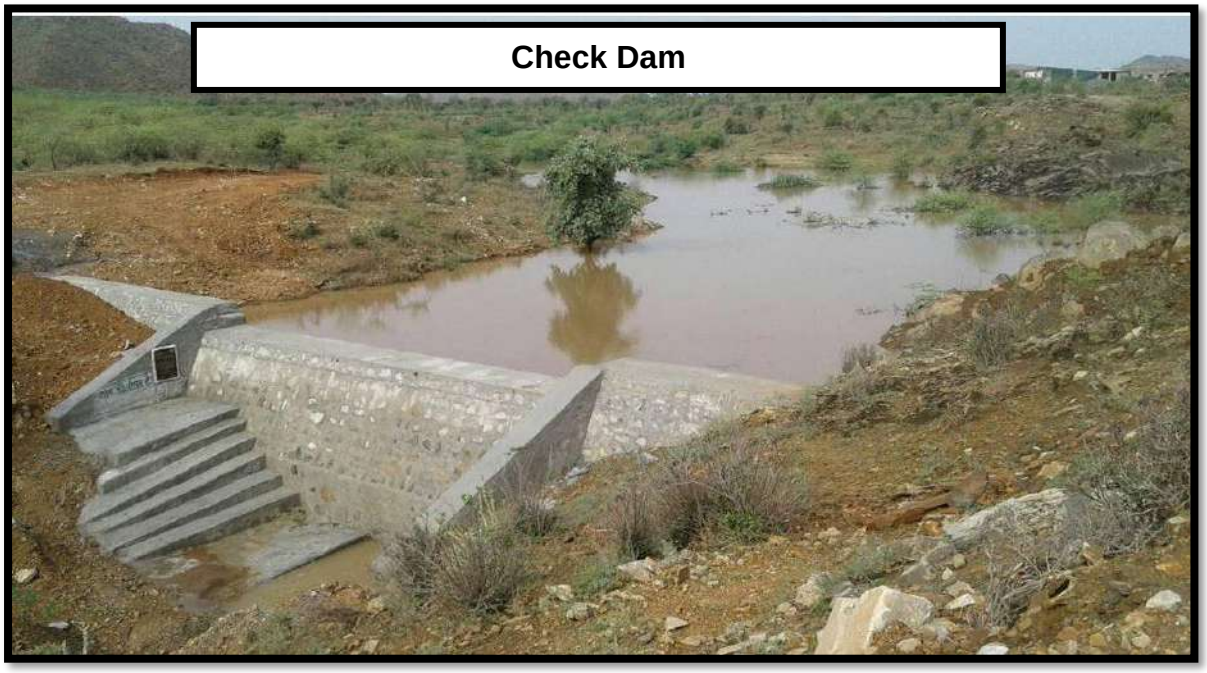


1.3.10. Bioswales

Bioswales are vegetated, porous ditches designed to capture and infiltrate stormwater runoff from roofs and roads, reducing pressure on sewer systems. Built with layered soil, gravel, and drainage pipes, they allow rainwater to percolate into the ground while filtering pollutants. During heavy rain, overflows direct excess water to drains or surface water, ensuring flood control and enhancing urban green infrastructure (Urban blue green belts, 2025).

1.3.11. Reusing Flash Floods

The adoption of sponge-city and floodwater harvesting approaches offer effective solutions for reusing flash floods as water resources. Techniques like constructing check-dams in gullies, retention basins, and underground storage tanks slow runoff, enhance infiltration, and facilitate groundwater recharge. Complemented by permeable pavements, bioswales, green roofs, and sediment-control structures, these systems cleanse and store stormwater for irrigation, ecosystem restoration, and emergency supply. Integrating these infrastructure elements with community-based planning and watershed management ensures sustainable, equitable reuse of floodwater while reducing soil erosion and improving local resilience (Zhang et al., 2018).



1.3.12. Wetland Restoration

Restoring and preserving wetlands is a best practice for flood mitigation, as wetlands act as natural sponges that absorb and store excess water during heavy rainfall, reducing downstream flood risks. Enhancing their capacity not only improves water retention but also filters out sediments and pollutants, contributing to better water quality. Additionally, wetlands support rich biodiversity and serve as critical carbon sinks, strengthening climate resilience and providing natural barriers against extreme weather events. These combined benefits make wetland restoration a vital strategy in sustainable flood management (Lee. 2025).

1.3.13. Gabion Walls

Gabion walls are a best practice for flood prevention due to their ability to regulate water flow, reduce erosion, and strengthen riverbanks and coastal areas. Their permeable and flexible structure slows down floodwaters, protects infrastructure, and enhances drainage systems. Environmentally sustainable and cost-effective, gabions also support agricultural land protection while requiring minimal maintenance (YKM Group, 2025).

1.4. Asian Countries with High Flood Damage:

Between 1950 and 2025, several Asian countries have experienced significant flood-related damages, both in terms of economic losses and human casualties. China, due to its vast river systems and large population, has been particularly affected. Notably, the 1954 Yangtze River flood resulted in over 30,000 deaths and inundated 3.17 million hectares of land, making it one of the most devastating floods in modern Chinese history. The 1998 Yangtze and Songhua Rivers flood caused approximately 5,500 deaths, displaced 21 million people, and led to economic losses of around US $31 billion (1998 prices). In 2010, floods across China affected 30 provinces, resulting in 3,222 deaths and economic losses of US $67.8 billion, marking it as the costliest flood year in the last three decades.

India has also faced severe flooding events. The 2020 South Asian floods, primarily affecting India, caused approximately 6,511 fatalities and economic damages amounting to US $105 billion, with India accounting for US $88.5 billion of the total.

In Japan, the 1953 Northern Kyushu flood resulted in 771 deaths and extensive property damage, while the 2020 Kyushu floods caused 77 deaths and US $5.67 billion in damages.

Pakistan's most significant flood event in recent history occurred in 2010, affecting over 20 million people and causing damages estimated at US $10 billion and Pakistan’s 2022 flood was one of the worst in its history. It killed 1,739 people and caused economic losses of approximately US $30 billion, affecting over 33 million people as shown in Figure 17. In 2025 till this time Malaysia and China has experienced floods affecting infrastructure and human life. These events underscore the urgent need for enhanced flood management strategies and international cooperation to mitigate future risks (Sohoulande Djebou & Singh, 2016).

Figure 17 illustrates major flood events in Asia and beyond from 1950 to 2025, highlighting trends in both human fatalities and economic losses. The 1954 China flood remains the deadliest, while the 2020 India flood caused the highest economic loss at $105 billion. Recent events like the 2025 Malaysia flood show lower fatalities but rising economic impacts, reflecting improved disaster response yet growing vulnerability due to urbanization and climate change. Overall, the graph emphasizes the urgent need for stronger flood resilience and adaptation measures (Sohoulande Djebou & Singh, 2016).

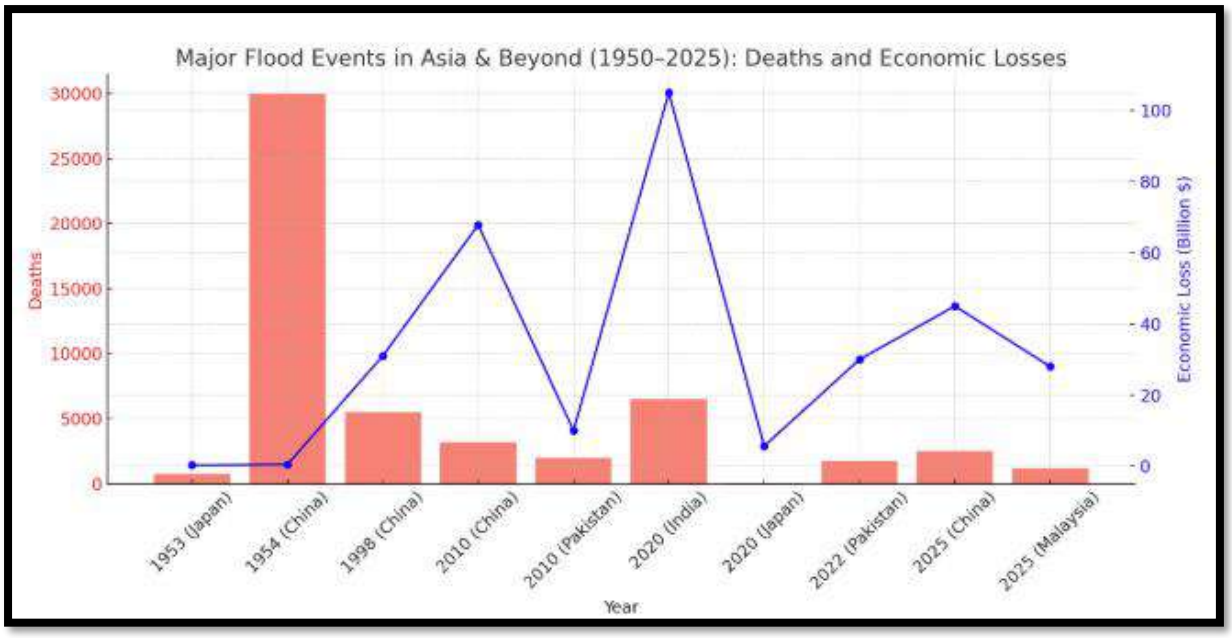
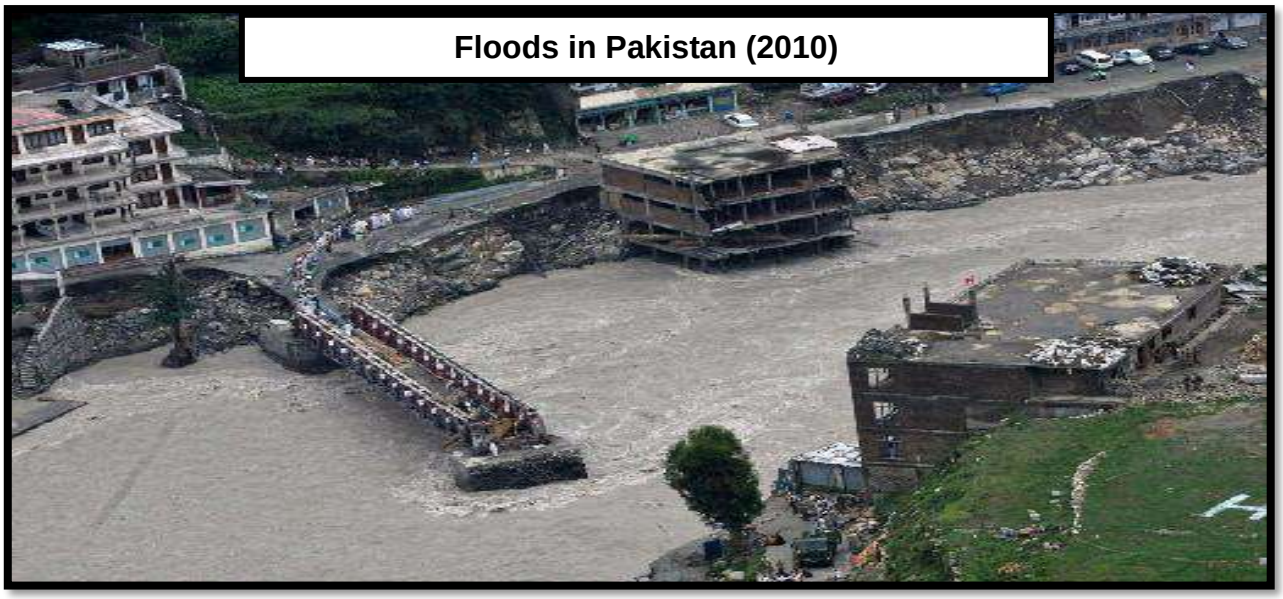


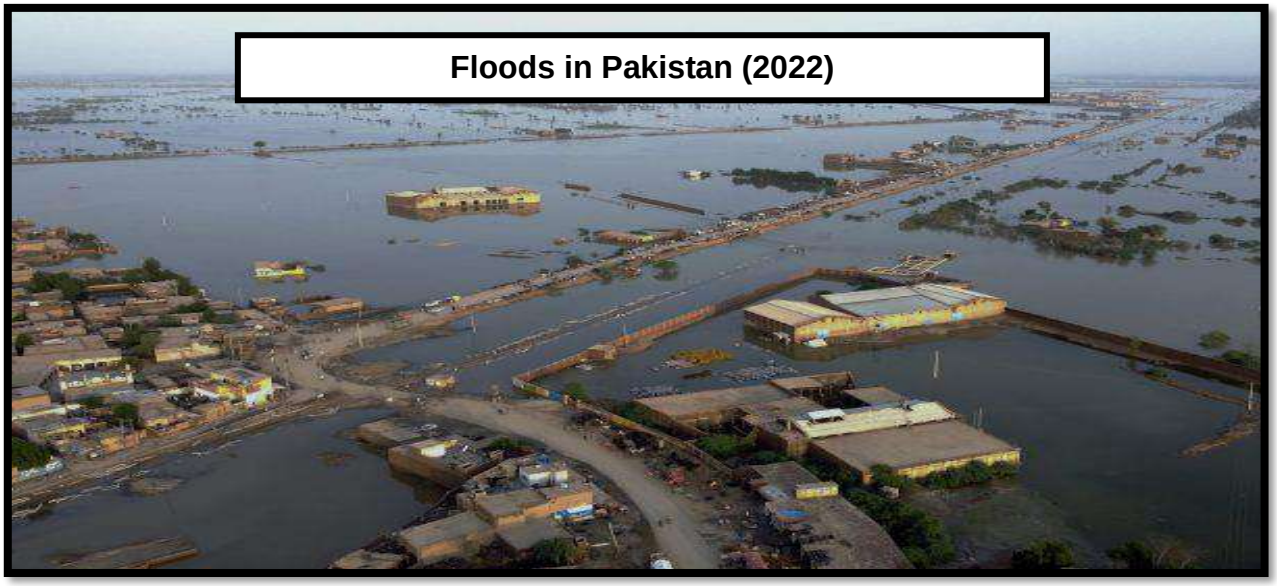
Figure 17: Major Flood Events in Asia (1950-2024): Deaths and Economic Losses

Floods in India (2020)

1953 Northern Kyushu Flood (Japan)

Floods in Malaysia (2025)





1.4. Pakistan's flood context:

Pakistan's climate, which is typically hot and dry, has experienced significant fluctuations in recent years, leading to severe flooding in major rivers and streams besides in plains and urban centers in addition to the coastal areas. Additionally, landslides can create temporary natural dams, and when these collapse, they cause large flows that result in floods. Floods in Pakistan primarily occur in mid-June, July to October, damaging monsoon crops like rice and sometimes affecting winter crops due to prolonged water retention. In the upper Indus Basin (Khyber Pakhtunkhwa and Punjab), floodwaters return to the main river channel, but in the lower basin (Sindh), the Indus River flows along ridges with embankments on both sides (first line of defense and second line of defense bunds/embankments). When these embankments fail, floodwaters overflow, submerging land and affecting both crops and local

communities. Table 3 highlights major flood events experienced by Pakistan in the past.

Since its creation, Pakistan has faced major flood events almost every 3rd year causing heavy damages to the public and private properties, important installations besides loss of precious human lives. Prior to the unprecedented floods of 2010, the total cumulative damages caused to the national economy by the recurring floods amounts almost to USD 19 billion. Later most recently the floods of 2010 alone inflicted loss of USD 10 billion with further loss of USD 30 billion by the 2022 pluvial floods (PDNA reports). The 2010 floods including that of 2011, 2012, 2014, 2015 and 2022 floods have cumulatively resulted in displacement of almost 63 million people ***(20 million in 2010, 10 million in all floods of 2011 to 2015, and 33 million alone in 2022 floods)***. These floods have affected vast areas in the four provinces including Gilgit-Baltistan, Merged Area-KP (Ex-FATA) and Azad Jammu & Kashmir. Owing to the adverse impacts of climate change, in the recent years, vulnerabilities of communities to coastal & urban flooding including GLOFs have also increased manifold.

Post 2010 floods, in a monsoon rainfall distribution analysis Pakistan Meteorological Department (PMD) assessed that climate change has rendered a 100 km spatial shift towards west in the overall monsoon pattern in the country. Rainfall distribution patterns have not only shifted spatially but also seasonally with summer monsoon rainfalls have shifted towards late season; similarly, winter rain and snowfall have also shifted towards late February and March. Changing patterns result into emergence of new vulnerable areas to floods which include Khyber Pakhtunkhwa (KP), South Eastern Punjab and Central Sindh. In-particular eleven (11) districts of KP and fourteen (14) districts of Punjab have been identified to be facing major brunt of future floods.

Flood control planning is a complex problem in Pakistan and calls for great ingenuity and experience on the part of the planners. To-date it is being carried out on pre-emptive flood management approach with essentially to cover three specific objectives:

i) Reduce or eliminate damages to existing properties
ii) Prevent future increase in damages
iii) Mitigate the residual hazards.

The nature of flood problems varies in each of the four provinces and federally administered areas due to varying physiographic, climatic, demographic, and socio-economic conditions. In Punjab flood protection marginal bunds, spurs, studs, dikes are generally constructed to protect Headworks and other irrigation structures, safeguard certain towns, villages & adjoining agricultural lands and prevent land erosion. The Indus River flows on a ridge in Sindh Province and generally, surrounding areas (outside the flood embankments) are lower than the river bed; hence, water once leaving the Indus River does not return to the main channel. For that purpose, Double Line of Defence bunds are constructed in Sindh. In KP floods in the province

are mainly due to flash flood flows in secondary rivers (Kabul, Swat, Panjkora, Khurram, Shah Alam etc.) and major hill torrents/flood flow generating nullahs having steep bed slopes. Mostly flood protection walls/embankments and short spurs are constructed to save the areas from spill action and erosion. The bed slopes of rivers and nullahs in Gilgit-Baltistan, Merged Area/Ex- FATA and AJ&K are very steep. Flood Protection walls and short spurs in Plain Cement Concrete (PCC) & gabion crates are constructed in order to check the spill and erosive action of flood flows in rivers/hill torrents.

For the purpose of flood forecasting and warning there exists weather radar network, HF Radio communication system and river flood telemetry system. In the past, exposure to flood risks has been handled largely through structural measures by working on pre-emptive flood management approach. However, strategies that rely largely on structural solutions may alter the natural environment of the river, which may result in loss of habitats, biological diversity and ecosystem productivity. Further, structural approaches are bound to fail the moment an extraordinary or unforeseen event occurs. These traditional approaches, where the risks are merely transferred spatially, are likely to generate conflicts and inequities. Environmental degradation has the potential to threaten human security, including life and livelihoods, food and health security. This realization has recently led to calls for a paradigm shift from traditional flood management approaches to Integrated Flood Risk Management (IFRM). A well-thought-out professional and all-inclusive Plan, aligned to the objectives envisaged in 4RF and 5Es document of Government of Pakistan, has been formulated pivoting around the **Integrated Flood Risk Management (IFRM**) approach as against the existing pre-emptive flood risk management approach, including:

iv) Structural measures for riverine, Hill torrents flash flooding, coastal flooding & GLOFs (e.g., spurs/dikes, dams & dispersal/drainage structures etc.),
v) Non-structural measures like Early Warning & Telemetry systems,
vi) Integrated Watershed Management including Nature-based Solutions (NbS),
vii) Urban/Pluvial flood control measures; & v) Legal and Institutional arrangements (Shah et al. 2020).

Table 3: Historical Flood Events Experienced in Pakistan

S.No	Year	Direct Losses (US$ Million) @1US$ = PKR 86	Lives Lost	Affected Population	Flooded Area (Sq. km)
1.	1950	488	2,190	10,000	17,920
2.	1955	378	679	6,945	20,480
3.	1956	318	160	11,609	74,406
4.	1957	301	83	4,498	16,003
5.	1959	234	88	3,902	10,424
6.	1973	5,134	474	9,719	41,472
7.	1975	684	126	8,628	34,931
8.	1976	3,485	425	18,390	81,920
9.	1977	338	848	2,185	4,657
10.	1978	2,227	393	9,199	30,597
11.	1981	299	82	2,071	4,191
12.	1983	135	39	643	1,882
13.	1984	75	42	251	1,093
14.	1988	858	508	100	6,144
15.	1992	3,010	1,008	13,208	38,758
16.	1994	843	431	1,622	5,568
17.	1995	376	591	6,852	16,686
18.	**2010**	**10,056 @1US$ = PKR 86**	**1,985**	**17,553**	**160,000**
19.	2011	3,730 @1US$ = PKR 94	s516	38,700	27,581
20.	2012	2,640 @1US$ = PKR 95	571	14,159	4,746
21.	2013	2000 @1US$ = PKR 98	333	8,297	4,483
22.	2014	440 @1US$ = PKR 101	367	4,065	9,779
23.	2015	170 1US$ = PKR 105.00	238	4,634	2,877

24.	2016	6 1US$ = PKR 104.81	153	43	-
25.	2017	-	172	-	-
26.	2018	-	88	-	-
27.	2019	-	235	-	-
28.	2020	-	409	-	-
29.	2021	-	198	-	-
30.	**2022**	**30,000* 1US$ = PKR 225**	**1,739**	**6,631^**	**85,000`**
31.	2023	-	226	-	-
Total		**68,225**	**15,199**	**203,704**	**701,558**

(FFC, 2023)

1 Major Flood Events in Pakistan:

Flooding in Pakistan has evolved significantly since the country's independence in 1947, both in terms of frequency and intensity. This evolution is shaped by a combination of climatic, geographic, demographic, and infrastructural factors.

2.1. 1950 Floods:

The 1950 flood was one of Pakistan's earliest major floods post-independence, severely impacting Punjab and causing significant economic damage. The monsoon rains of 1950 caused an estimated 2,900 deaths across Pakistan. Punjab, including Lahore, was severely impacted by flooding from one of the eastern rivers (River Ravi), while parts of Sindh also experienced flooding. Over 100,000 homes were destroyed, leaving approximately 900,000 people homeless (Relief Web, 2010; Page, 2023).

2.2. 1955 Floods:

In August 1955, heavy monsoon rains caused severe flooding in India and East Pakistan. With 20 major rivers flowing from the Himalayas into the Bay of Bengal's floodplains, the Indian states of Bihar and Assam, along with areas of East Pakistan, were hit hard. From October 4 to 6, 1955, Dalhousie and Sialkot received 200 mm of rain, while the Ujh and Basantar river catchments saw 500 mm of heavy rainfall, affecting the entire Ravi River basin. The 1955 flood was the most severe recorded at the Ravi River's Balloki Headworks, breaching embankments at the Bambanwala-Ravi-Bedian-Dipalpur Link Canal and Shahdara Bridge in Lahore (Government of Canada, 2019; Memon, 2014).

2.3. 1973 Floods:

In August and September of 1973, Pakistan's Indus River Valley was hit by one of the most severe floods in its history, causing extensive damage to infrastructure, agriculture, and livelihoods. Vast low-lying areas along the Indus and its main tributaries were submerged. In Punjab alone, around 8 million people were left without shelter, 10 million acres of land flooded, and one million individuals were displaced. Heavy rainfall, measuring 324 mm, led to major flood surges at Khanki Headworks and Panjnad Barrage on the Chenab River, affecting 3.6 million hectares/8.9 million acres of land across various districts, with floodwaters reaching heights of up to 6 meters (about 20 feet). The disaster resulted in the loss of 70,000 cattle, destruction of 255,000 homes, and the death of 474 people. The overall economic impact was estimated at US $2.39 billion (Deutsch & Ruggles, 1978; Johri, 1994; Memon, 2014).

2.4. 1975 Floods:

The 1975 floods in Pakistan were among the most devastating in the country's history, affecting a wide geographic area and causing significant human, agricultural, and economic losses. A total of 3,263 villages were affected across 16 major districts, impacting over 1.8 million people as shown in table 4**.** The floodwaters inundated approximately 1 million hectares/ 2.47 million acres, of which nearly 274,791 hectares**/** 679,000 acres were cropped land—resulting in severe agricultural disruption.

Among the worst-hit areas, Gujranwala District recorded the highest number of affected individuals, with over 420,000 people impacted and 42,253 hectares/104,405 acres of cropped land submerged. Sheikhupura District saw massive housing destruction, with more than 21,000 houses damaged. In Jhang District, over 92,200 hectares/ 171,000 acres of cropped land were affected, along with the displacement of more than 260,000 people**.** D.G. Khan experienced the largest area inundation, with over 215,000 hectares/ 531,000 acres affected, of which more than 41,000 hectares/ 101,000 acres were cultivated lands. The floods also caused significant livestock losses, with 1,062 cattle heads reported lost and 25 human fatalities across the impacted regions. In Narowal Tehsil alone, more than 182,000 people were affected, while Rajanpur saw extensive flooding across 208 villages**.**

The 1975 floods exposed the vulnerability of Pakistan's floodplain communities and highlighted the need for resilient infrastructure, early warning systems, and effective water management. The disaster served as a critical lesson in the importance of investing in long-term flood mitigation and climate adaptation strategies

Table 4: Statistical Statement Damages and Losses (Flood 1975)

S.No.	District	Tehsil	Village Affected	Persons Affected	Area Affected (Acres)	Cropped Area Affected (Acres)	Houses Damaged	Persons Died	Livestock Lost
1.	***Sialkot***	Shakargarh	258	20739	69404	14026	5193	4	93
		Narowal	250	182363	97401	63390	6930	4	73
		Pasrur	175	10227	29389	10552	711	-	12
		Daska	91	30000	34554	5000	541	-	3
		Sialkot	49	33265	10053	4099	277	2	3
			823	**276,594**	**240,801**	**97,067**	**13,652**	**10**	**184**
2.	***Gujranwala***	Gujranwala	107	168465	33612	14583	-	-	
		Wazirabad	57	77442	54743	2000	1012	-	
		Hafizabad	167	174254	185089	87822	2163	-	
			331	**420,161**	**273,444**	**104,405**	**3,175**	**-**	**-**
3.	***Sheikhupura***	Ferozewala	224	137041	80492	39768	11815	1	449
		Nankana	87	38000	64158	8269	9746	1	6
			311	**175,041**	**144,650**	**48,037**	**21,561**	**2**	**455**
4.	***Multan***	Multan	54	28687	34562	4453	98	1	-
		Kabirwala	40	47422	25674	12001	1201	-	-
		Shujabad	64	14828	76293	12123	37	-	-
		Khanewal	34	16000	15263	12449	452	-	-
		Vehari	2	-	201	95	-	-	-
			194	**106,937**	**151,993**	**41,121**	**1,788**	**1**	**-**
5.	***Sargodha***	Bhalwal	-	-	-	-	-	-	
		Jauhrabad	67	152891	88244	16317	1104		
6.	***Lahore***		105	51387	91566	24905	3320	7	7
7.	***Bahawalnagar***	Fortabbas	-	-	4427	1324	-	-	-

8.	***Rawalpindi***	Rawalpindi	-	2000	5 Miles	-	320	2	-
9.	***Rahim Yar Khan***		84	44849	159763	20450	4082		
10.	***Muzaffargarh***	Alipur	79	17338	58197	5709	329	5	
		Muzaffargarh	91	26619	96777	4257	294	-	
			170	**43,957**	**154,974**	**9,966**	**623**	**5**	
11.	***D.G. Khan***	Taunsa	94	1395	111473	3906	282	-	3
		Jampur	36	42713	40206	23329	1639	2	5
		Rajanpur	208	95363	343895	49947	5556	-	-
		D.G. Khan	26	17720	35960	24217	2527	1	50
			364	**157,191**	**531,534**	**101,399**	**10,004**	**3**	**58**
12.	***Gujrat***	Gujrat	44	-	7741	957	-	-	-
		Phalia	61	-	40068	1107	-	-	-
		Kharian	1	-	10	5	-	-	-
			106	**-**	**47,819**	**2,069**	**-**	**-**	**-**
13.	***Jhang***	Jhang	189	101918	153243	107432	734	-	-
		Chiniot	154	78366	155841	39459	1109	-	-
		Shorkot	79	82591	73591	24417	27	-	-
			422	**262,875**	**382,675**	**171,308**	**1,870**	**-**	**-**
14.	***Sahiwal***	Sahiwal							
		Okara	103	94254	22145	3895	170	-	-
15.	***Layallpur***	Toba Tek Singh	60	20346	30273	10196	456	-	-
		Sumandari	24	1035	17692	1520	60	-	-
			84	**21,381**	**47,965**	**11,716**	**516**	**-**	**-**
16.	***Mianwali***		99	-	125000	25000	1700	-	360
	Grand Total		**3,263**	**1809518**	**2467000**	**678979**	**63885**	**25**	**1062**

(PDMA, Punjab)

2.5. 1976 Floods:

The 1976 floods in Pakistan were also among the most catastrophic in the country's history, both in terms of scale and human impact. Between July and September, monsoon rainfall of 579 mm in the Indus catchment area triggered severe flooding, particularly affecting the Jinnah and Guddu Barrages along the Indus River. Table 5 shows that a total, more than 6.3 million people across 11,013 villages

were impacted, with over 0.85 million hechares/ 2.1 million acres of land submerged—273,783 hectares/ 676,509 acres of which were cropped farmland—resulting in massive losses to Pakistan's agricultural sector.

Sheikhupura, Lahore, and Sargodha were among the hardest-hit districts. Lahore District alone saw more than 540,000 people affected, with 29,324 houses damaged and 23,964 homes completely demolished or washed away. Sheikhupura recorded the highest amount of cropped area affected—over 94,295 hectares/ 233,000 acres—while Sargodha suffered both significant agricultural loss and the death of 1,862 cattle. In Mianwali, over 0.526 million hectares/ 1.3 million acres were inundated, making it the district with the highest area affected. The flood also devastated Muzaffargarh, where over 356,540 hectares/ 881,000 acres were impacted and 61,400 homes were damaged or destroyed—the highest housing loss recorded. The overall death toll reached 408 people, while 27,555 cattle (including 2,650 chickens) were lost. Campbellpur (now Attock) alone reported 3,056 livestock deaths, reflecting the profound toll on rural livelihoods.

The floods affected both urban and rural regions—from major districts like Gujranwala, Rawalpindi, and Multan to less urbanized areas such as D.G. Khan, Kasur, and Bahawalnagar. In Rawalpindi, over 1,277 villages were affected, though the extent of land submerged was comparatively smaller. The 1976 flood crisis revealed critical weaknesses in Pakistan's disaster response systems and flood infrastructure. (Memon, 2014; PDMA, Punjab)

Table 5: Statistical Statement Damages and Losses (Flood 1976)

S.No.	District	Tehsil	Village Affected	Persons Affected	Area Affected (Acres)	Cropped Area Affected (Acres)	Houses Damaged	Houses Demolished/ Washed Away	Persons Died	Livestock Lost
1.	***Sialkot***	Sialkot	79	3120	38801	12600	344	139	-	6
		Pasrur	576	39855	32624	18245	6686	3390	-	3
		Daska	277	372843	198000	70210	5326	3567	-	-
		Narowal	301	212238	151621	14997	11026	3831	-	3
		Shakargarh	161	79981	77021	11608	3467	1102	-	-
			1,394	**708,037**	**498.067**	**127,660**	**26,849**	**12,029**	**-**	**12**
2.	***Gujranwala***	Gujranwala	321	134449	81091	64822	8409	11862	-	39
		Wazirabad	147	111731	79842	19789	4445	7410	-	48

		Hafizabad	262	104765	130466	37569	4227	11072	-	388
			730	**350,945**	**291,399**	**122,180**	**17,081**	**30,344**	**-**	**475**
3.	***Sheikhupura***	Ferozewala	326	304164	199874	150807	18271	-	-	30
		Nankana	154	47972	114887	46691	2526	-	-	9
		Sheikhupura	157	127691	187468	35898	12123	-	-	124
			637	**479,827**	**502,229**	**233,396**	**32,920**	**-**	**-**	**163**
4.	***D.G. Khan***	D. G. Khan	244	79550	84482	56785			-	152
		Taunsa	93	30000	160900	6869			-	23
		Jampur	78	24561	93875	6407	32069	14163	-	-
		Rajanpur	220	117593	452272	70721			-	-
			635	**251,704**	**791,529**	**140,782**	**32,069**	**14,163**	**-**	**175**
5.	***Sargodha***	Sargodha	101	201424	18248	7299	196	2149	-	-
		Shahpur	118	82906	105150	65132	4210	2870	-	-
		Jauharabad	177	105925	243427	67691	11254	4990	-	1862
		Bhalwal	166	119416	128983	62503	5618	1168	-	-
			562	**509,671**	**495,808**	**202,625**	**21,278**	**11,177**	**-**	**1,862**
6.	***Lahore***		338	542880	178808	65946	24266 (K) 5058 (P)	21736 (K) 2228 (P)	-	522 2650 Chicken
			338	**542880**	**178808**	**65946**	**29,324**	**23,964**	**-**	**-**
7.	***Muzaffargarh***	Kot Adu	33	12090	83038	567	1475	1968	-	1
		Muzaffargarh	167	82478	207653	36812	2497	24790	-	15
		Leiah	115	104249	280991	6677	7566	15131	-	7
		Alipur	169	140889	309513	133214	9755	19511	-	18
			484	**339,706**	**881,195**	**177,270**	**21,293**	**61,400**	**-**	**41**
8.	***Gujrat***	Gujrat	140		68981	14380	6146	634	-	-
		Kharian	67	69714	17144	1043	156	45	-	83
		Phalia	128		27461	15480	5813	3710	-	-
			335	**69,714**	**113,586**	**30,903**	**12,115**	**4389**	**-**	**83**
9.	***Jhang***	Shorkot	124	77994	161788	67740	2190	15929	-	1511
		Chiniot	230	105125	254245	49297	8947	4245	-	181
		Jhang	312	225873	358584	99048	7099	9163	-	10

			666	**408,992**	**774,617**	**216,085**	**18,236**	**29,337**	**-**	**1,702**
10.	***Mianwali***	Bhakkar	144	133200	269031	58173	14418	655	-	815
		Mianwali	186	55826	646165	40941	79561	15623	-	11697
		Isa Khel	63	9743	442134	3573	15722	3882	-	4128
			393	**198,769**	**1,357,330**	**102,687**	**109,701**	**20,160**	**-**	**16,640**
11.	***Multan***	Multan	67	70331	68136	29945	2636	20313	-	7
		Kabirwala	117	69327	86287	27444	12065	6817	-	-
		Khanewal	38	28497	19605	8546	697	-	-	-
		Shujabad	87	103999	154724	42135	24794	6798	-	3
			309	**272,154**	**328,752**	**108,070**	**40,192**	**33,928**	**-**	**10**
12.	***Kasur***	Kasur	320	Both	117465	50232	Both	Both	-	139
		Chunian	65	233858	28143	7683	3673	50717	-	3
			385	**233,858**	**145,608**	**57,915**	**3,673**	**50,717**	**-**	**142**
13.	***Rahim Yar Khan***		93	59921	196584	17633	1429	5193	-	12
14.	***Campbellpur***		503	988650	291851	199433	113850	37407	-	3056
15.	***Vehari***	Vehari/Mailsi	88	-	78835	14593	117	-	-	-
16.	***Rawalpindi***		1,277	172840	4971	1555	102895	4449	-	790
17.	***Lyallpur***		**383**	**143056**	**184131**	**67971**	**11291**	**13494**	**-**	**226**
18.	***Sahiwal***	Sahiwal	134	71694	76433	32925	1006	5051	-	-
		Okara	76	24402	47086	19095	1162	3575	-	-
		Pakpattan	7	-	29	29	20	-	-	-
		Depalpur	11	-	-	-	-	585	-	2
			228	**96,096**	**123,548**	**52,049**	**2,188**	**9,211**	**-**	**2**
19.	***Jhelum***	Jhelum	427	62661	6932	5635	12648	18277	-	650
		Pind Dadan Khan	205	153000	70000	14226	10010	13330	-	539
		Chakwal	262	125000	11716	20660	6441	122690	-	406
			894	**340,661**	**88,648**	**21,927**	**29,099**	**154,297**	**-**	**1,595**

20.	***Bahawalnagar***	Bahawalnagar	243	22962	111155	103331	19546	-	-	-
		Minchinabad	251	52486	92153	34834	10448	-	-	-
		Chistian	102	23497	119053	29985	7787	-	-	22
		Haroonabad	29	26674	38108	4957	5974	-	-	-
		Fortabbas	26	2580	1911	677	3	-	-	-
			651	**128,199**	**362,380**	**173,784**	**43,758**	**-**	**-**	**22**
21.	***Bahawalpur***	Ahmedpur East	23	35000	45000	11144	7151	-	-	-
	Grand Total:		**11,013**	**6330880**	**7814876**	**2145635**	**676509**	**515659**	**408**	**27555 2650 Chicken**

(PDMA Punjab)

2.6. 1977 Floods:

The 1977 floods in Pakistan as highlighted in table 6 caused widespread but relatively less severe damage compared to the catastrophic floods of preceding years. A total of 1,441 villages across multiple provinces were affected, impacting over 580,000 people and inundating 4,485,334 hectares/ 1,083,109 acres of land, of which 59,410 hectares/ 146,801 acres were cropped—posing significant setbacks to agricultural productivity in several regions. The human toll was comparatively contained, with 22 reported fatalities and 95 cattle deaths**.**

The Lahore District alone saw 170,936 people affected, with over 3,440 hectares/ 8,500 acres flooded and 143 houses damaged, while Gujranwala Division (including Gujranwala, Wazirabad, and Hafizabad) reported over 50,992 hectares/ 126,000 acres impacted and 7,796 hectares/ 19,264 acres of cropland damaged, although casualties remained minimal. In Sialkot**,** particularly in Narowal and Shakargarh tehsils, around 90,000 people were affected, with moderate crop and housing damage, while Sheikhupura faced heavy property damage, with over 1,191 houses damaged and 37,203 hectares/ 91,928 acres affected overall.

Southern districts such as Dera Ghazi Khan and Mianwali were also hit significantly. In D.G. Khan, over 50,588 hectares/ 125,000 acres were flooded, and 23,877 hectares/ 59,000 acres of crops lost, with 86 cattle deaths reported—among the highest in this flood. Mianwali and Isa Khel together recorded over 45,731 hectares/ 113,000 acres inundated and 2,832 hectares/ 6,999 acres of crops damaged, with 31 houses demolished and 8 cattle killed**.**Jhang District emerged as one of the worst-hit in central Punjab, with over

90,000 people affected and more than 107,650 hectares/ 266,000 acres submerged, though loss of life and livestock was low. Similarly, Muzaffargarh**,** Multan, and Gujrat districts saw local flooding, affecting thousands of acres and hundreds of homes.

Table 6: Statistical Statement Damages and Losses (Flood 1977)

S.No.	District	Tehsil	Village Affected	Persons Affected	Area Affected (Acres)	Cropped Area Affected (Acres)	Houses Damaged	Houses Demolished/ Washed Away	Persons Died	Livestock Lost
1.	***Lahore***		56	170936	85820	6687	143	4	-	-
2.	***Gujranwala***	Gujranwala	21	1285	7024	2821	-	-	-	-
		Wazirabad	54	4353	39629	7517	7	-	-	-
		Hafizabad	120	9820	80286	8926	-	-	-	-
			195	**15,458**	**126,939**	**19,264**	**7**	**-**	**3**	**-**
3.	***Sialkot***	Sialkot	22	243	2263	800	-	-		-
		Daska	2	132	432	304	-	-		-
		Pasrur	18	285	6636	221	50	-		-
		Narowal	57	48709	13048	2681	448	521		-
		Shakargarh	83	40617	35837	1841	115	70		-
			182	**89,986**	**58,216**	**5,847**	**613**	**591**	**-**	**-**
4.	***Sheikhupura***	Ferozewala	132	25857	86224	15679	1191	205	-	-
		Nankana	27	-	5704	80	-	23	-	-
			159	**25,857**	**91,928**	**15,759**	**1,191**	**228**	**-**	**-**
5.	***Gujrat***	Kharian	21	210	358	30	29	2	-	-
		Gujrat	54	4163	7893	4482	169	103	-	-
			75	**4,373**	**8,251**	**4,512**	**198**	**105**	**-**	**-**
6.	***Sargodha***	Bhalwal	42	13514	30930	3278	808	285		
		Jauharabad	15	2093	3300	500	200 350 (Kacha)	372	-	-
			57	**15,607**	**34,230**	**3,778**	**1,358**	**1036**	**-**	**-**
7.	***D.G. Khan***	Taunsa	86	65811	83575	47575	970	89	-	86

		D.G.Khan	18	8184	16705	8057	52	10	-	-
		Jampur	7	-	5000	1500	-	-	-	-
		Rajanpur	17	4000	20000	2000	100	20	-	-
			128	**77,995**	**125,280**	**59,132**	**1,122**	**119**	**-**	**86**
8.	***Jhang***	Jhang	129	57861	133490	7085	3776	85	-	-
		Shorkot	73	2280	19180	1771	467	-	-	
		Chiniot	117	30448	114055	8003	498	-	-	-
			319	**90,589**	**266,725**	**16,859**	**4,741**	**85**	**-**	**-**
9.	***Muzaffargarh***	Muzaffargarh	83	19486	60401	2633	522	-	-	-
		Alipur	19	10282	18492	1356	-	-	-	-
		Kot Adu	10	6840	36982	-	220	95	-	-
			112	**36,608**	**115,875**	**3,989**	**742**	**95**	**-**	**-**
10.	***Multan***	Multan	40	803	27892	913	136	-	-	-
		Kabirwala	14	2791	5196	973	-	-	-	-
		Shujabad	33	25251	21927	1737	1842	-	-	-
			87	**28,845**	**55,015**	**3,623**	**1,978**	**-**	**-**	**-**
11.	***Mianwali***	Mianwali	37	14313	14888	5891	806	10	-	-
		Isa Khel	32	9012	98935	1108	908	21	-	8
			69	**23,325**	**113,823**	**6,999**	**1,714**	**31**		**8**
12.	***Bahawalnagar***	Fort Abbas	2	673	1007	352	-	-	1	-
13.	***Jhelum***		-	-	-	-	-	-	1	-
14.	***Rawalpindi***		-	-	-	-	-	-	9	-
	Grand Total:		**1,441**	**580252**	**1083109**	**146801**	**13807**	**2294**	**22**	**95**

(PDMA, Punjab)

2.7. 1978 Floods:

The 1978 floods in Pakistan were extensive in both geographic spread and intensity, affecting over 5,173 villages across the country as shown in table 7. A staggering 1.63 million people were impacted as torrential monsoon rains and riverine floods inundated approximately 3.7 million acres of land, of which over 366,254 hectares/ 905,000 acres were cropped, devastating livelihoods in agrarian communities. The floods caused 127 human fatalities and the loss of at least 4,003 cattle heads, with widespread destruction to homes, infrastructure, and agricultural assets.

Multan Division was among the hardest hit, with nearly 1,000 villages affected. Over 493,000 people were impacted and more than 99,152 hectares/ 245,000 acres of farmland were damaged. Layyah, Kot Adu, and Kabirwala suffered massive crop losses and housing destruction, with reports of 52 deaths and significant property losses including tube wells and poultry farms.

In Muzaffargarh, the flood affected 1,367 villages, inundating 0.43 million hectares/ 1.06 million acres, damaging over 62,000 homes, and destroying more than 72,000 structures. Similarly, Dera Ghazi Khan experienced flooding across 315 villages, with more than 253,342 hectares/626,000 acres submerged and extensive agricultural losses, including 53302 maunds of wheat and 119149 maunds of bhoosa (fodder). At least 10 people died and 3,444 cattle were lost.

The Jhang region recorded the highest number of affected villages (638), where over 278,838 hectares/ 689,000 acres were impacted. A total of 25,488 houses were demolished, with particularly severe damage reported in Shorkot. Faisalabad also faced significant destruction, with over 31786 houses damaged and 265 tube wells along with a poultry farm affected.

Urban areas like Lahore, Sheikhupura, and Rawalpindi were not spared. While the scale was smaller, damage to infrastructure, homes, and utilities like tube wells and water wells was substantial. In Sialkot, 150 tubewells were damaged. Rawalpindi, particularly Kahuta and Murree, experienced landslides and structural damages due to flash floods.

Bahawalnagar and Bahawalpur districts also reported high housing losses and widespread agricultural impact. In Bahawalnagar, over 159,000 people were affected, with 25,338 homes demolished and 242 cattle lost.

Table 7: Statistical Statement Damages and Losses (Flood 1978)

S.No.	District	Tehsil	Village Affected	Persons Affected	Area Affected (Acres)	Cropped Area Affected (Acres)	Houses Damaged	Houses Demolished/ Washed Away	Persons Died	Livestock Lost	Misc.
1.	***Lahore***		8	5000	3000	120	102	10	3	10	
2.	***Sheikhupura***	Ferozewala	84	579	18316	4223	274	52	4	-	
3.	***Gujranwala***	Gujranwala	24	1517	7981	-	-	-	-	-	
		Wazirabad	50	2047	13271	2560	-	-	-	-	
		Hafizabad	49	989	15808	614	14	-	-	-	
			123	**4553**	**37060**	**3174**	**14**	**-**	**-**	**-**	
4.	***Sialkot***	Sialkot	11	150	820	600	-	-	-	-	
		Daska	20	1750	5308	1900	204	-	-	-	150 Tubewells Damaged
		Narowal	8	2214	2419	78	3	127	-	-	
			39	**4114**	**8547**	**2578**	**207**	**127**			
5.	***Gujrat***	Gujrat	29	-	11479	3903	-	-	-	-	
		Mandi B-din	32	-	17345	-	406	-	-	-	
			61	**-**	**28824**	**3903**	**406**	**-**	**-**	**-**	
6.	***Faislabad***		295	123971	179572	66517	20992	31786	5	45	265 Tubewells and 1 Poultry farm damaged
7.	***Jhang***	Jhang	336	57183	135733	334841	13795	3225	-	-	-
	Chiniot	Chiniot	65	1317	302222	3149	-	-	-	-	-
	Shorkot	Shorkot	237	259876	523400	40337	108803	2263	-	-	-
			638	**318376**	**689357**	**76970**	**122598**	**25488**	**-**	**-**	**-**
8.	***Sargodha***	Sargodha	74	15160	26100	11150	1231	60	-	1	

		Bhalwal	35	12205	11600	5340	245	22	-	21	
		Shahpur	21	10000	8913	700	-	-	-	-	
			130	**37365**	**46613**	**17190**	**1476**	**82**	**-**	**22**	
9.	***Mianwali***	Bhakkar	100	4707	23794	3104	-	-	-	-	
		Mianwali	49	1525	15265	375	329	50	-	-	
		Isakhel	25	13299	67577	70	5327	6	-	6	
			174	**19531**	**106636**	**3549**	**5656**	**56**	**-**	**6**	
10.	***Sahiwal***	Sahiwal	39	2512	417	80	150	2542	-	-	
		Okara	79	907	2783	2668	450	-	-	-	
		Dipalpur	1	-	-	-	9	16	-	-	
		Pakpattan	34	736	11708	2815	-	12	-	-	
			153	**4155**	**14908**	**5563**	**609**	**2570**	**4**	**-**	
11.	***Multan***	Multan	242	91629	76314	76185	9091	4498	-	30	
		Kabirwala	263	228558	76310	57402	10924	29233	-	50	
		Khanewal	146	171353	171903	15550	2074	6097	-	3	
		Shujabad	210	1700	234703	89746	238	165	-	18	
		Lodhran	136	540	36839	6848	756	636	-	-	
			997	**493780**	**596069**	**245731**	**23083**	**40629**	**52**	**101**	
12.	***Muzaffargarh***	Muzaffargarh	389	39780	158172	39199	12650	7926	-	-	
		Alipur	98	5777	176436	38651	309	168	-	-	
		Kot Adu	268	134051	353918	32344	8056	27836	-	6	
		Layyah	612	164083	377163	104671	41204	36800	-	111	
			1367	**343691**	**1065689**	**214865**	**62219**	**72730**			
13.	***D.G.Khan***		315	94673	626187	103644	8816	8533	10	3444	168 Tubewells, 228 Wells, one factory damaged. 53302 Maunds

											wheat & 119149 Maunds Bhoosa lost.
14.	***Vehari***		52	687	19705	1697	21	5728	2	-	
15.	***R. Y. Khan***		18	8374	56590	779	1182	-	-	-	
16.	***Bahawalnagar***	Minchinabad	239	-		78043	5352	13934		116	-
		Bahawalnagar	165	159534	209137	56964	99	10628		10	-
		Haroonabad	29	-		5603	894	476	-	-	-
		Fortabbas	3	-		517	-	-	-	-	-
		Chistian	49	-		9706	1410	300		116	-
			485	**159534**	**209137**	**150633**	**7755**	**25338**	**9**	**242**	**-**
17.	***Bahawalpur***	Bahawalpur	31	4915	2180	2180	45	938	-	-	8 Tubewells / water wells damaged.
		Ahmedepur-East	4	76	256	256	35	-	-	-	
			35	**4991**	**2436**	**80**	**938**	**6**	**-**		
18.	***Rawalpindi***	Rawalpindi	-	1837	139	-	1711	378	-	-	-
		Gujar Khan	-	-	-	1179	374	-	-	-	-
		Kahuta	163	715	504	331	627	421	-	22	-
		Murree	36	567	84	-	206	31	-	4	-
			199	**1282**	**588**	**331**	**833**	**452**	**8**	**26**	**-**
	Grand Total:		**5173**	**1626593**	**3709373**	**905082**	**258408**	**214897**	**127**	**4003**	**As. above.**

(PDMA, Punjab)

2.8. 1979 Floods:

In the 1979 floods in Pakistan as shown in table 8, the Dera Ghazi Khan district was significantly impacted, with 13 villages affected by hill torrents. While the number of persons affected was not reported, the floods damaged 468 hectares/ 1,200 acres of land, all of which was cropped area. Additionally, 56 houses were damaged, 13 were demolished or washed away, one person died, and one horse was lost. In contrast, the Sialkot district experienced minimal damage. Although floodwaters entered four villages in Sialkot Tehsil and one in Shakargarh Tehsil, timely evacuation efforts prevented significant harm, and no casualties or major damage were reported there.

Table 8: Statistical Statement Damages and Losses (Flood 1979)

S.No	District	Tehsil	Village Affected	Persons Affected	Area Affected (Acres)	Cropped Area Affected (Acres)	Houses Damaged	Houses Demolished/ Washed Away	Persons Died	Livestock Lost	Misc.
1.	*Dera Ghazi Khan*		13	Not reported	1200	1200	56	13	1	1 Horse	By Hill Torrents
2.	*Sialkot*	No damage reported except water entered 4 villages in Sialkot Tehsil and another village in Shakargarh Tehsil. Evacuation was done.									

(PDMA, Punjab)

2.9. 1980 Floods:

The 1980 floods in Pakistan caused widespread destruction across multiple districts, affecting a total of 862 villages and 54,318 people as presented in table 9. Lahore was one of the hardest-hit areas, with 100 villages affected and 15,698 people impacted. Over 39,256 hectares/ 97,000 acres were inundated, including more than 30,353 hectares/ 75,000 acres of cropped land. The floods damaged or demolished over 4,000 houses in Lahore alone, injured 32 people, and led to an ex-gratia compensation of Rs. 535,000. Kasur also faced severe losses, with 176 villages and 8,388 people affected, and over 54,230 hectares/ 134,000 acres impacted. Sheikhupura district, particularly Ferozewala and Nankana tehsils, saw 262 villages affected, with 27,016 people impacted and significant damage to houses and livestock. Gujranwala and Sialkot experienced moderate damage, mostly in terms of area affected. In Sargodha, nine deaths were reported due to a windstorm and rain on September 4, 1980. Other districts like Multan and Sahiwal

also saw localized damage, especially to agricultural land and homes. Overall, the floods resulted in 61 deaths, 79 cattle losses, and extensive damage to property and crops across Punjab.

Table 9: Statistical Statement Damages and Losses (Flood 1980)

S.No	District	Tehsil	Village Affected	Persons Affected	Area Affected (Acres)	Cropped Area Affected (Acres)	Houses Damaged	Houses Demolished/ Washed Away	Persons Died	Livestock Lost	Misc.
1.	***Lahore***		100	15698	97733	75601	K-3376 P-485	K-889 P-155	34	-	32 persons injured. Ex-gratia grant Rs. 535000 distributed.
							3861	**1044**			
2.	***Kasur***		176	8388	134582	39862	8350	191	9	57	12 persons injured.
3.	***Sheikhupura***	Ferozewala	208	15724	167165	1123	1383	1673	3	20	
		Nankana	53	11292	10955	2091	123	152	4	2	
		Sheikhupura	1	-	200	200	-	-	-	-	
			262	**27016**	**178320**	**14014**	**1506**	**1825**	**7**	**22**	**-**
4.	***Gujranwala***	Gujranwala	26	2603	30000	10000	-	-	-	-	-
		Hafizabad	6	160	1000	-	-	-	-	-	-
			32	**2763**	**31000**	**10000**	**-**	**-**	**-**	**-**	**-**
5.	***Sialkot***	Shakargah	18	-	6849	-	-	-	-	-	
		Narowal	6	400	-	-	-	-	-	-	-
			24	**400**	**6,849**						
6.	***Sargodha***		-	-	-	-	-	-	9 due to windstorm and rain on 4-9-1980		

7.	***Multan***	Khanewal	27	-	5513	2357	9	6	-	-	-
8.	***Sahiwal***	Sahiwal	1	53	25	20	1718	59	2	-	-
		Depalpur	240	-	21951	21951	-	7156	-	-	-
			241	**53**	**21,976**	**21,971**	**1,718**	**7,215**	**2**	**-**	**-**
	Grand Total:		**862**	**54318**	**475973**	**163810**	**15444**	**11281**	**61**	**79**	**-**

(PDMA, Punjab)

2.10. 1981 Floods:

The 1981 floods in Pakistan were among the most widespread and destructive, affecting 2,071 villages and impacting approximately 648,373 people as shown in table 10. A total of over 1 million acres of land was inundated, with nearly 121,410 hectares/ 300,000 acres of cropped land severely damaged. Faisalabad was the worst-affected district, with 310 villages and over 147,000 people impacted, along with significant agricultural and housing losses, including 21 deaths and the loss of 150 cattle and 2,310 hens. Other heavily impacted districts included Bahawalnagar, where 426 villages were affected, resulting in 10 deaths and the loss of 88 cattle, and Muzaffargarh, with 245 villages and over 101,984 hectares/ 252,000 acres affected. Lahore, while not reporting widespread village damage, still saw 107 houses damaged and 12 demolished. Kasur faced additional health crises, with 13 deaths reported due to cholera. Infrastructure damage was also noted in Rawalpindi, where small bridges and wells were destroyed. Overall, the floods led to 68 human fatalities, 302 cattle losses, and extensive destruction of homes, crops, and infrastructure, highlighting the severe humanitarian and economic toll of the disaster.

Table 10: Statistical Statement Damages and Losses (Flood 1981)

S.No.	District	Village Affected	Persons Affected	Area Affected (Acres)	Cropped Area Affected (Acres)	Houses Damaged	Houses Demolished/ Washes Away	Persons Died	Livestock Lost	Misc.
1.	***Faisalabad***	310	147712	148267	59363	23579	23439	21	150	2310 Hens
2.	***Sargodha***	29	29975	41034	4133	941	399	2	2	
3.	***Jhang***	324	52897	222511	70763	1435	421	1	-	
4.	***Mianwali***	8	124	107	107	59	7	4	1	100 Maunds wheat, 100

										Maunds Bhoosa, 9 Bags Cement 10 Hens
5.	***Kasur***	11	999	2593	1493	429	156	One Child		13 deaths due to Cholera
6.	***Lahore***	-	-	-	-	107	-	12	-	-
7.	***Sheikhupura***	18	1453	394	153	22	451	3	-	
8.	***Sialkot***	374	113830	105054	19614	513	85	4	54	
9.	***Gujranwala***	84	19933	53152	2840	104	1	4	-	
10.	***Gujrat***	-	-	-	-	-	-	2	-	
11.	***Rawalpindi***					5	90	-	7	2 small bridges (Pulies) & 3 wells destroyed.
12.	***Multan***	195	129931	153991	40556	1617	289	1	-	
13.	***Muzaffargarh***	245	85408	252007	82337	1800	380	1	-	
14.	***D. G. Khan***	47	3382	48359	6379	-	792	3	-	2 Fish Farms, 7 Wells, 3 Tubewells, 22 Bhanjet, 808 trees
15.	***Bahawalnagar***	426	62729	20080	11811	10648	13537	10	88	
	Grand Total:	**2,071**	**648,373**	**1,047,549**	**299,549**	**41,259**	**30,047**	**68**	**302**	

(PDMA, Punjab)

2.11. 1982 Floods:

The 1982 floods in Pakistan, while less extensive than previous years, still caused localized but significant damage across several districts. As shown in table 11 Faisalabad was notably affected, with 141 villages impacted and over 13,000 people affected. Around 12,950 hectares/ 32,000 acres were inundated, and over 2,000 houses were damaged, prompting the establishment of five relief camps. In Sahiwal, particularly Pakpattan, heavy rain led to the collapse of approximately 595 houses, affecting 3,000 people, with three relief camps set up to aid victims. In Rawalpindi, flooding caused by the Lehi Nullah rainwater led to the destruction of over 800 houses and household goods valued at approximately Rs. 212,150. Rajanpur saw 40 villages affected and 7,000 people impacted, with damage to over 2,833 hectares/ 7,000 acres of land. Other districts such as Muzaffargarh, Bhakkar, Gujranwala, and D.G. Khan experienced moderate damage, mostly to crops and infrastructure. One person died in Sialkot while bathing in a nullah. Although the overall human toll was lower compared to previous years, the 1982 floods still disrupted lives, damaged property, and strained local resources.

Table 11: Statistical Statement Damages and Losses (Flood 1982)

S.No	District	Tehsil	Village Affected	Persons Affected	Area Affected (Acres)	Cropped Area Affected (Acres)	Houses Damaged	Houses Demolished/ Washed Away	Livestock Lost	Misc.
1.	*Faisalabad*	Faisalabad	141	13058	32206	16466	2007	237	4	5 Relief Camps opened
2.	*Sahiwal*	Pakpattan	1	3000	438	-	6	589		Damage is due to rain. 3 relief camps opened.
							(About 700 to 800 i.e., 595 houses collapsed			
3.	*Gujranwala*	Wazirabad	6	-	170	140	-	-	-	
4.	*D. G. Khan*	Taunsa Sharif	-	392	112	26	-	86		One Tube well, One well.
5.	*Rawalpindi*	Rawalpindi City	-	-	-	-	396	446		Loss to household goods Rs.

										2,12,150 approx. Due to Lehi Nullah rain water.
6.	***Muzaffargarh***	Muzaffargarh	31	470	11724	880				
		Alipur	21	-	319					
7.	***Bhakkar***		2	1774	565	372	158	74		Bhoosa 6690 Maunds
8.	***Sialkot***		-	-	-	-	-	-		One died by bathing in an Nullah
9.	***Rajanpur***		40	7000	12868	7283	15	6	-	
	Grand Total:		**242**	**25,694**	**58,402**	**25,167**	**3,177**	**1,438**	**4**	

(PDMA, Punjab)

2.12. 1983 Floods:

The 1983 floods in Pakistan affected several districts, with Muzaffargarh bearing the brunt of the disaster. Across its tehsils—Muzaffargarh, Alipur, and Kot Adu—184 villages were impacted, affecting over 57,000 people and inundating nearly 89,034 hectares/ 220,000 acres, including 5,595 hectares/ 13,824 acres of cropped land. The floods resulted in the deaths of one person and 11 cattle, with 10 houses demolished. Multan district was also severely affected, particularly in Lodhran and Shujabad, where around 20,052 hectares/ 49,547 acres were flooded and 900 houses were damaged, along with two human and seven cattle deaths. Sargodha district saw extensive agricultural loss with over 72,441 hectares/ 179,000 acres affected, and significant housing damage—particularly in Shahpur and Bhalwal—where more than 650 houses were demolished. In Rajanpur, 52 villages were flooded, affecting 2,220 people and damaging over 2,428 hectares/ 6,000 acres. Landslides caused additional destruction in Rawalpindi and Kahuta, where 47 cattle perished and 21 houses were demolished. D.G. Khan also saw major house damage, with 1,221 houses impacted as highlighted in table 12. Overall, the 1983 floods led to widespread destruction of agriculture and housing, moderate human casualties, and substantial disruption to rural livelihoods across Punjab.

Table 12: Statistical Statement Damages and Losses (Flood 1983)

S.No	District	Tehsil	Village Affected	Persons Affected	Area Affected (Acres)	Cropped Area Affected (Acres)	Houses Damaged	Houses Demolished/ Washed Away	Persons Died	Livestock Lost	Misc.
1.	***Muzaffargarh***	Muzaffargarh	114	39544	103460	9641	3	10	1	11	
		Alipur	58	13289	78451	3908	-	-	-	-	
		Kot Adu	12	4471	37913	275	-	-	-	-	
			184	**57304**	**219824**	**13824**	**3**	**10**	**1**	**11**	
2.	***Multan***	Multan	33	-	1707	1707	142	-	2	7	
		Lodhran	75	-	10894	10894	758	-	-	-	
		Shujabad	46	-	36921	20823	-	-	-	-	
		Khanewal	1	-	25	25	-	-	-	-	
			155	**0**	**49547**	**33449**	**900**	**0**	**2**	**7**	
3.	***Sargodha***	Sargodha	45	-	4003	-	-	-	-	-	
		Bhalwal	135	2371	160622	67391	324	192	-	-	
		Shahpur	52	2460	15168	3042	1000	460	-	-	
			232	**4831**	**179793**	**70433**	**1324**	**652**			
4.	***Rajanpur***	Rajanpur	14	990	5781	2951	18	-	-	-	
		Jampur	38	1230	8319	3138	65	-	-	-	
			52	**2220**	**14100**	**6089**	**83**				
5.	***Rawalpindi***	Rawalpindi	1	-	-	-	3	-	-	-	
		Kahuta	1	-	-	-	10	21	-	47	Damage due to landslide
			2	**-**	**-**	**-**	**13**	**21**		**47**	
6.	***Khushab***	Khushab	2	22	330	149	-	-	-	-	
7.	***D. G. Khan***	D. G. Khan	9	1103	2674	2674	1221	-	-	-	
8.	***Gujrat***	Gujrat	1	-	-	-	2	-			
9.	***Layyah***	Layyah	7	-	3278	659	-	-	-	-	
	Grand Total:		**644**	**65,480**	**469,546**	**127,277**	**3,546**	**683**	**3**	**65**	

(PDMA, Punjab)

2.13. 1984 Floods:

The 1984 floods in Pakistan caused extensive damage across several southern and central Punjab districts, with Dera Ghazi Khan, Rajanpur, and Muzaffargarh among the most affected as shown in table 13. In D.G. Khan, 102 villages were impacted, affecting 9,644 people and inundating over 16,188 hectares/ 40,000 acres, including 9,802 hectares /24,221 acres of cropped land. The district suffered substantial housing damage, with 2,437 houses affected and one person dead, along with the loss of 66 cattle. Rajanpur experienced even greater agricultural devastation, with 67 villages affected and over 81,345 hectares/ 201,000 acres submerged, including more than 46,540 hectares/ 115,000 acres of cultivated land. The floods damaged nearly 2,900 houses and caused one fatality. Muzaffargarh saw moderate damage across 28 villages, affecting 15,847 people and damaging 295 hectares/ 782 acres, while Toba Tek Singh's Gojra Tehsil was also affected, with 54 villages flooded and 1,657 homes either damaged or destroyed. Significant losses of wheat and animal feed (bhoosa) were reported in both D.G. Khan and Rajanpur. Overall, the 1984 floods inflicted severe agricultural and infrastructural damage, especially in southern Punjab, further straining local resources and livelihoods.

Table 13: Statistical Statement Damages and Losses (Flood 1984)

S.No	District	Tehsil	Village Affected	Persons Affected	Area Affected (Acres)	Cropped Area Affected (Acres)	Houses Damaged	Houses Demolished/ Washed Away	Persons Died	Livestock Lost	Misc.
1.	***D. G. Khan***	D. G. Khan	34	541	24914	22264	1229	191	-	66	
		Taunsa	68	9103	15370	195	1208	72	1	-	Wheat 6840 Mds Bhoosa 31293 Mds
			102	**9644**	**40284**	**24221**	**2437**	**263**	**1**	**66**	
2.	***Rajanpur***	Rajanpur	23	10528	37866	34322	573	1037	1	-	Wheat 20826 Mds & Bhoosa 58263 Mds
		Jampur	44	13152	163890	80820	2312	2001	-	-	
			67	**23680**	**201756**	**115142**	**2885**	**3038**	**1**	**0**	
3.	***Muzaffargarh***	Muzaffargarh	6	-	830	235	-	-	1	-	

		Kot Adu	22	15847	21284	547	67	105	-	0	0
			28	**15847**	**22114**	**782**	**67**	**105**	**1**		
4.	***Toba Tek Singh***	Gojra	54	3818	8756	1776	1400	257	-	-	
	Grand Total:		**251**	**52,989**	**272910**	**141,921**	**6,789**	**3,664**	**3**	**66**	

(PDMA, Punjab)

2.14. 1985 Floods:

The 1985 floods in Pakistan caused scattered but impactful damage across several districts, with the most severe effects reported in Rajanpur, Rawalpindi, and parts of Punjab. In Rajanpur's Jampur tehsil, an extraordinarily high figure of 3.89 million persons was reported as affected, alongside the flooding of 438 hectares/ 1,083 acres and damage to 23 houses. Rawalpindi city faced widespread destruction due to rain and overflow from the Leh Nullah, with 205 people affected, 96 houses damaged, 12 lives lost, and extensive property losses amounting to Rs. 337,430. Lahore and Attock districts each reported multiple fatalities due to house collapses, with Lahore losing two lives and Attock recording the deaths of two adults and five children due to structural collapses. In Sheikhupura's Ferozewala tehsil, nine villages were affected with damage to crops worth Rs. 42,550, and two people died. Gujrat district saw considerable damage, with 66 villages affected, three deaths, and over 2,000 houses damaged or destroyed, particularly in Phalia and Gujrat tehsils. Muzaffargarh also experienced significant flooding, damaging 53 houses across 32 villages. Other areas like Okara, Gujranwala, Sargodha, and Multan saw localized flooding and property damage. Overall, the 1985 floods led to at least 21 confirmed deaths, loss of livestock, destruction of homes and property, and considerable disruption to rural livelihoods across multiple regions of Punjab as highlighted in table 14.

Table 14: Statistical Statement Damages and Losses (Flood 1985)

S.No	District	Tehsil	Village Affected	Persons Affected	Area Affected (Acres)	Cropped Area Affected (Acres)	Houses Damaged	Houses Demolished/ Washed Away	Persons Died	Livestock Lost	Misc.
1.	***Lahore***	Lahore City	-	-	-	-	7- Houses	-	2	-	
2.	***Sheikhupura***	Ferozewala	9	-	1100	-	-	-	-	2	Bhossa Rs. 42,550/-
3.	***Multan***	Multan	1	3	-	-	1-Partially	-	-	-	
4.	***D.G.Khan***	D.G.Khan	-	100	700	90	55	-	-	-	
5.	***Muzaffargarh***	Muzaffargarh	32	-	1167	805	40-Katcha 13 Pacca	-	-	-	
6.	***Rajanpur***	Jampur	13	3894992	1083	23	7	2	-	-	
7.	***Sargodha***	Bhalwal	27	16670	34396	432	-	-	-	-	
8.	***Rawalpindi***	Rawalpindi City	R/Pindi City	205	-	-	96- Houses	-	12 due to collapse		2- Buffalo, 1-Goat, 1 Poultry Farm damaged (Building) 1800 Hens.
		Leaih Nullah					5 - Shops				200 Bags Cement, 10 Maunds Bhoosa, 5-Tola Jewelry lost. Household articles, utensils etc lost/ washed away due to flood/rains of 10 families. Total Cost Rs. 3,37,430/-
9.	***Gujranwala***	Gujranwala	17	-	8391	7209	-	-	-	-	
10.	***Attock***	Attock	2	-	-	-	133-Kachcha	-	2 Adults 2 Minors		
		Pindigheb	2	-	-	-	48-Kachcha	-	3 Minors		

11.	***Okara***	Depalpur	-	1615	115	283	-	-	-	Bhoosa 20 Maunds, and loss of other property amounting to Rs. 22,43,800/-	
12.	***Gujrat***	Gujrat	28	755	1950	939	642	223	1	1	-
		Kharian	2	10	13	23	5	-	-	10	-
		Phalia	36	58	2882	2021	1882	25	2	-	-
	Grand Total:		**170**	**39,914,444**	**51,797**	**11,825**	**2914**	**250**	**24**	**33**	

(PDMA, Punjab)

2.15. 1986 Floods:

As shown in table 15, the 1986 floods in Pakistan were widespread and devastating, affecting numerous districts across Punjab and causing extensive damage to life, property, and agriculture. Rajanpur was the worst-hit, with 279 villages affected and over 508,000 people impacted. The district suffered the loss of 11 lives, destruction of over 25,000 houses, and the loss of 370 cattle, alongside massive agricultural losses including tens of thousands of maunds of wheat, bhoosa, and other crops. Rahim Yar Khan also faced severe flooding, with over 42,000 people affected, 1852 houses demolished, and 113 cattle lost, along with damage to 238 tubewells. Sialkot, with 377 villages affected, recorded five deaths and significant crop loss over 28,988 hectares/ 71,628 acres. Jhang district saw both floods and hailstorms throughout the year, with nearly 100,000 people impacted and over 114,530 hectares/ 283,000 acres inundated. Estimated losses from hailstorms in March and May reached over Rs. 8 million. Other severely affected areas included Bahawalnagar, Multan, D.G. Khan, and Muzaffargarh, where large tracts of cropped land were submerged and homes destroyed. In total, the floods of 1986 resulted in numerous casualties, widespread crop destruction, and significant infrastructure damage, highlighting the vulnerability of rural Punjab to seasonal disasters.

Table 15: Statistical Statement Damages and Losses (Flood 1986)

S.No	District	Tehsil	Village Affected	Persons Affected	Area Affected (Acres)	Cropped Area Affected (Acres)	Houses Damaged	Houses Demolished/ Washed Away	Persons Died	Livestock Lost	Misc.
1.	*Lahore*	-	-	-	-	-	2	2	5	-	
2.	*Sheikhupura*		18	150	18	6	-	62	-	-	
3.	*Gujranwala*		28	317	8329	8329	K-8329 P-146	-	3	-	
4.	*Sialkot*		377	-	71628	22188	503	116	5	4	
5.	*Kasur*		26	-	8172	8172	-	-	-	-	
6.	*Chakwal*	Chakwal	79	5922	24101	24101	-	-	-	-	
		Talagang	12	1833	8078	8078	-	-	-	-	
			91	**7755**	**32179**	**32179**					
7.	*Multan*		94	8453	70102	17548	82	7	-	-	
8.	*Bhawalnagar*		328	63572	183693	65600	P-2404 K-9852	P-4465 K-9834	7	108	-
9.	*Rahim Yar Khan*		93	42721	137469	32094	2405	1852	-	113	238 Tubewells Affected
10.	*D. G. Khan*		230	14845	143187	19997	1509	2	5	-	-
11.	*Layyah*		37	15739	37217	10751	-	-	-	-	
12.	*Muzaffargarh*		207	33695	154897	27523	261	130	1	3	-
13.	*Rajanpur*		279	508885	102084	184280	6718	18372	11	370	Wheat = 53,193 Maunds. Bhoosa = 1,10,931 Maunds Muter = 912 Maunds Chana = 1,394 Maunds Toria = 330 Maunds etc.
14.	*Jhang*		324	98132	283748	112599	214	336		15,725 cattle affected due to	

										rains from 6/1986 to 9/1986	
		Jhang	12	-	17238	17238	-	-	-	Estimated loss Rs. 3,26,160/- due to hail windstorm on 3/1986	
		Shorkot	28	-	5835	5835	-	-	-	Estimated loss Rs. 75,74,000/- due to hail windstorm on 5/1986	
	Grand Total:		**2,172**	**794,264**	**1,255,796**	**564,339**	**32,425**	**35,178**	**37**	**16,323**	

(PDMA, Punjab)

2.16. 1988 Floods:

The 1988 floods in Pakistan marked one of the most catastrophic natural disasters in the country's history, with over 4,000 villages affected and more than 2.88 million people impacted. Spanning across key districts in Punjab, the floods submerged approximately 3.46 million acres of land, including nearly 1.3 million acres of vital cropped area, devastating agriculture-dependent communities. The hardest-hit regions included Sheikhupura, Sialkot, and Lahore, with Sheikhupura alone reporting over 406,000 people affected and nearly 202,350 hectares/ 500,000 acres inundated. Housing destruction was widespread: more than 315,000 homes were damaged—over 122,000 kacha (mud) houses and 54,000 pacca (brick) houses partially or fully collapsed. The death toll reached 234 people, while nearly 30,000 cattle were lost, severely impacting livelihoods. Infrastructure damage included the loss of tube wells, livestock shelters, and household assets as shown in table 16. The sheer scale of destruction underscored the vulnerability of Pakistan’s floodplain communities and highlighted the urgent need for long-term disaster preparedness and resilient infrastructure.

Table 16: Statistical Statement Damages and Losses (Flood 1988)

S.No.	District	Village Affected	Persons Affected	Area Affected (Acres)	Cropped Area Affected (Acres)	Houses Damaged		Houses Demolished/ Washed Away		Persons Died	Livestock Lost	Misc.
						Kacha	Pacca	Kacha	Pacca			
1.	*Lahore*	43	275485	87373	-	948	11020	2554	3774	36	983	
2.	*Sheikhupura*	582	406574	496161	281310	18108	17717	75708	18436	43	6292	
3.	*Kasur*	195	75494	232837	103234	11430	347	17701	152	15	155	
4.	*Okara*	281	163591	210194	100596	860	1000	16997	2716	10	10079	
5.	*Gujranwala*	265	198723	223259	143140	130	354	15481	1266	1	1009	
6.	*Gujrat*	145	75390	143140	95629	561	774	1295	492	4	1381	
7.	*Sialkot*	833	187291	265012	117971	22164	8866	16046	3305	49	9389	
8.	*Faisalabad*	83	44465	60743	-	1935	259	4580	304	1	-	
9.	*Jhang*	114	91561	117170	59149	8669	646	12694	300	1	10	
10.	*T.T.Singh*	165	99343	170822	-	268	1895	17558	1523	29	-	
11.	*Multan*	209	220525	331222	-	26087	3069	-	-	13	-	
12.	*Khanewal*	146	153726	183240	119567	1623	204	14873	1451	3	70	100 Tube wells
13.	*Sahiwal*	241	429728	255575	135500	515	426	37172	3154	6	345	
14.	*Vehari*	155	112436	134588	95438	329	430	28527	2909	6	122	
15.	*Muzaffargarh*	182	16250	58345	37884	2084	193	500	156	8	-	
16.	*Bahawalpur*	127	61575	155387	3980	21291	6308	17970	5391	4	-	
17.	*Bahawalnagar*	269	269143	337466	-	5140	878	35479	1390	5	30	
	Grand Total:	**4035**	**2881300**	**3462534**	**1293398**	**122142**	**54386**	**315135**	**46719**	**234**	**29865**	

(PDMA, Punjab)

2.17. 1989 Floods:

The 1989 floods in Pakistan brought widespread destruction across Punjab, affecting 2,124 villages and displacing over 146,000 people. More than 1 million acres of land were flooded, including nearly 161,880 hectares/ 400,000 acres of cropped farmland, dealing a severe blow to agriculture and rural livelihoods. Rajanpur, Muzaffargarh, and Sialkot were among the hardest-hit districts,

with Rajanpur alone suffering damage to over 132,337 hectares/ 327,000 acres and the loss of 1,149 houses. Thousands of homes were destroyed—over 6,300 kacha and 1,470 pacca structures—leaving many homeless. A total of 122 lives were lost, including incidents in Rawalpindi and Lahore where one person each died due to flooding and a collapsed house, respectively. More than 30,000 cattle were lost, along with significant damage to infrastructure, including dozens of tube wells in Mianwali, Bhakkar, and Khanewal as mentioned in table 17. The floods highlighted the continuing vulnerability of flood-prone districts, underscoring the urgent need for improved flood management, resilient infrastructure, and early warning systems in rural Pakistan.

Table 17: Statistical Statement Damages and Losses (Flood 1989)

S.No.	District	Village Affected	Persons Affected	Area Affected (Acres)	Cropped Area Affected (Acres)	Houses Damaged		Houses Demolished/ Washed Away		Persons Died	Livestock Lost	Misc.
						Kacha	Pacca	Kacha	Pacca			
1.	*Sialkot*	363	12681	90763	23756	266	101	56	10	13	11	
2.	*Gujrat*	97	-	5500	5500	-	34	45	8	-	-	
3.	*Gujranwala*	148	15384	46293	15681	-	-	-	-	2	-	
4.	*Sargodha*	128	14842	47226	6756	457	25	73	4	2	-	
5.	*Bhakkar*	43	2425	9614	4348	-	-	368	39	2	-	6 Tube wells affected
6.	*Mianwali*	47	3422	4015	3840	234	54	447	52	-	22	40 Tube wells affected
7.	*Khushab*	52	-	11216	1960	-	-	-	-	-	-	
8.	*Jhang*	404	-	61594	61594	314	1237	29	1	5	-	
9.	*T.T.Singh*	31	166	578	578	-	-	-	-	-	-	
10.	*Multan*	117	26378	106990	50079	64	-	21	-	1	10	
11.	*Khanewal*	34	6850	45707	11870	586	15	297	8	-	-	39 Tube wells affected

12.	***D.G.Khan***	17	459	2500	1200	257	4	-	-	-	-	
13.	***Muzaffargarh***	353	30176	248129	40069	1412	-	569	-	2	72	
14.	***Layyah***	45	9999	12673	979	-	-	307	-	-	-	
15.	***Rajanpur***	245	23280	327248	162960	2794	-	1149	-	3	189	-
	Grand Total:	**2124**	**146062**	**1020046**	**391170**	**6384**	**1470**	**3361**	**122**	**30**	**304**	

Rawalpindi and Lahore have reported 1 death. At Rawalpindi 1 man drowned in Nullah Lai while at Lahore a women died due to house collapse.

(PDMA, Punjab)

2.18. 1990 Floods:

The 1990 floods in Pakistan, though less widespread than previous years, still inflicted significant localized damage, particularly in southern Punjab. A total of 416 villages were affected, displacing over 14,600 people and inundating nearly 45,731 hectares/ 113,000 acres of land, including over 6,070 hectares/ 15,000 acres of cropped farmland. Dera Ghazi Khan and Muzaffargarh bore the brunt of the disaster—D.G. Khan alone saw extensive housing damage with 3,026 homes affected and the tragic loss of three children. Muzaffargarh reported damage to over 1,400 homes, with the loss of 133 cattle. Other districts, such as Layyah, Kasur, and Sahiwal, experienced moderate flooding, while Bahawalpur and Bahawalnagar reported minimal details as shown in table 18. The floods highlighted the recurring threat faced by vulnerable rural communities in Punjab, with damage concentrated in agricultural zones, posing a threat to food security and rural livelihoods. The need for improved flood preparedness and community-level protection remained evident in the aftermath of this event.

Table 18: Statistical Statement Damages and Losses (Flood 1990)

S.No.	District	Village Affected	Persons Affected	Area Affected (Acres)	Cropped Area Affected (Acres)	Houses Damaged		Houses Demolished/ Washed Away		Persons Died	Livestock Lost
						Kacha	Pacca	Kacha	Pacca		
1.	***Kasur***	28	2524	22669	6455	70	-	6	-	-	-
2.	***Sheikhupura***	-	-	5	-	-	-	-	-	-	-
3.	***D.G.Khan***	16	3442	16304	1650	2920	106	-	-	3-Child	-
4.	***Layyah***	41	3642	18267	3348	389	88	-	-	-	-

5.	***Rajanpur***	78	-	-	-	-	-	-	-	-	-
6.	***Muzaffargarh***	27	2278	53715	2002	241	57	1141	286	-	133
7.	***Sahiwal***	65	-	2000	2000	-	-	-	-	-	-
8.	***Bahawalpur***	75									
9.	***Bahawalnagar***	86	2767	-	-	-	-	-	-	-	-
	Grand Total:	**416**	**14653**	**112960**	**15455**	**3620**	**251**	**1147**	**286**	**3-Child**	**133**

(PDMA, Punjab)

2.19. 1992 Floods:

The monsoon rains of 1992 brought widespread precipitation to the catchments of the Indus, Jhelum, and Chenab rivers. From September 7 to 11, rainfall reached unprecedented levels for this period. This intense rainfall caused flooding across these rivers, with flood protection levees (FPLs) breaching in several areas, exposing vast regions to severe damage. The 1992 floods in Pakistan were catastrophic, affecting 7,435 villages and over 4.12 million people across multiple divisions. A staggering 5.79 million acres of land were impacted, including approximately 2.84 million acres of cropped area. The disaster caused extensive damage to infrastructure, with 196,902 kacha (mud) and 73,751 pacca (brick) houses either damaged or destroyed. The human toll was severe, with 435 people losing their lives and 39,126 cattle heads perishing. The Jhang and Sargodha districts were among the most heavily affected, with Jhang reporting over 893,000 people affected and massive damage to agriculture. Muzaffargarh also faced extreme losses, with more than 242,820 hectares/ 600,000 acres impacted and significant casualties in both housing and livestock as shown in table 19. (Malevolent Floods of Pakistan).

Table 19: Statistical Statement Damages and Losses (Flood 1992)

S.No.	District	Village Affected	Persons Affected	Area Affected (Acres)	Cropped Area Affected (Acres)	Houses Damaged		Persons Died	Livestock Lost
						Kacha	Pacca		
	Lahore Division								
1.	***Lahore***	-	107	-	-	13	12	10	-
2.	***Kasur***	103	25064	37539	13218	328	3	1	-
3.	***Okara***	101	6278	62261	26215	321	-	-	-
4.	***Sheikhupura***	-	-	-	-	-	-	-	-
	Gujranwala Division								
1.	***Gujranwala***	266	298184	217130	134530	1731	146	9	371
2.	***Sialkot***	252	72889	136524	41025	610	429	19	587
3.	***Narowal***	326	48282	37061	27721	190	24	8	12
4.	***Gujrat***	364	260937	192185	86025	81	4209	24	10548
	Faisalabad Division								
1.	***Faisalabad***	-	-	-	-	-	-	1	-
2.	***T.T.Singh***	15	83	-	1372	-	-		
3.	***Jhang***	800	893196	1145776	682927	42954	1886	25	369
	Sargodha Division								
1.	***Sargodha***	502	640045	837058	544464	40658	25694	121	17000
2.	***Khushab***	265	562012	253619	253619	7534	3480	19	1610
3.	***Bhakkar***	89	30555	150105	26023	2022	238	1	3
4.	***Mianwali***	50	30120	648	28	1130	122	4	-
	Multan Division								
1.	***Multan***	288	137942	299964	191456	9126	2421	11	-

2.	***Khanewal***	283	16715	45251	26818	4714	1269	6	35
3.	***Sahiwal***	218	5911	11822	5102	1420	46	-	-
4.	***Pakpattan***	25	368	5782	3792	73	102	-	2
5.	***Vehari***	66	7077	26942	19891	2045	10	2	-
6.	***Lodhran***	62	2412	17127	16185	270	113	-	-
	Rawalpindi Division								
1.	***Rawalpindi***	859	112062	45785	26718	9890	3410	31	1
2.	***Jhelum***	235	203374	225518	54387	2510	24643	92	6997
3.	***Attock***	118	5901	-	51	1654	131	2	-
4.	***Chakwal***	389	16693	224	3161	5765	1736	13	918
	Bahawalpur Division								
1.	***Bahawalpur***	327	43563	156194	62581	15407	634	5	68
2.	***R.Y.Khan***	105	78160	207416	104	7271	449	-	-
3.	***Bahawalnagar***	357	28082	-	41630	3140	909	5	15
	D.G.Khan Division								
1.	***D.G.Khan***	136	30834	126804	85603	1449	7	2	1
2.	***Layyah***	85	86355	241625	23318	2760	1	5	39
3.	***Rajanpur***	295	120559	702320	57485	5405	2	-	-
4.	***Muzaffargarh***	454	357250	605650	388048	23195	1625	19	553
	Grand Total:	**7435**	**4121010**	**5788330**	**2843497**	**196902**	**73751**	**435**	**39126**

(PDMA, Punjab)

2.20. 1993 Floods:

The 1993 floods in Pakistan had a devastating impact across multiple districts, affecting a total of 1,375 villages and approximately 264,022 individuals as highlighted in table 20. The disaster damaged around 811,500 acres of land, with 109,180 hectares/ 269,782 acres of cropped area affected. Housing suffered significantly, with 300 kacha (mud) and 436 pacca (brick) houses damaged, while 300 kacha and 253 pacca houses were demolished or washed away. The floods led to the loss of 16 lives and 75 cattle heads. Narowal was among the worst-hit areas, with over 151,000 people affected, while Jhang reported the highest damage to cropped

area (over 24,687 hectares/ 61,000 acres). Districts such as Rajanpur and Multan also experienced severe agricultural losses, highlighting the widespread destruction caused by the floods.

Table 20: Statistical Statement Damages and Losses (Flood 1993)

S.No.	District	Village Affected	Persons Affected	Area Affected (Acres)	Cropped Area Affected (Acres)	Houses Damaged		Houses Demolished/ Washed Away		Persons Died	Livestock Lost
						Kacha	Pacca	Kacha	Pacca		
1.	*Lahore*	4	3696	5627	3023	-	238	-	47	1	-
2.	*Mianwali*	4	1017	-	-	-	47	24	74	-	-
3.	*Kasur*	75	13572	23655	11860	11	4	-	-	-	-
4.	*Gujranwala*	12	-	-	-	-	-	-	-	1	-
5.	*Sialkot*	98	-	-	20	2	-	-	-	1	-
6.	*Narowal*	202	151862	70510	8156	-	-	127	48	4	74
7.	*Faisalabad*	1	15	-	-	24	18	-	-	1	-
8.	*Multan*	126	10893	102557	27430	-	-	-	-	4	-
9.	*Khanewal*	75	9500	30844	13153	-	-	-	-	-	-
10.	*Lodhran*	11	-	-	1128	48	23	-	-	-	-
11.	*Muzaffargarh*	94	21076	60972	10083	-	-	-	-	2	-
12.	*Rajanpur*	145	23850	268931	11602	187	40	92	2	-	-
13.	*Sheikhupura*	1	-	-	1117	-	-	13	82	-	-
14.	*R.Y.Khan*	95	27107	15808	15808	-	-	-	-	-	-
15.	*Jhang*	380	-	228213	61338	5	-	2	-	1	-
16.	*Bahawalnagar*	14	872	-	21661	65	-	-	-	-	-
17.	*Gujrat*	11	-	250	-	-	-	-	-	1	-
18.	*Pakpattan*	27	562	4133	2898	22	1	42	-	-	1
	Grand Total:	1375	264022	811500	269782	300	436	300	253	16	75

(PDMA, Punjab)

2.21. 1994 Floods:

From July to September 1994, heavy rainfall led to flooding in the Indus and Sutlej rivers. The 1994 floods in Pakistan caused widespread destruction across 2,154 villages, affecting approximately 252,215 people and damaging over 1.22 million acres of land, including 142,173 hectares/ 351,305 acres of cropped area. Housing infrastructure suffered significantly, with 19,002 kacha and 3,601 pacca houses damaged, and 10,295 kacha and 1,282 pacca houses demolished or washed away. The floods claimed 84 lives and led to the loss of 210 cattle heads. Major districts impacted included D.G. Khan, Rajanpur, Muzaffargarh, and Bhakkar, which reported extensive damage to agriculture and housing. D.G. Khan alone had over 89,034 hectares/ 220,000 acres affected and more than 2,000 homes destroyed as highlighted in table 21. The disaster once again highlighted the vulnerability of rural regions to seasonal flooding, with considerable losses in both human life and livelihood. (Malevolent Floods of Pakistan).

Table 21: Statistical Statement Damages and Losses (Flood 1994)

S.No.	District	Village Affected	Persons Affected	Area Affected (Acres)	Cropped Area Affected (Acres)	Houses Damaged		Houses Demolished/ Washed Away		Persons Died	Livestock Lost
						Kacha	Pacca	Kacha	Pacca		
1.	*Lahore*	4	749	1109	72	-	-	-	-	1	-
2.	*Kasur*	58	15247	66115	28673	232	2	65	4	3	-
3.	*Okara*	49	1139	2500	2500	533	2	540	14	-	-
4.	*Multan*	76	9774	46361	25747	93	343	145	162	8	-
5.	*Khanewal*	16	297	1980	1277	-	-	47	16	-	-
6.	*Pakpattan*	19	528	1627	1627	-	-	90	-	-	-
7.	*Lodhran*	34	795	7244	7244	249	-	-	-	-	-
8.	*D.G.Khan*	189	28644	220600	48696	1546	131	2253	196	4	82
9.	*Vehari*	52	-	13114	6450	49	67	130	16	-	3
10.	*Rajanpur*	213	27461	311241	60584	3484	2	82	-	4	-
11.	*Muzaffargarh*	213	20404	26851	20853	655	26	2760	203	3	1
12.	*Layyah*	63	20000	155336	-	700	-	300	-	-	-
13.	*Jhang*	100	-	114456	-	23	1	-	-	4	-
14.	*Bhakkar*	55	71000	109525	75000	4600	500	701	-	-	-

15.	***Khushab***	20	180	-	-	120	69	-	-	1	-
16.	***Mianwali***	20	117	5310	1962	8	-	207	-	-	-
17.	***Narowal***	207	998	17385	17385	243	37	198	34	15	3
18.	***Gujrat***	83	2793	3602	3645	124	636	7	52	-	6
19.	***Hafizabad***	7	16	123	47	4	-	4	-	1	-
20.	***Sialkot***	304	2199	14272	14272	705	182	-	-	9	4
21.	***Rawalpindi***	-	-	-	-	36	198	-	-	16	-
22.	***Jhelum***	87	1083	2	-	26	801	9	325	4	-
23.	***Attock***	105	5122	-	-	2504	93	294	65	10	23
24.	***Bahawalpur***	40	1724	13153	10063	119	53	221	46	1	2
25.	***R.Y.Khan***	77	39220	77762	13939	2949	458	1680	73	-	86
26.	***Bahawalnagar***	63	1655	17856	11269	-	-	562	76	-	-
	Grand Total:	**2154**	**252215**	**1227524**	**351305**	**19002**	**3601**	**10295**	**1282**	**84**	**210**

(PDMA, Punjab)

2.22. 1995 Floods:

The 1995 floods as shown in table 22 in Pakistan caused extensive devastation across the country, affecting 4,912 villages and displacing more than 1.63 million people. The floods inundated around 3.45 million acres of land, of which approximately 1.38 million acres were cultivated farmland, resulting in severe agricultural losses. Housing was heavily impacted, with over 49,000 homes damaged—41,068 kacha (mud) and 8,176 pacca (brick)—and more than 39,000 homes completely destroyed. The disaster led to 177 fatalities and the loss of 574 cattle, further compounding the suffering of affected communities. Emergency response efforts saw the establishment of 309 relief camps across the most affected regions. Districts such as Sialkot, Narowal, Jhang, Rajanpur, and Lahore bore the brunt of the flood's impact, with massive damage to property, crops, and infrastructure.

Table 22: Statistical Statement Damages and Losses (Flood 1995)

S.No.	District	Village Affected	Persons Affected	Area Affected (Acres)	Cropped Area Affected (Acres)	Houses Damaged		Houses Demolished/ Washed Away		Persons Died	Livestock Lost	Relief Camps Established
						Kacha	Pacca	Kacha	Pacca			
1.	*Lahore*	93	38432	22368	22368	2222	954	443	150	4	46	9
2.	*Sheikhupura*	211	21926	76815	42830	1437	43	354	33	-	-	
3.	*Okara*	126	9046	63754	37832	986	6	4266	5	3	22	12
4.	*Kasur*	265	38954	89938	80819	4230	580	8364	617	2	320	15
5.	*Gujranwala*	153	135579	154155	78455	189	101	442	-	8	18	4
6.	*Gujrat*	131	8191	27000	5000	377	786	73	76	12	22	21
7.	*Sialkot*	612	300000	266642	130540	1747	1179	37	-	21	11	2
8.	*Narowal*	416	300000	154895	90829	3500	67	107	7	21	-	-
9.	*Hafizabad*	154	42732	131927	85000	520	420	528	416	3	21	-
10.	*M.B.Din*	42	7000	13000	7000	152	30	178	-	-	2	11
11.	*Sargodha*	209	63012	82705	52436	406	215	314	13	1	-	11
12.	*Bhakkar*	22	224	2610	907	15	-	-	-	-	-	14
13.	*Khushab*	50	8037	24330	6674	425	59	71	32	2	1	11
14.	*Mianwali*	10	247	828	205	34	48	13	-	-	-	-
15.	*D.G.Khan*	14	443	9200	2600	362	12	496	496	9	-	3
16.	*Muzaffargarh*	177	39957	194862	47491	2370	231	1691	123	15	-	24
17.	*Rajanpur*	196	47875	449139	64119	2230	50	367	-	-	-	26
18.	*Layyah*	77	2625	145739	9687	1056	89	932	80	-	-	-
19.	*Multan*	124	80698	133185	56434	3057	169	2060	49	22	30	13
20.	*Khanewal*	70	8700	30839	13500	495	15	1284	29	2	2	10
21.	*Vehari*	99	41033	69028	48876	-	-	-		-	1	15
22.	*Pakpattan*	77	12972	94518	67281	-	-	1140	-	-	-	14
23.	*Sahiwal*	68	11775	22477	16188	378	111	670	117	-	1	7
24.	*Lodhran*	36	1697	13767	10925	110	4	67	9	1	-	-
25.	*Faisalabad*	36	1821	30073	13303	90	27	257	21	-	-	-
26.	*Jhang*	551	310608	616688	222526	2582	114	2582	114	12	70	-

27.	***T.T.Singh***	60	23337	22950	-	-	-	3894	-	1	-	6
28.	***Bahawalpur***	94	19660	112310	62137	654	226	2427	121	-	7	18
29.	***R.Y.Khan***	277	22936	224041	62897	9183	880	1386	237	1	-	-
30.	***Bahawalnagar***	138	34863	144106	32924	1785	37	1785	-	-	1	26
31.	***Rawalpindi***	-	-	-	-	-	-	-	-	11	-	-
32.	***Jhelum***	309	3458	25597	10022	469	1520	29	39	23	-	-
33.	***Attock***	15	293	-	-	7	203	35	-	2	-	-
	Grand Total:	**4912**	**1638131**	**3449486**	**1381805**	**41068**	**8176**	**36292**	**2784**	**177**	**574**	**309**

(PDMA, Punjab)

2.23. 1996 Floods:

The 1996 floods in Pakistan had a severe humanitarian and economic impact, affecting 3,769 villages and displacing over 1.27 million people. The flooding inundated more than 0.80 million hectares/ 1.97 million acres of land, with nearly 0.445 million hectares/ 1.1 million acres of fertile agricultural land submerged, leading to significant crop losses. Housing destruction was extensive: over 24,000 kacha (mud) and 30,000 pacca (brick) houses were damaged, while more than 55,000 homes were completely demolished as highlighted in table 23. The floods claimed 196 lives and caused the loss of 1,105 cattle. Emergency relief efforts saw the establishment of 249 camps, providing temporary shelter to more than 8,300 individuals. Among the hardest-hit areas were Sialkot, Sheikhupura, Gujranwala, and Narowal, with Sialkot alone reporting 350,000 people affected.

Table 23: Statistical Statement Damages and Losses (Flood 1996)

S.No.	District	Village Affected	Persons Affected	Area Affected (Acres)	Cropped Area Affected (Acres)	Houses Damaged		Houses Demolished/ Washed Away		Persons Died	Cattle Heads Lost	Relief Camps Established	Person in Relief Camps
						Kacha	Pacca	Kacha	Pacca				
1.	***Lahore***	318	40787	46403	41403	5731	10958	3263	3179	42	98	8	-
2.	***Kasur***	133	15197	86784	55458	1102	4060	166	63	9	4	15	-
3.	***Okara***	53	2957	31399	13061	-	-	195	133	-	-	5	-
4.	***Sheikhupura***	455	59159	310223	280980	12711	9897	7558	5246	9	35	24	160

5.	***Sargodha***	44	19759	42350	22329	-	-	-	-	-	-	3	-
6.	***Mianwali***	6	2640	6426	2426	106	112	50	21	-	40	-	-
7.	***Khushab***	23	1200	5680	844	64	-	162	-	2	-	2	-
8.	***Faisalabad***	16	809	6289	6289	521	15	527	277	1	147	5	266
9.	***Jhang***	390	53340	274643	64347	-	-	3007	1467	12	4	29	-
10.	***T.T.Singh***	65	16696	35288	21002	330	56	3520	86	3	-	5	4919
11.	***Gujranwala***	169	250400	52106	52106	1052	759	1480	1826	8	8	7	-
12.	***Hafizabad***	150	110000	105000	105000	-	-	762	35	4	-	5	-
13.	***Sailkot***	522	350000	205000	205000	-	-	17725	-	41	330	12	-
14.	***Gujrat***	112	5316	12434	10663	259	985	231	197	11	266	24	2600
15.	***M.B.Din***	76	106332	10650	10650	129	161	293	139	2	14	5	-
16.	***Narowal***	605	131390	73709	35376	1276	2998	20	2153	34	143	13	174
17.	***Rawalpindi***	-	-	-	-	-	1	-	-	2	-	-	-
18.	***D.G.Khan***	32	7961	13025	12556	84	4	28	9	1	-	11	125
19.	***Rajanpur***	115	3854	219623	2085	-	101	-	-	2	-	24	15
20.	***Muzaffargarh***	172	43720	182804	17346	4	2	4	2	1	-	24	-
21.	***Layyah***	11	1270	3520	2130	-	-	-	-	-	-	6	-
22.	***Multan***	118	24622	114360	51924	25	-	159	4	10	12	-	-
23.	***Khanewal***	91	18426	48977	16571	287	33	728	3	1	4	-	-
24.	***Sahiwal***	73	3985	75011	67029	6	-	-	-	1	-	-	-
25.	***R.Y.Khan***	20	2679	12605	382	586	266	620	10	-	-	22	-
	Grand Total:	**3769**	**1272499**	**1974309**	**1096957**	**24273**	**30408**	**40498**	**14850**	**196**	**1105**	**249**	**8302**

(PDMA, Punjab)

2.24. 1997 Floods:

The 1997 floods in Pakistan were widespread and destructive, affecting 5,891 villages and displacing over 2.08 million people. The floods inundated approximately 3.33 million acres of land, including 1.348 million hectares/ 1.36 million acres of cropped area, resulting in significant agricultural losses. Housing damage was extensive, with 49,572 kacha and 27,331 pacca houses damaged, while 35,209 kacha and 14,987 pacca houses were completely demolished or washed away. Tragically, 250 people lost their lives, and 864 cattle heads were lost. Relief efforts involved the establishment of 299 camps that sheltered over 8,700 individuals. Districts such as Sargodha, Sialkot, Sheikhupura, Jhelum, and Rawalpindi were among the hardest hit—Sargodha alone reported over 842,000 people affected and more than 360,000 acres flooded as highlighted in table 24.

Table 24: Statistical Statement Damages and Losses (Flood 1997)

S.No.	District	Village Affected	Persons Affected	Area Affected (Acres)	Cropped Area Affected (Acres)	Houses Damaged		Houses Demolished/ Washed Away		Persons Died	Livestock Lost	Relief Camps Established	Person in Relief Camps
						Kacha	Pacca	Kacha	Pacca				
1.	*Lahore*	55	490	1115	1115	1707	3191	1701	164	20	11	-	-
2.	*Kasur*	350	21317	162239	129439	4216	706	2675	1053	14	37	17	-
3.	*Okara*	155	12227	54155	8714	2599	77	8151	400	5	2	4	-
4.	*Sheikhupura*	563	69431	92278	64804	5522	1379	7193	884	21	124	26	121
5.	*D.G.Khan*	15	9367	217674	11152	135	79	56	-	1	3	5	-
6.	*Rajanpur*	135	9367	217674	11152	89	1	56	62	2	-	5	-
7.	*Muzaffargarh*	168	26509	146651	79450	518	-	44	-	2	5	23	-
8.	*Layyah*	62	10500	91442	28290	337	-	-	-	-	-	7	-
9.	*Multan*	124	110246	143229	83251	194	21	564	-	10	1	15	63
10.	*Khanewal*	80	6892	41770	16259	133	6	243	-	-	1	14	4522
11.	*Lodhran*	-	-	-	-	-	-	-	-	-	-	10	-
12.	*Sahiwal*	297	16956	17623	15709	10102	3194	868	961	11	-	-	-
13.	*Pakpattan*	-	-	-	-	-	-	-	174	-	-	9	-

14.	***Vehari***	-	830	7227	21464	-	-	2	-	1	-	-	-
15.	***Sargodha***	486	842541	360360	538006	4892	3049	5837	3554	13	9	21	-
16.	***Mianwali***	46	3209	25719	6183	160	21	32	32	2	-	11	-
17.	***Bhakkar***	23	3285	3684	2422	43	-	21	-	-	-	6	-
18.	***Khushab***	53	27362	43636	10262	-	1724	-	304	3	2	8	2197
19.	***Gujranwala***	128	13619	123525	45250	1613	264	1765	555	27	56	16	-
20.	***Narowal***	345	13089	50000	13538	2609	-	798	618	22	11	15	-
21.	***Sialkot***	464	305545	201366	78152	2069	67	306	323	20	2	-	-
22.	***M.B.Din***	250	-	130621	-	1200	-	957	962	4	-	-	-
23.	***Hafizabad***	145	51920	128998	51920	32	-	328	170	3	10	8	-
24.	***Gujrat***	165	35000	43500	27300	2061	-	1031	209	8	76	-	-
25.	***Rawalpindi***	413	8230	2022	2022	3651	1335	273	213	19	34	8	1175
26.	***Jhelum***	407	220313	225627	42604	2704	11033	2075	2460	13	357	39	
27.	***Chakwal***	199	5198	122	122	2102	1064	30	210	7	110	-	-
28.	***Attock***	40	616	33	33	361	15	-	-	2	2	-	-
29.	***Faisalabad***	51	2392	12033	7720	29	-	32	53	5	2	-	-
30.	***Jhang***	522	214344	622950	37069	-	104	4	1586	5	-	-	-
31.	***T.T.Singh***	51	1045	4385	2153	3	-	-	40	2	2	4	600
32.	***Bahawalpur***	17	30735	39353	10165	-	-	-	-	4	-	8	-
33.	***R.Y.Khan***	82	13010	120863	14822	491	1	167	-	4	7	20	-
	Grand Total:	**5891**	**2085585**	**3331874**	**1360542**	**49572**	**27331**	**35209**	**14987**	**250**	**864**	**299**	**8723**

(PDMA, Punjab)

2.25. 1998 Floods:

The 1998 flood in Pakistan significantly impacted several districts, including Layyah, Rajanpur, Rahim Yar Khan (R.Y. Khan), and Dera Ghazi Khan (D.G. Khan), affecting a total of 111 villages. Approximately 1,148 persons were directly affected, with 53,882 hectares/ 133,141 acres of land inundated, including 2,305 acres of cropped area. Layyah experienced damage across 5 villages, affecting 650 people and 1,702 hectares/ 4,205 acres of land. Rajanpur was the hardest hit in terms of area, with 92 villages impacted and 44,032 hectares/ 108,801 acres flooded; it also recorded 19 fatalities. R.Y. Khan saw damage to 10 villages and 7,887 hectares/ 19,489 acres of land, with 64 kacha houses destroyed. D.G. Khan, while affecting only 4 villages, reported the highest number of damaged houses (73 kacha) and hosted 508 people in relief camps across 4 sites. Overall, 148 houses were damaged, 73 kacha

houses were demolished, 19 lives were lost, and 10 relief camps were established, providing shelter to at least 508 displaced individuals as highlighted in table 25.

Table 25: Statistical Statement Damages and Losses (Flood 1998)

S.No.	District	Village Affected	Persons Affected	Area Affected (Acres)	Cropped Area Affected (Acres)	Houses Damaged		Houses Demolished/ Washed Away		Relief Camps Established	Person in Relief Camps
						Kacha	Pacca	Kacha	Pacca		
1.	*Layyah*	5	650	4205	1230	43	-	-	-	-	
2.	*Rajanpur*	92	-	108801	172	29	-	-	19	6	
3.	*R.Y.Khan*	10	-	19489	582	76	64	-	-	-	
4.	*D.G.Khan*	4	498	646	321	-	-	73	-	4	508
	Grand Total:	**111**	**1148**	**133141**	**2305**	**148**	**64**	**73**	**19**	**10**	**508**

(PDMA, Punjab)

2.26. 1999 Floods:

The 1999 flood in Pakistan affected 42 villages across multiple districts, including Kasur, Mianwali, Rajanpur, Narowal, Chakwal, Jhang, Lahore, Sialkot, Layyah, and Muzaffargarh (M/Garh) as shown in table 26. A total of 248 individuals were reported affected, with 7,749 acres of land inundated, including 95 hectares/ 234 acres of cropped area. Housing damage was extensive, with 152 kacha and 161 pacca houses damaged, and 13 kacha houses demolished or washed away. The flood caused 23 fatalities and the loss of 20 cattle heads. Relief efforts included the establishment of 40 camps, though only one camp reported accommodating displaced persons. Mianwali was among the most severely impacted districts, with significant housing losses and 19 lives lost, while Rajanpur experienced the largest area affected, totaling 3,034 hectares/ 7,496 acres. Despite data gaps in certain districts such as D.G. Khan, the overall impact highlights the recurring vulnerability of these regions to seasonal flooding and underscores the need for sustained disaster risk management and resilience-building measures.

Table 26: Statistical Statement Damages and Losses (Flood 1999)

S.No.	District	Village Affected	Persons Affected	Area Affected (Acres)	Cropped Area Affected (Acres)	Houses Damaged		Houses Demolished/ Washed Away		Persons Died	Cattle Heads Lost	Relief Camps Established
						Kacha	Pacca	Kacha	Pacca			
1.	*Kasur*	-	-	-	-	36	4	-	-	13	36	-
2.	*Mianwali*	8	148	-	-	77	126	3	19	-	2	-
3.	*D.G.Khan*	-	-	-	-	-	-	-	-	-	-	-
4.	*Rajanpur*	31	41	7496	-	-	-	5	-	-	-	1
5.	*Narowal*	-	-	-	-	-	-	-	-	1	-	-
6.	*Chakwal*	-	50	-	-	36	-	-	-	-	2	-
7.	*Jhang*	-	-	-	-	3	31	-	-	3	-	-
8.	*Lahore*	-	-	-	-	-	-	-	-	2	-	-
9.	*Sialkot*	-	-	-	-	-	-	-	-	1	-	-
10.	*Layyah*	2	-	231	220	-	-	-	-	-	-	-
11.	*M/Garh*	1	9	22	14	-	-	5	4	-	-	-
	Grand Total:	**42**	**248**	**7749**	**234**	**152**	**161**	**13**	**23**	**20**	**40**	**1**

(PDMA, Punjab)

2.27. 2000 Floods:

The 2000 flood in Pakistan primarily affected the Dera Ghazi Khan (D.G. Khan) and Kasur districts, with significant impact observed in D.G. Khan Tehsil and its adjoining areas. In D.G. Khan Tehsil alone, 16 villages were affected, impacting 696 people and inundating 2,964 hectares/ 7,324 acres of land, including 1,283 hectares/ 3,171 acres of cropped area. Six kacha houses were damaged, though no fatalities or cattle losses were reported. In Taunsa Tehsil, two persons were affected, with damage to two pacca houses and one fatality. The Tribal Area within D.G. Khan reported no direct impacts. In Kasur District, specifically Chunian Tehsil, one village and three individuals were affected, with three cattle lost but no structural damage or fatalities. No relief camps were established during this flood event. The data underscores the localized but serious impact of the flood, particularly on agriculture and rural housing infrastructure as shown in table 27.

Table 27: Statistical Statement Damages and Losses (Flood 2000)

S.No.	District	Tehsil	Village Affected	Persons Affected	Area Affected (Acres)	Cropped Area Affected (Acres)	Houses Damaged		Persons Died
							Kacha	Pacca	
1.	***D.G.Khan***	D.G.Khan	16	696	7324	3171	6	-	-
		Taunsa	16	2	-	-	-	2	1
		Tribal Area	1	-	-	-	-	-	-
2.	***Kasur***	Chunain	1	3	-	-	-	-	3
	Grand Total:		**34**	**701**	**7324**	**3171**	**6**	**2**	**4**

2.28. 2001 Floods:

The 2001 flood in Pakistan had a particularly devastating impact on Rawalpindi, where approximately three-fourths of the city's population—around 1.2 million people—were affected as highlighted in table 28. The flood caused significant structural damage, with 1,378 houses and buildings partially damaged and 601 completely demolished. Tragically, 51 lives were lost in Rawalpindi alone, and 742 cattle heads perished. In Multan, while the extent of the population affected is unspecified, 49 hectares/ 120 acres of crops were damaged and one fatality was reported. Overall, the 2001 flood resulted in the displacement of over a million people, the destruction of vital infrastructure, and considerable loss of life and livestock, particularly in urban areas like Rawalpindi.

Table 28: Statistical Statement Damages and Losses (Flood 2001)

S.No	District	Villages Localities Affected	Persons Affected	Damage to Crops. (Acres)	House/Buildings Damaged (Partial)	House/Buildings Demolished	Persons Died	Livestock Lost
1.	***Rawalpindi***	3/4th population of Rawalpindi affected	1,200,000	-	1378	601	51	742
2.	***Multan***	-	-	120	-	-	1	-
	Grand Total:		**1,200,000**	**120**	**1378**	**601**	**52**	**742**

(PDMA, Punjab)

2.29. 2003 Floods:

The 2003 flood in Pakistan affected multiple districts, causing widespread damage across both urban and rural areas. Mianwali and Dera Ghazi Khan (D.G. Khan) were among the hardest hit, with Mianwali recording 1,817 persons affected and 16,422 hectares/ 40,579 acres of land inundated, all of which was cropped area. The district also saw 126 kacha and 148 pacca houses damaged, along with 178 kacha and 185 pacca houses demolished or washed away. D.G. Khan faced the destruction of 93 villages, affecting 4,975 people and 7,130 hectares/ 17,618 acres of land, including 5,992 hectares/ 14,807 acres of crops, and reported 21 deaths. Muzaffargarh reported 1,188 persons affected and 21,706 hectares/ 53,635 acres inundated, with significant damage to housing and one fatality. Other affected districts included Layyah, with 12,825 hectares/ 31,690 acres flooded; Narowal, with 2,864 hectares/ 7,078 acres of cropped area impacted; and Rajanpur, which experienced 26,588 hectares/ 65,698 acres of cropped area affected. Fatalities were also reported in Gujrat (3), Sheikhupura (1), and Gujranwala (11), while Sialkot recorded the highest number of cattle lost (20) and 26 relief camps established as shown in table 29. In total, the 2003 flood demonstrated the vulnerability of agricultural and housing infrastructure in the face of natural disasters, particularly in Punjab province.

Table 29: Statistical Statement Damages and Losses (Flood 2003)

S.No.	District	Village Affected	Persons Affected	Area Affected (Acres)	Cropped Area Affected (Acres)	Houses Damaged		Houses Demolished/ Washed Away		Persons Died	Livestock Lost	Relief Camps Established
						Kacha	Pacca	Kacha	Pacca			
1.	*Mianwali*	-	1817	40579	40579	126	148	178	185	2	123	-
2.	*Layyah*	12	-	31690	15919	-	-	-	-	-	-	8
3.	*Muzaffargarh*	79	1188	53635	10661	277	12			1		22
4.	*Narowal*	62	-	-	7078	-	-	-	-			
5.	*Gujrat*	-	-	-	-	-	-	-	-	3	-	-
6.	*Sheikhupura*	-	-	-	-	-	-	-	-	1	-	-
7.	*Gujranwala*	-	-	-	-	-	-	-	-	11	-	-
8.	*D.G.Khan*	93	4975	17618	14807	401	102	95	21	5	14	
9.	*Rajanpur*	-	-	-	65698	-	-	-	-	2	-	-
10.	*Sialkot*				21253					20	26	

2.30. 2005-2006 Floods:

In 2005 and 2006, the Kabul and Chenab rivers experienced severe flooding (Memon, 2014). The 2005 flood in Pakistan had a widespread and severe impact across 10 districts, affecting a total of 716 villages and 331,262 individuals. The flood inundated approximately 169,183 hectares/ 418,045 acres of land, including 62,578 hectares/ 154,628 acres of cropped area, significantly disrupting agriculture-based livelihoods. Layyah was the most heavily affected district, with 240,000 people impacted and extensive damage to 3,205 kacha and 908 pacca houses. Dera Ghazi Khan (D.G. Khan) followed, with 158 villages affected, over 5,000 houses damaged, and one fatality reported, along with 58 cattle heads lost. Rajanpur and Muzaffargarh also experienced substantial land and crop losses, while districts like Sialkot, Bhakkar, Gujrat, Gujranwala, and Mandi Bahauddin reported localized impacts. In total, 9,228 houses were damaged and 2,387 demolished or washed away. Relief efforts included the establishment of 79 relief camps, with the highest number in Rajanpur (23) and Muzaffargarh (22) as highlighted in table 30. Despite the significant scale of destruction, particularly to housing and agriculture, reported human casualties were minimal, underscoring the importance of early warning systems and timely evacuation efforts.

Table 30: Details of Losses and Damages due to Rain/Flood-2005 up to 9-7-2005

S.No.	District	Village Affected	Persons Affected	Area Affected (Acres)	Cropped Area Affected (Acres)	Houses Damaged		Persons Died	Livestock Lost	Relief Camps Established
						Kacha	Pacca			
1.	*Layyah*	89	240,000	158,096	94,370	3,205	908	-	-	-
2.	*D.G.Khan*	158	14,515	-	-	5,262	1,424	1	58	14
3.	*Rajanpur*	193	32,000	158,944	-	-	-	-	-	23
4.	*Mianwali*	40	-	-	24,270	-	-	-	-	-
5.	*Muzaffargarh*	105	2,454	80,377	27,958	761	55	1	-	22
6.	*Sialkot*	31	22,193	-	-	-	-	-	-	-
7.	*Bhakkar*	26	100	3,924	-	-	-	-	-	-
8.	*Gujrat*	34	20,000	-	1,030	-	-	-	-	9
9.	*Gujranwala*	24	-	16,704	-	-	-	-	-	11

10.	*Mandi Bahauddin*	16	-	-	7,000	-	-	-	-	-
	Grand Total:	**716**	**331,262**	**418,045**	**154,628**	**9,228**	**2,387**	**2**	**58**	**79**

(PDMA, Punjab)

The 2006 flood in Pakistan caused widespread devastation across 22 districts, affecting over 301,000 people and submerging approximately 363,115 hectares/ 897,246 acres of land, including 82,5333 hectares/ 203,937 acres of vital cropped area. A total of 1,383 villages were impacted, with severe damage to residential infrastructure—7,357 houses were partially damaged while 3,254 were completely destroyed as shown in table 31. Layyah emerged as the most affected district in terms of population, while Rajanpur, Rahim Yar Khan, and Mianwali experienced the highest levels of crop damage. Jhelum suffered the most structural damage to houses and reported 12 fatalities, while other districts like Gujrat, Rawalpindi, and Sialkot also recorded significant loss of life. In total, 127 people died and 141 cattle heads were lost due to the flooding. Relief operations included the setup of 104 camps, with the highest numbers in Bhakkar, Muzaffargarh, and Mianwali. The disaster emphasized the recurring threat of floods in both rural and urban regions and highlighted the urgent need for improved flood management and response systems.

Table 31: Details of Losses and Damages due to Rain/Flood 2006

S.No.	District	Village Affected	Persons Affected	Area Affected (Acres)	Cropped Area Affected (Acres)	Houses Partially Damaged	Houses Completely Damaged	Persons Died	Livestock Lost	Relief Camps Established
1.	*Jhelum*	123	4018	3420	3420	2734	130	12	57	-
2.	*Layyah*	89	218325	158096	94370	319	211	4	-	-
3.	*Sialkot*	108	37	221	221	-	-	10	-	-
4.	*Rawalpindi*	-	219	114	114	9	16	16	39	-
5.	*Gujrat*	-	84	1023	1023	253	46	17	4	25
6.	*Chakwal*	11	397	19	19	387	8	3	2	-
7.	*Lahore*	-	46	-	-	-	-	14	-	-
8.	*Narowal*	3	-	847	123	-	-	12	-	8
9.	*Gujranwala*	6	9	391	89	4	2	7	-	-

10.	***M.B.Din***	7	209	725	165	47	24	-	-	-
11.	***Khushab***	6	34	26	19	1128	121	1	10	-
12.	***D.G.Khan***	107	69	44	27	56	-	-	-	-
13.	***Attock***	-	-	-	-	51	-	-	-	-
14.	***Mianwali***	62	5204	135412	32115	984	1237	2	23	12
15.	***Bhakkar***	14	-	-	-	349	661	-	-	20
16.	***Muzaffargarh***	193	5214	126177	43679	856	469	7	-	19
17.	***Jhang***	309	-	-	-	-	-	1	-	-
18.	***Rajanpur***	189	37156	377834	-	-	-	2	-	20
19.	***Rahim Yar Khan***	78	30416	92897	-	-	-	1	-	-
20.	***Sahiwal***	6	-	-	568	-	329	-	-	-
21.	***Sargodha***	-	-	-	-	-	-	-	2	-
22.	***Sheikhupura***	66	-	-	27985	180	-	2	4	-
	Grand Total:	**1383**	**301437**	**897246**	**203937**	**7357**	**3254**	**127**	**141**	**104**

(PDMA, Punjab)

2.31. 2007 Floods:

The 2007 flood in Pakistan, though more localized than in previous years, still caused notable damage across 14 districts. A total of 98,775 hectares/ 244,070 acres of land was affected, including 2,960 hectares/ 7,312 acres of cropped area as shown in table 32. The most significant impact was seen in Toba Tek Singh (T.T. Singh), where 1,140 hectares/ 2,817 acres were flooded and 6,017 houses were completely destroyed, resulting in 13 fatalities and the loss of 18 cattle. Sahiwal experienced the largest area of inundation—97,560 hectares/ 241,065 acres—with 1,743 hectares/ 4,307 acres of crops damaged and 7 deaths reported. Mianwali faced both structural and livestock losses, with 66 houses partially damaged and 9 cattle heads lost. Additional fatalities occurred in districts such as Lahore, Khushab, Attock, and Chakwal, where damage also included 84 shops. Overall, the flood resulted in 57 deaths, the loss of 40 cattle, and destruction or damage to over 6,600 structures. Relief efforts included the establishment of 4 camps. This event highlighted the need for continued investment in localized disaster response and infrastructure resilience in both rural and semi-urban areas.

Table 32: Details of Losses/ Damages due to Rain/Flood-2007

S.No.	District	Village Affected	Persons Affected	Area Affected (Acres)	Cropped Area Affected (Acres)	Houses Partially Damaged	Houses Completely Damaged	Persons Died	Livestock Lost	Relief Camps Established
1.	*T.T Singh*	1	-	2817	2817	-	6017	13	18	-
2.	*D.G.Khan*	5	-	188	188	-	500	1	-	-
3.	*Lahore*	-	-	-	-	-	-	9	-	-
4.	*Khushab*	-	-	-	-	-	-	5	-	-
5.	*Attock*	-	-	-	-	-	-	4	-	-
6.	*Mianwali*	6	172	-	-	66	2	-	9	4
7.	*Sahiwal*	-	-	241065	4307	-	-	7	13	-
8.	*Chakwal*	-	-	-	-	-	84 Shops	1	-	-
9.	*Muzaffargarh*	-	-	-	-	-	-	2	-	-
10.	*Gujrat*	-	-	-	-	-	-	3	-	-
11.	*Kasur*	-	-	-	-	-	-	3	-	-
12.	*Sialkot*	-	-	-	-	-	-	4	-	-
13.	*Sheikhupura*	-	-	-	-	-	-	4	-	-
14.	*Sargodha*	-	-	-	-	-	-	1	-	-
	Grand Total:	**12**	**172**	**244070**	**7312**	**66**	**6603**	**57**	**40**	**4**

(PDMA, Punjab)

2.32. 2008 Floods:

The 2008 flood in Pakistan affected 570 villages across 19 districts, displacing over 110,000 people and inundating approximately 271,196 hectares/ 670,117 acres of land, including 123,910 hectares/ 306,177 acres of cropped area. Rajanpur was the most severely impacted district, with 86,000 persons affected and extensive damage to 523,600 acres of land, including nearly 80,940 hectares/ 200,000 acres of crops. The district also saw the highest number of houses damaged—2,074 partially and 9,549 fully. Other significantly impacted areas included Dera Ghazi Khan (D.G. Khan), Toba Tek Singh (T.T. Singh), Bahawalnagar, and Mianwali, all

reporting considerable damage to property and agriculture. Overall, 2,581 houses were partially damaged and 10,600 completely destroyed. The flood resulted in 51 deaths, 15 injuries, and the loss of 8 cattle heads. Relief efforts included the establishment of 85 camps, with notable responses in Bahawalnagar (20 camps), Vehari (14), and D.G. Khan (4) as shown in table 33.

Table 33: Details of Losses/Damages due to Rain/Flood-2008

S.No.	District	Village Affected	Persons Affected	Area Affected (Acres)	Cropped Area Affected (Acres)	Houses Damaged		Persons Died	Persons Injured	Livestock Lost	Relief Camps Established
						Partially	Fully				
1.	*Muzaffargarh*	20	-	200	-	4	4	6	7	-	3
2.	*Sahiwal*	-	-	-	-	-	-	9	1	-	-
3.	*Chakwal*	-	-	-	-	-	-	1	1	-	-
4.	*Rawalpindi*	-	-	-	-	-	-	6	-	-	-
5.	*Gujrat*	-	-	-	-	-	-	1	-	-	-
6.	*Sargodha*	-	-	-	-	-	-	1	3	-	-
7.	*Khushab*	-	-	-	-	-	-	1	-	-	-
8.	*Sialkot*	-	-	-	-	-	-	7	-	3	-
9.	*T.T Singh*	22	-	2287	21	41	-	2	-	-	-
10.	*Rajanpur*	176	86000	523600	199894	2074	9549	9	-	22	-
11.	*D.G.Khan*	41	4992	19783	19783	273	960	1	3	-	4
12.	*Hafizabad*	-	-	-	-	-	-	-	-	-	7
13.	*Mianwali*	19	-	2080	2080	155	23	1	-	5	-
14.	*Kasur*	91	12742	26656	26656	-	-	-	-	-	-
15.	*Okara*	94	-	35194	35194	-	-	-	-	-	4
16.	*Bahawalnagar*	88	6574	59062	19807	34	64	-	-	-	20
17.	*Vehari*	4	-	985	855	-	-	1	-	-	14
18.	*Pakpattan*	15	-	270	1887	-	-	-	-	-	11
19.	*Bahawalpur*	-	-	-	-	-	-	5	-	-	-
	Grand Total:	**570**	**110308**	**670117**	**306177**	**2581**	**10600**	**51**	**15**	**8**	**85**

2.33. 2010 Floods:

The monsoon of 2010 unleashed one of the most devastating natural disasters in Pakistan's history, triggered by a rare meteorological convergence in July. An easterly monsoon system collided with a developing westerly wave over Khyber Pakhtunkhwa (KP), producing intense rainfall that led to catastrophic flooding in the Swat and Kabul rivers. These events marked the beginning of a nationwide crisis, later described by the UN Secretary-General as a “slow-evolving tsunami.”

Initial downpours in Balochistan during the third week of July were soon followed by torrential rains in KP by the month's end, extending into early August. These conditions generated historic flood flows across a network of rivers and nullahs, including the Swat, Panjkora, and Kabul in KP, as well as in local waterways in Balochistan. The floodwaters cascaded downstream into Punjab and Sindh, severely straining the Indus River system. The Federal Flood Commission reported that the Swat and Kabul rivers collectively reached a peak discharge of 400,000 cusecs—far exceeding the previous high of 250,000 cusecs recorded in 1929. The surge moved through major barrages in the country before finally dispersing into the Arabian Sea beyond the Kotri Barrage.

In total, the disaster affected 78 out of 141 districts, covering an area of over 100,000 square kilometers—around one-fifth of the country’s landmass. It directly impacted more than 20 million people, resulting in 1,980 fatalities and nearly 3,000 injuries. Roughly 1.6 million homes were destroyed, and over 2 million hectares /4.942 million acres of farmland were damaged. Vital infrastructure—including nearly 24,000 kilometers of roads, more than 10,000 schools, and hundreds of healthcare centers—suffered extensive losses.

A joint Damage and Needs Assessment (DNA) by the World Bank and Asian Development Bank placed total economic losses above USD 10 billion, accounting for both direct destruction and broader socio-economic impacts. When compared by area and population affected, the 2010 floods exceeded the destruction caused by several other global catastrophes such as the 2005 Pakistan Earthquake, Hurricane Katrina, the Indian Ocean Tsunami, Cyclone Nargis, and the Haiti Earthquake.

Regional impact varied due to terrain, flood behavior, and differing levels of preparedness. KP bore the brunt of flash floods, while Punjab and Sindh experienced a combination of flash and riverine flooding. Sindh was particularly hard-hit due to its flat topography, which hampered the drainage of floodwaters (Province wise details of affected districts are given in table 34). Beyond the physical damage, the floods had profound long-term consequences. They reversed years of development progress and exacerbated existing socio-economic challenges, particularly for marginalized populations already struggling with poverty and inequality (NDMA, 2010; NDMA, 2010).

Table 34: Province-wise details of affected districts

Province-wise details of Affected Districts			
Regions/Provinces	**Severely Affected**	**Moderately affected**	**Affected Districts**
KP	10	14	24
Punjab	7	4	11
Sindh	9	8	17
Balochistan	2	10	12
AJ&K	1	6	7
GB	0	7	7
Grand Total	**29**	**49**	**78**

(NDMA, 2010)

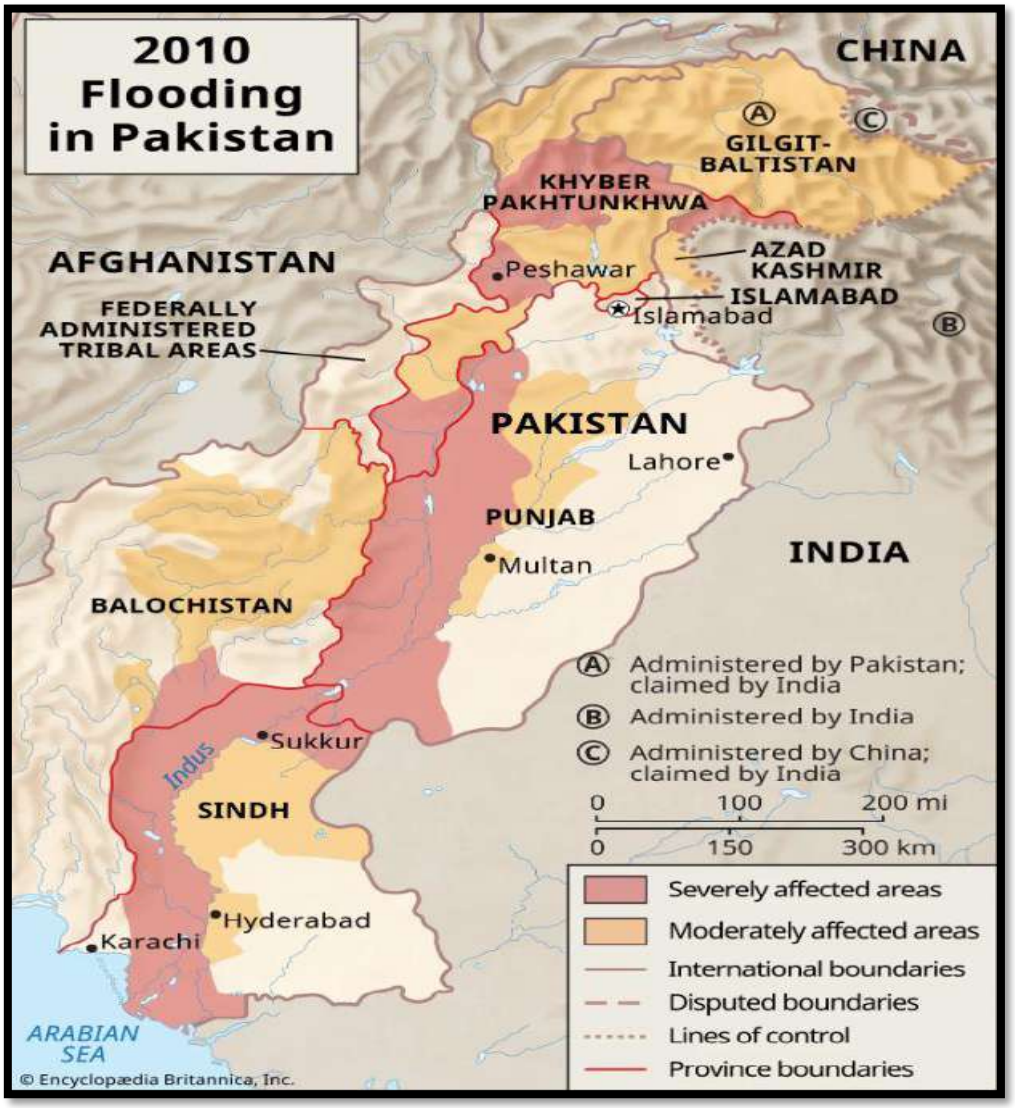


Figure 18: Areas affected by flooding in Pakistan in 2010 (NDMA, 2010)

2.33.1. Khyber Pakhtunkhwa:

Khyber Pakhtunkhwa (KP) was among the worst-affected regions during the 2010 floods. The Swat and Kabul rivers recorded unprecedented water flows exceeding 400,000 cusecs—far surpassing the historic high of 250,000 cusecs recorded in 1929. This surge led to extensive flooding across Charsadda, Nowshera, and surrounding areas. Exceptionally high flood levels were also observed in the Panjkora River and Budni Nullah, with additional flash floods reported in the hill torrents of Dera Ismail Khan.

The devastation extended across multiple districts, including Swat, Shangla, Upper and Lower Dir, Malakand, Mansehra, Charsadda, Mardan, Peshawar, Nowshera, Kohat, Karak, Bannu, Lakki Marwat, D.I. Khan, and Tank.

Infrastructure damage was extensive. A total of 278 bridges were either damaged or completely washed away. Road networks suffered significantly, with approximately 6,511 kilometers affected. Key headworks including Amandra, Munda, and Kurram Garhi also sustained serious damage. Power infrastructure was heavily impacted, with 605 transformers and five grid stations affected. Small dams, irrigation systems, and both public and private infrastructure also faced severe destruction.

In total, flooding disrupted 544 villages across 24 districts in KP. The disaster resulted in the destruction of approximately 257,294 homes, damage to 1,790 watercourses, and the submergence of 121,500 hectares /300,227 acres of cultivated land. An estimated 3.8 million people were affected, with 1,156 lives lost and 1,198 individuals injured (FFC, 2010).

Munda Headwork after Floods (2010)

2.33.2. Punjab:

During the 2010 monsoon season, intense rainfall across northern Pakistan caused a significant rise in water levels in major rivers and seasonal nullahs, leading to severe flooding in the Indus River. The situation worsened as the River Swat and River Kabul discharged large volumes of water into the Indus, triggering unprecedented floods across the stretch from Jinnah Barrage to Taunsa Barrage in Punjab.

Between July 30 and August 2, 2010, the River Indus experienced exceptionally high flood levels within this reach. On July 30, Jinnah Barrage recorded a peak discharge of 937,453 cusecs. In response to the extreme water pressure, four predetermined breaching sections were activated on the Right Marginal Bund, resulting in the inundation of surrounding low-lying areas, including the under-construction Jinnah Hydropower Project. At Chashma Barrage, the river reached a historic flow of 1,036,673 cusecs on August 1—exceeding the barrage's design capacity—causing widespread flooding in the riverine plains of Mianwali, Bhakkar, and Layyah districts.

On August 2, Taunsa Barrage registered a peak flow of 960,000 cusecs, surpassing its previous record of 788,646 cusecs set in 1958. The immense pressure led to the breaching of the Left Marginal Bund between RD 32 and 38, which flooded numerous settlements, agricultural lands, and infrastructure on the left bank of the Indus in Muzaffargarh district. The floodwaters also overtopped the Taunsa-Punjnad Link Canal at RD 10 and severely damaged the Muzaffargarh Canal at several points between RD 13 and 14.

As a result, large portions of Kot Addu town, along with the areas of Shaikh Omar, Sinawan, Thatta Gurmani, Gujrat, Mahmood Kot, and Ghazi Ghat, were submerged. These areas, located between the right side of the Muzaffargarh Canal and the Indus's left bank, were severely impacted. To mitigate further flooding, a deliberate cut was made at Gattu Flood Bund downstream of Ghazi Ghat Bridge to redirect the flow back into the Indus via the breached bund and an escape channel at RD 246 of the Muzaffargarh Canal. The flooding also damaged critical power infrastructure, including Kot Addu Power Plant, AES Lalpir, AES PakGen, and disrupted fuel supplies from PARCO and PSO depots.

Meanwhile, southwestern Punjab, particularly Dera Ghazi Khan (DG Khan) and Rajanpur, witnessed devastating flash floods caused by intense rainfall over the Suleman Mountain Range and adjacent plains. Hill torrents such as Vahowa and Vidor overflowed, flooding extensive areas and raising the Indus River's water levels further. In Rajanpur, floodwaters entered several villages along the riverbelt. The irrigation department issued flood warnings in Vahowa due to a dam breach in Balochistan, which intensified flood threats. On August 8, 2010, combined hill torrent discharges amounting to approximately 239,600 cusecs entered the Indus River from the DG Khan and Rajanpur region.

In total, catastrophic flooding affected 1,778 villages across 11 districts in Punjab. The disaster damaged around 375,773 homes, submerged 746,900 hectares /1,845,590 acres of cultivated land, and disrupted 2,598 watercourses and 2,819 kilometers of road networks. The human toll included 110 fatalities and 262 injuries, while an estimated 8.2 million people were affected across the province (FFC, 2010).

2.33.3. Sindh:

The Indus River experienced exceptionally high flood flows as it entered upper Sindh at Guddu Barrage on August 5, 2010. The first major flood wave, with a peak discharge of 1,149,000 cusecs, passed through Guddu on August 8–9, followed by another peak of 1,131,000 cusecs that moved through Sukkur Barrage on August 9–11. The extreme hydraulic pressure led to breaches along the 16-mile-long Left Marginal Bund (LMB) of Guddu Barrage at five locations—one in Sindh and four in Punjab—resulting in widespread flooding in Bhong, Somiani, Kot Sabzal, Sajanpur, Indus Highway, and adjacent areas.

Rainee Canal recorded a discharge of 9,645 cusecs, nearly double its designed capacity, which led to 13 breaches on its left bank. Simultaneously, on August 6, the Tori Bund—a critical first line of defense located 30 km downstream of Guddu Barrage on the right bank of the Indus—failed at mile 0/2 due to excessive water pressure. Additional breaches occurred in the Beghari Sindh (B.S.) Feeder on August 8. The resultant floodwaters flowed into the western districts of Sindh, affecting the tehsils of Mehar, Khairpur Nathan Shah, and Johi in Dadu district.

As the waters spread, they inundated towns such as Ghouspur, Kandhkot, and Dari, and continued their path toward Thul, Shahdadkot, and Usta Muhammad, reaching parts of Balochistan. This led to extensive damage to homes, agriculture, and critical irrigation infrastructure, including the Saifullah Magsi Branch. Additional breaches occurred at Old Ghora Ghat Bund (mile 0/0 to 0/2) and Haibat Loop Bund (mile 12/3), both situated downstream of Guddu Barrage on the right bank of the Indus. Floodwaters from the Tori breach also encircled Jacobabad and subsequently entered Balochistan.

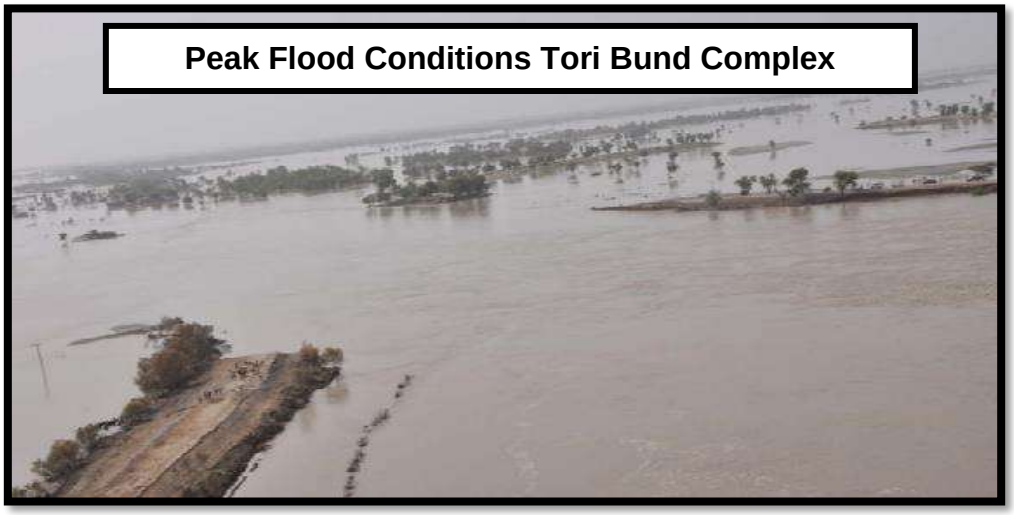
A second wave of exceptionally high floodwaters passed through Guddu and Sukkur Barrages between August 14 and 17, maintaining critical flood levels. On August 26, a breach developed at mile 18/2 of the M.S. Bund along the eastern bank of the Indus in Thatta district, prompting the evacuation of Thatta city as the river overflowed its western bank in the southern region.

At Kotri Barrage, a peak discharge of 965,000 cusecs was recorded on August 27, inundating low-lying areas in Hyderabad, Thatta, and Badin districts, particularly impacting towns like Sujawal, Mirpur Bathoro, Mirpur Sakro, Jhang Shahi, Jamshoro, Matiari, Makaro, Keti Bunder, and Shah Bunder. Both upstream and downstream areas along the Katcha belt near Kotri Barrage were submerged.

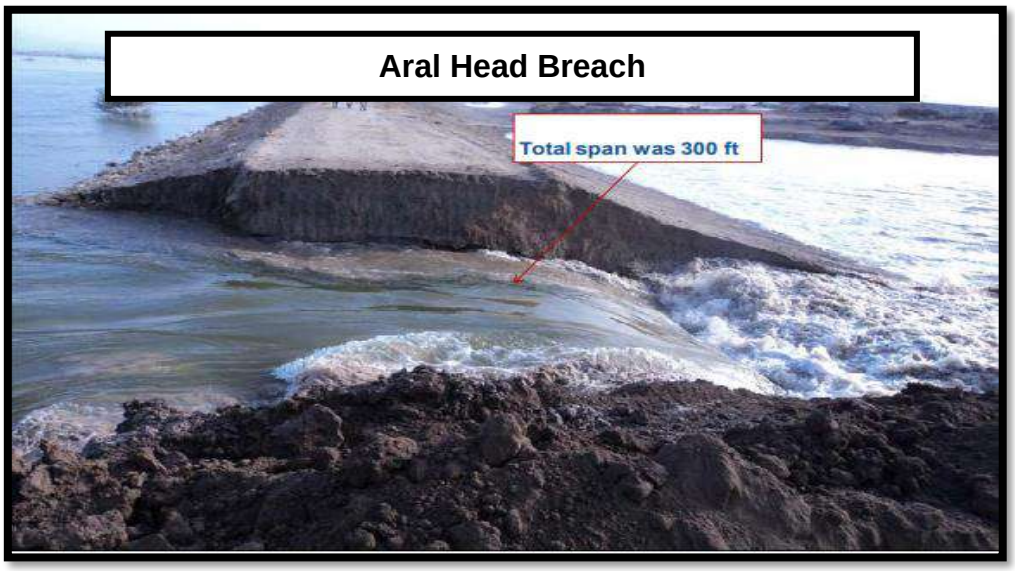
Floodwaters from the breach in M.S. Bund reached Sujawal Town, then further spread to Jati, Chohar Jamali, and nearby parts of Thatta district. On September 16, Manchar Lake overflowed between RD 92 and RD 97, flooding large portions of Jamshoro district. To alleviate the situation, eight relief cuts were made in the lake. However, a breach in the Main Nara Valley (MNV) drain remained unsealed, redirecting floodwaters toward the final protective embankment at Bhan Saeedabad along the Indus Link Canal. This caused extensive flooding across the area.

As a result, approximately 200 villages were submerged, affecting critical infrastructure such as Sehwan Airport, Pakistan Railways tracks, the Pak-Arab refinery station, the Indus Highway, telecommunications towers, and the region's primary optical fiber network—leading to a complete breakdown of communication systems.

In total, the catastrophic flooding impacted 11,988 villages across 17 districts in Sindh province. It caused significant damage to 879,978 homes, submerged 1,043,500 hectares /2,578,488 acres of agricultural land, disrupted 6,990 watercourses, and damaged 8,467 kilometers of road infrastructure. The disaster affected an estimated 7.185 million people, resulted in 411 fatalities, and left 1,235 injured (FFC, 2010).



Peak Flood Conditions Tori Bund Complex



2.33.4. Balochistan:

The northeastern regions of Balochistan were significantly impacted by intense rainfall and thunderstorms during July 2010, which triggered flash floods originating from surrounding hill torrents. The most affected districts included Zhob, Kohlu, Sibi, Barkhan, Kachhi, Nasirabad, Jaffarabad, Musakhel, Shirani, Harnai, and Killa Saifullah. In Sibi, the torrential rains caused a breach in the Lehri Dam, resulting in flooding across approximately 20 nearby villages.

In early August 2010, the breach of the Tori Bund in Sindh allowed floodwaters to flow into parts of Balochistan, inundating Jaffarabad, Nasirabad, and certain areas of Jhal Magsi district. Settlements such as Rojhan Jamali, Usta Muhammad, and numerous other villages experienced significant flooding.

In total, 12 districts across Balochistan were severely affected, impacting an estimated 700,000 people. The floods resulted in the loss of 54 lives, with 104 individuals reported injured. Approximately 79,720 houses sustained damage, while agricultural losses included the destruction of crops spread over 132,500 hectares/ 327,408 acres. Additionally, 47 watercourses were damaged, and 2,077 kilometers of road infrastructure were rendered unusable.

The severity of the flooding also disrupted transportation networks. Floodwaters overtopped the Indus Highway, leading to prolonged road closures between Shikarpur and Jacobabad, Jacobabad and Sibi, as well as between Shikarpur and Kandhkot, halting all types of vehicular traffic for several weeks (FFC, 2010).

2.33.5. Newly Merged Districts (Ex-FATA):

Severe flash floods in the newly merged districts caused extensive damage to both irrigation infrastructure and private and public assets. According to the Damage and Needs Assessment (DNA) report jointly conducted by the Asian Development Bank (ADB) and the World Bank, the floods resulted in the destruction of approximately 5,419 homes, the devastation of 7,220 hectares of cultivated land, and damage to around 1,257 kilometers of road infrastructure

2.33.6. Gilgit Baltistan:

Beginning on July 28, 2010, severe rainfall in Gilgit-Baltistan (G-B) led to widespread destruction across the region. The Karakoram Highway (KKH) was blocked at multiple locations, effectively severing G-B's land connection with the rest of the country. Intense thunderstorms triggered flash floods that caused extensive damage to infrastructure including roads, bridges, power stations, and irrigation channels. Overflowing rivers and streams inundated low-lying areas, impacting approximately 100,000 individuals across 347 villages. The disaster resulted in 183 reported fatalities, the destruction of 3,157 homes, and the loss of around 7,900 hectares/ 19,521 acres of cultivated land. In total, flooding across seven districts of G-B damaged 960 watercourses and approximately 382 kilometers of road networks.

2.33.7. Azad Jammu & Kashmir:

Severe rainfall and subsequent flooding caused widespread destruction across Azad Jammu and Kashmir (AJK), leading to the loss of 71 lives and injuring 87 individuals. The disaster affected an estimated 200,000 people. Approximately 6,843 homes were damaged, and around 33,100 hectares/ 81,790 acres of agricultural land suffered significant losses. Public infrastructure, including roads, bridges, power facilities, and irrigation channels, also sustained heavy damage. In total, flash floods severely impacted 657 watercourses and disrupted about 3,575 kilometers of road infrastructure throughout the region (FFC, 2010).

The data presented in table 35 outlines the extensive damage caused by the 2010 floods in Pakistan (Country-wide Losses/Damages), affecting a total of 78 districts across the country. Punjab and Sindh were among the hardest-hit provinces, with Sindh having the largest area of cropped land affected (1,043,500 hectares/ 2,578,488 acres) and the highest number of houses damaged (879,978), while Punjab had the highest number of people affected at 8.2 million. Khyber Pakhtunkhwa also suffered significant human loss, recording the highest number of deaths (1,156). Infrastructure damage was widespread, including over 25,000 kilometers of road and 13,042 watercourses across all regions. A total of nearly 1.6 million houses were damaged and more than 2,900 people were injured. The flood disaster also had a substantial impact on agriculture, infrastructure, and human life across smaller regions like Gilgit-Baltistan, Azad Jammu & Kashmir (AJK), and FATA. Overall, table 35 highlights the massive scale and variation in flood impact across Pakistan, from infrastructure and agriculture to human life and livelihoods.

During the 2010 floods Sindh was the worst affected 43%, followed by Punjab 26%, KP 12%, Federal 11%, Balochistan 6%, and 1% in AJ&K and FATA as presented in figure 19. (NDMA Annual Report, 2010)

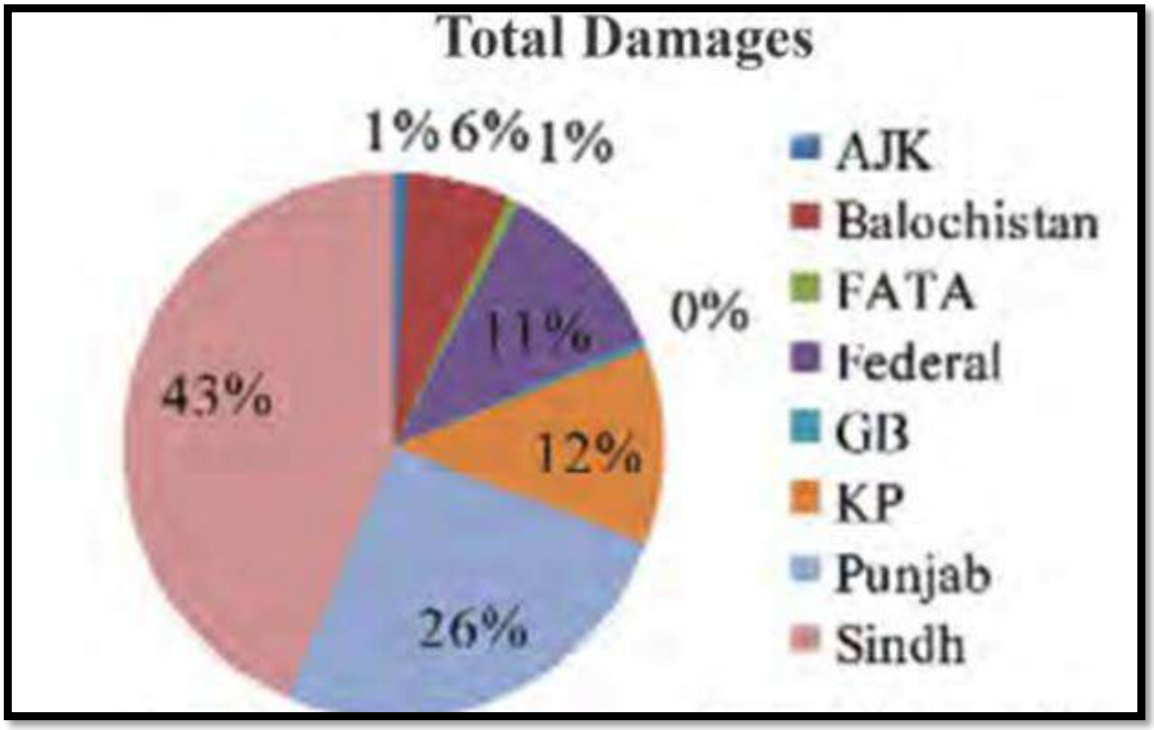


Figure 19: Total damages during 2010 floods in Pakistan (NDMA, 2010)

Table 35: Country-Wide Losses/Damages Due to Rain/Flood 2010

S.No	Province/Agency	Total Affected Districts	Cropped Area Affected (Ha)	Population Affected (Millions)	Houses Damaged	Road Milage (Km)	Villages Affected	Water Courses Damaged	Person Died	Persons Injured
1.	***Punjab***	11	746,900	8.20	375,773	2,819	1,778	2,598	110	262
2.	***Sindh***	17	1,043,500	7.185	879,978	8,467	11,988	6,990	411	1,235
3.	***Khyber Pakhtunkhwa***	24	121,500	3.80	257,294	6,511	544	1,790	1,156	1,198
4.	***Balochistan***	12	132,500	0.70	79,720	2,077	2,896	47	54	104
5.	***FATA***	#	7,220	#	5,419	1,257	#	0	#	#
6.	***Gilgit Baltistan***	7	7,900	0.10	3,157	382	347	960	183	60
7	***AJK***	7	33,100	0.20	6,843	3,575	0	657	71	87
	Grand Total	**78**	**2,092,600**	**20.185**	**1,608,184**	**25,088**	**17,553**	**13,042**	**1,985**	**2,946**
	Source of Information	*NDMA AS ON 24.2.2011*	*Page 153 of DNA Report*	*NDMA as on 24.2.2011*	*Page 89 of DNA Report*	*Page 129 of DNA Report*	*NDMA as on 24.2.2011*	*Page 153 of DNA Report*	*NDMA as on 24.2.2011*	*NDMA as on 24.2.2011*

 # Date not received by NDMA (FFC, 2010)

The table 36 outlines the estimated economic impact of the 2010 floods in Pakistan, showing both direct damages and indirect losses across various sectors, totaling over PKR 854 billion (approximately USD 10 billion). The economic sectors—primarily agriculture, livestock, and fisheries—suffered the most, with combined losses of over PKR 509 billion, accounting for nearly 60% of the total damage. The social infrastructure sector, especially housing, also faced severe losses, with damages amounting to PKR 135 billion. Physical infrastructure, including transport, irrigation, energy, and water systems, recorded damages of over PKR 172 billion, severely disrupting public services and connectivity. Additionally, cross-cutting sectors like governance and the environment saw modest yet significant impacts.

Table 36: Total Costs of Damages by Sector (Flood 2010)

S.no.	Sector	Direct Damages PKR millions	Indirect Losses PKR millions	Total Damage	
				PKR millions	USD millions
1.	***Social Infrastructure***				
	Housing	91,843	43,171	135,014	1,588
	Health	1,562	2,661	4,222	50
	Education	22,047	4,418	26,464	311
	Subtotal	115,451	50,249	165,700	1,949
2.	***Physical Infrastructure***				
	Irrigation and Flood Management	23,600		23,600	278
	Transport and Communications	62,491	50,420	112,911	1,328
	Water Supply and Sanitation	3,194	6,112	9,306	109
	Energy	13,184	13,116	26,300	309
	Subtotal	102,469	69,648	172,117	2,025
3.	***Economic Sectors***				
	Agriculture, Livestock and Fisheries	315,547	113,257	428,805	5,045
	Private Sector and Industries	14,463	9,468	23,932	282
	Financial Sector	110	57,141	57,251	674
	Subtotal	330,120	179,866	509,987	6,000
4.	***Cross Cutting Sectors***				
	Governance	3,141	2,835	5,976	70
	Environment	992		992	12
	Subtotal	4,133	2,835	6,968	82
	Total	**552,173**	**302,599**	**854,771**	**10,056**

(FFC, 2010)

A detailed overview of the damages and reconstruction costs caused by the 2010 floods in Pakistan, totaling Rs. 855 billion in damages and Rs. 578 billion in estimated reconstruction costs are highlighted in table 37. Among the provinces, Sindh suffered

the most extensive damage at Rs. 373 billion, followed by Punjab with Rs. 219 billion, while Gilgit Baltistan, FATA, and AJK experienced comparatively lower damage. Interestingly, reconstruction needs are not always proportional—Punjab's reconstruction cost (Rs. 93 billion) is significantly lower than its total damage, while Khyber Pakhtunkhwa, though lacking specific damage data, has the highest estimated reconstruction cost (Rs. 106 billion) after Sindh.

Sector-wise, agriculture faced the greatest losses with Rs. 429 billion in damages, yet the reconstruction cost is only Rs. 22 billion, likely reflecting the lower capital requirements for recovery compared to infrastructure. Conversely, transport and communication, with Rs. 113 billion in damage, requires the highest reconstruction investment of Rs. 200 billion, highlighting the high cost of rebuilding physical infrastructure. Housing was also heavily impacted, with Rs. 135 billion in damage and Rs. 126 billion in reconstruction cost. Other sectors such as education, health, and energy also saw notable losses as shown in table 38. This data emphasizes the widespread and multi-sectoral impact of the floods, underlining the immense financial burden required for Pakistan's recovery and reconstruction.

Table 37: Flood Damages and Reconstruction Cost (Rs. In Billion)

Province/Area	Damages	Reconstruction Cost
AJK	7	13
Balochistan	53	27
FATA	6	8
Federal	93	96
Gilgit Baltistan	4	7
Khyber	100	106
Pakhtunkhwa	-	-
Punjab	219	93
Sindh	373	228
Total	**855**	**578**

(Finance Division, 2010)

Table 38: Flood Damages and Reconstruction Cost by Sectors (Rs. In Billion)

Sectors	Damages	Reconstruction Cost
Transports and Communication	113	200
Irrigation	24	37
Energy	26	9
Agriculture	429	22
Education	27	43
Health	4	4
Water and Sanitation	9	6
Environment	1	18
Governance	6	5
Disaster Risk Management	-	2
Housing	135	126
Private Sector	24	9
Livelihood Support	-	58
Financial Sector	57	39
Total	**855**	**578**

(Finance Division, 2010)

2.33.8. International Appeal:

On August 11, 2010, an initial appeal was launched seeking US$ 459 million to address the immediate humanitarian needs of populations affected by the catastrophic floods in Pakistan. This was followed by a revised and expanded "Pakistan Floods Emergency Relief and Early Recovery Response Plan" (PFERRP), introduced on November 5, 2010. Jointly developed by the National Disaster Management Authority (NDMA) and the United Nations, the revised plan aimed to mobilize US$ 1.96 billion to support ongoing relief efforts and facilitate early recovery over the following twelve months.

As of December 31, 2010, 50.9% of the requested funding had been secured. The appeal encompassed a total of 397 carefully vetted projects, ensuring alignment with the Government of Pakistan's priorities. The PFERRP included:

- **139 Relief Projects** valued at US$ 928 million
- **224 Early Recovery Projects** amounting to US$ 956 million
- **34 Integrated Relief and Early Recovery Projects** worth US$ 53 million

All projects were implemented by UN agencies, international organizations, and INGOs/NGOs. Notably, none of the funds were routed through government financial channels, maintaining a clear separation to ensure transparency and efficient delivery of humanitarian assistance (NDMA, 2010).

2.33.9. Source of Relief:

In response to the disaster, alongside the efforts of the federal and provincial governments, there was a significant outpouring of support from a wide range of stakeholders. Contributions came from friendly nations, donor agencies, international organizations, financial institutions, INGOs/NGOs, the private sector, the Pakistani diaspora, philanthropists, and civil society organizations. This collective support facilitated immediate rescue operations and the delivery of critical humanitarian assistance, including medical supplies, food, clothing, non-food items (NFIs), and shelter kits for the affected population. Figure 20 shows the countries and organizations that donated relief assistance to Pakistan.

Figure 20: Name of Donor Countries (2010 Flood) (NDMA, 2010)

2.34. 2011 Floods:

In August 2011, Pakistan faced devastating flooding following intense monsoon rains in southern Sindh, parts of Punjab, and northeastern Balochistan. The resulting flash floods caused significant damage to infrastructure in the affected regions. The National Disaster Management Authority (NDMA) reported that the floods impacted 9.6 million people, resulted in 520 deaths, and left over 1,180 people injured as shown in table 39. Entire villages and urban areas were submerged, homes were destroyed, and more than a million acres of crops and agricultural land were ruined. This disaster was compounded by the 2010 floods, which had already affected 20 million people, many of whom were still recovering. In the most affected areas, food insecurity and malnutrition were already at critical levels before the 2011 floods struck (FFC, 2011).

Table 39: Damages during Floods in 2011

Death	520
Injuries	1180
Affected Districts	23
Affected Population	9.2 million
Affected Houses	1.5 million
Affected Area	25090 square km
Affected Cropped Area	881.03 thousand hectares

(Memon, 2014)

The table 40 shows a comprehensive assessment of the damages and reconstruction costs from the 2011 floods in Pakistan, showing a total loss of Rs. 324.5 billion

(approximately USD 3.73 billion) and an estimated reconstruction cost of Rs. 239 billion (USD 2.75 billion). The most affected area was the economic sector, especially agriculture, livestock, and fisheries, with combined losses of Rs. 27.3 billion, and large allocations for social protection reconstruction at Rs. 34.1 billion, despite no reported direct losses in that category. The social infrastructure sector—including housing, health, and education—suffered damages totaling Rs. 98.7 billion, with housing alone accounting for Rs. 85.5 billion in damage and requiring the highest reconstruction funding at Rs. 91.5 billion.

Physical infrastructure, particularly transport and communication, also saw significant losses at Rs. 26.5 billion, with a reconstruction need of Rs. 33.9 billion. Cross-cutting sectors such as governance, disaster risk management, and the environment reported lower overall losses, but still required substantial investment for recovery. This data illustrates the widespread and multi-sectoral impact of the floods, with heavy financial burdens particularly in restoring critical infrastructure, livelihoods, and public services.

Table 40: Estimate of Total Damages and Reconstruction Costs

Sector	Direct Losses	Indirect Losses	Total Damage		Reconstruction Cost	
	(Rs million)	(Rs million)	(Rs million)	(US $)	Rs million	(US $ million)
1.***Social Infrastructure***						
1.1 Housing	77,420	8,046	85,466	982	91,510	1,052
1.2 Health	432	826	1,258	14	864	10
1.3 Education	10,157	1,856	12,014	138	22,589	260
Sub-total	**88,009**	**10,728**	**98,738**	**1,135**	**114,963**	**1,321**
2.Physical Infrastructure						
2.1 Irrigation & Flood Management	4,763	0	4,763	55	9,526	110
2.2 Transport & Communications	16,386	10,082	26,468	304	33,902	390
2.3 Water Supply & Sanitation	500	704	1,204	14	1,900	22
2.4 Energy	457	783	1,240	14	292	3
Sub-total	**22,106**	**11,569**	**33,674**	**387**	**45,620**	**524**
3.Economic Sectors						
3.1 Agriculture,	22,694	4,560	27,254	313	8,178	94

Livestock & Fisheries						
3.2 Private Sector/I	88,009	10,728	98,738	1,135	114,963	1,321
3.3 Social & Gender	39	5	44	1	65	1
3.4 Social Protection	0	0	0	0	34,126	392
Sub-total	**165,091**	**22,314**	**187,405**	**2,154**	**68,959**	**793**
4.Cross Cutting Sectors						
4.1 Governance Management	4,763	0	4,763	55	9,526	110
4.2 Disaster & Risk Management	16,386	10,082	26,468	304	33,902	390
4.3 Environment	500	704	1,204	14	1,900	22
Sub-total	**4,334**	**382**	**4,716**	**54**	**9,470**	**109**
Total	**279,540**	**44,992**	**324,533**	**3,730**	**239,011**	**2,747**

/I Includes Commerce, Industry and Finance (FFC, 2011)

2.35. 2012 Floods:

In the first week of September 2012, torrential rains struck Khyber Pakhtunkhwa (D.I. Khan), Upper Sindh, Southern Punjab, and Northeastern Balochistan in Pakistan. The heavy rainfall caused flash floods in hilly regions and raised water levels in hill torrents and flood channels. Southern Punjab, particularly Dera Ghazi Khan and Rajanpur districts, Upper Sindh, including Jacobabad, Shikarpur, Khashmore, Larkana, Sukkur, Qambar-Shahdadkot, Dadu, and Badin, and Northeastern Balochistan, covering Jaffarabad, Naseerabad, Jhal Magsi, Loralai, and Qila Saifullah districts, were severely impacted.

Flash floods triggered by the rains caused widespread damage, resulting in over 100 deaths in Upper Sindh and significant destruction in Dera Ghazi Khan and Rajanpur in Punjab. Additionally, five districts in eastern Balochistan were left isolated. The already vulnerable communities, still recovering from the 2010 and 2011 floods, were once again severely affected by the torrential rains, hill torrents, and canal breaches. The 2012 floods impacted around 4.85 million people—887,345 in Punjab, 3.17 million in Sindh, and 788,780 in Balochistan. The floods damaged 14,159 villages, claimed approximately 571 lives, destroyed 819,951 homes, and inundated around 0.473 million hectares/ 1.17 million acres of agricultural land as shown in table 41 (FFC, 2012).

Table 41: Country-Wide Losses/Damages Due to Rain/Flood 2012

Province/Region	Persons Died	Persons Injured	Persons Affected	Houses Damaged		Villages Affected	Cropped Area Affected (Acres)	Livestock Lost
				Partially	Fully			
Punjab	63*	272	887,345	16440	9116	1512	473,998	898
Sindh	283	2421	3,174,716	188,935	232,723	11,894	245,459	2029
Khyber Pakhtunkhwa	38	36	NR	4293	105	NR	NR	NR
Balochistan	156	146	787,780	183,513	183,513	753	452,588	9194
FATA	NR	NR	NR	NR	NR	NR	NR	NR
Gilgit Baltistan	NR	NR	NR	NR	NR	NR	NR	NR
AJ&K	31	32	NR	1017	226	NR	NR	NR
Grand Total	**571**	**2,907**	**4,849,841**	**394,268**	**425,683**	**14,159**	**1,172,045**	**12,121**

NR: Not Reported, * including 3 in Islamabad (FFC, 2012).

WHO Surveillance officers visit a road blocked by flood water in Sindh in 2012

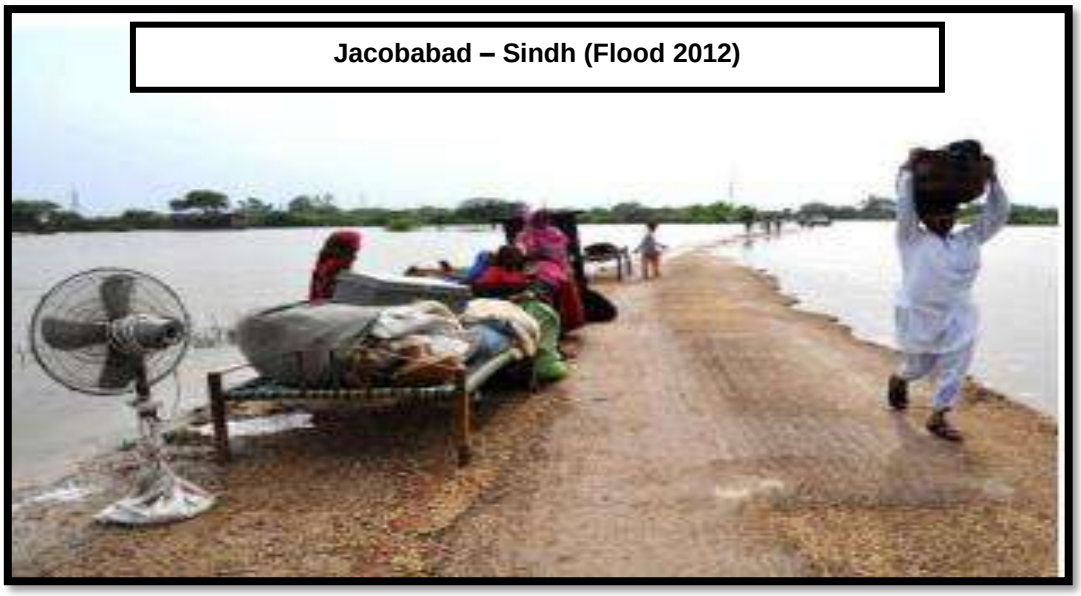
Road in Sindh cut off by floodwater in 2012

Poor Quality Drinking Water (Flood 2012)

A Roadside camp established for people affected by the flood in Sindh in 2012

Flooded water destroyed crops in Sindh in 2012

Jacobabad – Sindh (Flood 2012)



Sukkur – Sindh (Flood 2012)

Rajanpur – Punjab (Flood 2012)

2.36. 2013 Floods:

The 2013 rains and floods impacted approximately 1.107 million acres of agricultural land, affecting 8,297 villages. The disaster resulted in around 333 fatalities, with 33,763 houses completely destroyed and 46,180 partially damaged. The total number of people affected by the floods was about 1.489 million as highlighted in table 42 (FFC, 2013).

Table 42: Country-Wide Losses/Damages due to Rain/Flood 2013

Province/Region	Persons Died	Persons Injured	Persons Affected	Houses Damages		Villages Affected	Cropped Area Affected (Acres)	Livestock Lost
				Partially	Fully			
Punjab	109	39	795,857	7,935	12,656	2,946	745,655	81
Sindh	47	43	524,833	21,400	14,095	3,068	246,590	88
Khyber Pakhtunkhwa	70	27	584	507	287	2	535	80
Balochistan	39	23	167,789	15,419	6,537	2,281	114,463	13,160
Gilgit Baltistan	NR	NR	NR	NR	NR	NR	NR	NR
FATA	35	26	NR	266	55	NR	17	14
AJ&K	33	15	NR	653	133	NR	NR	81
Grand Total	**333**	**173**	**1,489,260**	**46,180**	**33,763**	**8,297**	**1,107,260**	**13,504**

(FFC, 2013)

Sialkot – Punjab (Flood 2013)

Karachi – Sindh (Flood 2013)

Chitral – Khyber Pakhtunkhwa (Flood 2013)

2.37. 2014 Floods:

In September 2014, a severe and late monsoon, combined with significant water discharges from the eastern rivers, particularly the Chenab, led to widespread flooding in Azad Jammu & Kashmir (AJ&K), Punjab, and landslides in Gilgit-Baltistan (GB). The floods, which were larger in scale and coverage than anticipated, occurred despite forecasts predicting below-average rainfall. Heavy rains, which began in the first week of September, caused extensive damage to crops, infrastructure, and human settlements, with significant impacts on the national economy.

As shown in table 43 the floods and rains claimed 367 lives and affected more than 2.5 million people. A total of 107,102 houses were either partially damaged or completely destroyed. Over 1 million acres of agricultural land were impacted, affecting 250,000 farmers, many of whom lost food, fodder, or cash crops. The total estimated cost for recovery was $439.7 million (Finance Division, 2014).

In 2014, the flood damages in Pakistan were significant. The province of Punjab bore the overwhelming majority of the damage, accounting for Rs. 41.15 billion (US $0.41 billion), which represented 94.74% of the total losses. In contrast, Azad Jammu and Kashmir (AJ&K) experienced comparatively lower damages, amounting to Rs. 2.85 billion (US $0.03 billion), contributing 5.26% to the overall damage figures. This data highlights the disproportionate impact of the 2014 floods on different regions, with Punjab suffering the most severe consequences as highlighted in table 44.

The 2014 floods in Pakistan caused significant damage across multiple sectors. The Community Physical Infrastructure sector was the hardest hit, accounting for 39.09% of the total damage (Rs. 17.16 billion), affecting roads, bridges, and basic public services. The housing sector followed, suffering 28.67% of the losses (Rs. 12.59

billion), as countless homes were either destroyed or severely damaged. Agricultural crops were also heavily impacted, comprising 24.85% of the total damage (Rs. 10.91 billion), which threatened food security and income for many rural communities. Livelihoods, especially those dependent on daily wages and agriculture, experienced 6.24% of the damage (Rs. 2.74 billion). Meanwhile, losses in Disaster Risk Resilience infrastructure and livestock were relatively lower, at 0.80% (Rs. 0.35 billion) and 0.53% (Rs. 0.23 billion) respectively as presented in table 45. This distribution highlights how the flood not only disrupted essential services and homes but also severely affected agricultural productivity and income sources for vulnerable populations.

Table 43: Country- Wide Losses/Damages due to Rain/Flood 2014

Province/Region	Persons Died	Persons Affected	Persons Injured	Houses Damaged	Villages Affected	Cropped Area Affected (Acres)	Livestock Lost
Punjab	286	2,474,272	512	100,000	3,484	2,413,797	1,733
Sindh	-	65,583	-	-	267	-	-
Khyber Pakhtunkhwa	12	-	15	42	-	-	-
Gilgit Baltistan	13	13,266	35	1,292	127	1,513	5,369
AJ&K	56	46,979	111	5,768	187	-	2,620
Grand Total	**367**	**2,600,555**	**673**	**107,102**	**4,065**	**2,415,310**	**9,722**

(FFC, 2014)

Table 44: Flood Damages 2014

Province/Area	Damages (Rs. billion)	Damages (US $ billion)	Damages (in percentage)
Punjab	41.15	0.41	94.74
AJ&K	2.85	0.03	5.26
Total	**43.90**	**0.44**	**100**

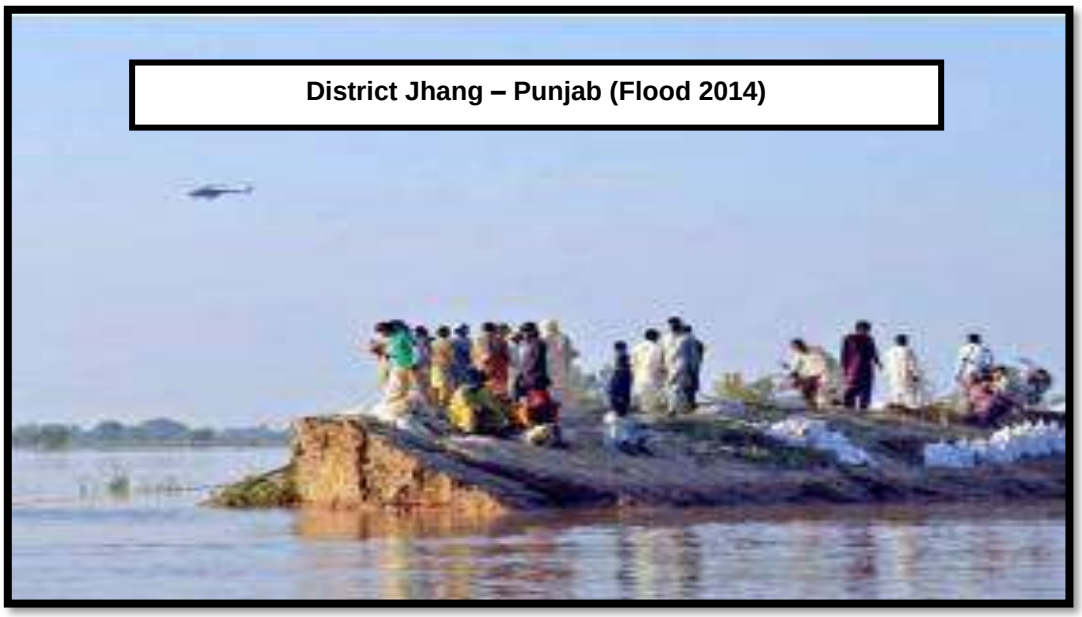
(Finance Division, 2014)

Table 45: Flood Damages by Sectors (Flood 2014)

Sectors	Damages (Rs. billion)	Damages (US $ billion)	Damages (in percentage)
Community Physical Infrastructure	17.16	0.17	39.09
Housing	12.59	0.13	28.67
Crops	10.91	0.11	24.85
Livelihoods	2.74	0.03	6.24
Disaster Risk Resilience	0.35	0.003	0.80
Livestock	0.23	0.002	0.53
Total	**43.9**	**0.44**	**100**

(Finance Division, 2014)

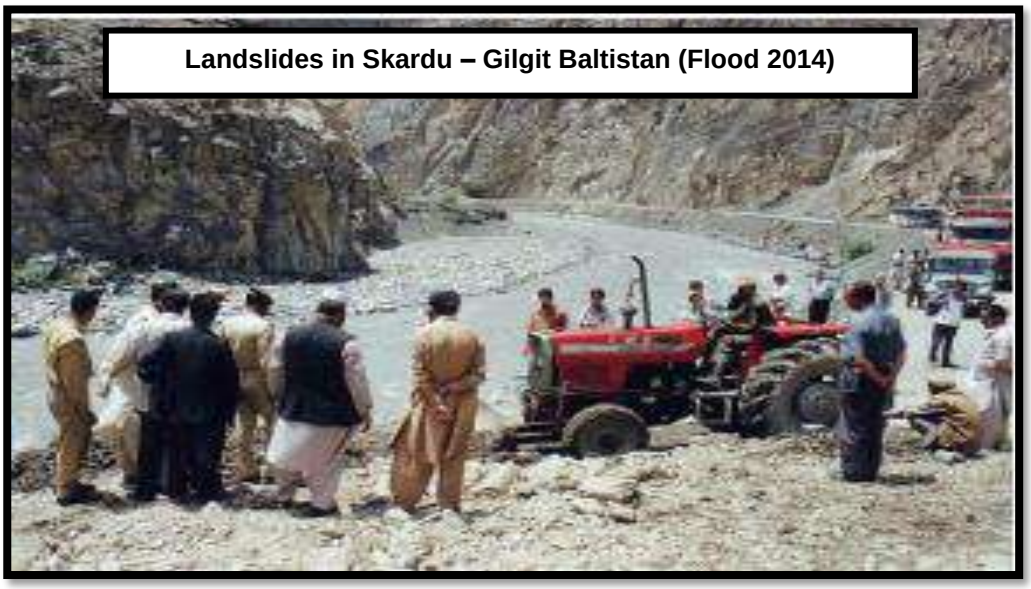
Breaching Section activated at Head Muhammad Wala Bridge – Multan (Flood 2014)



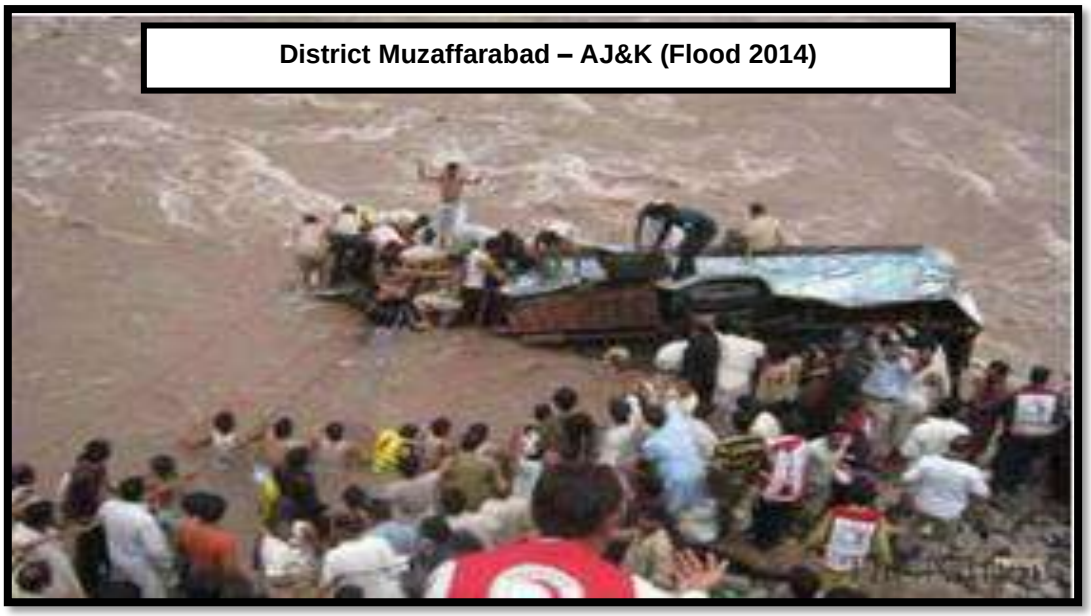
District Jhang – Punjab (Flood 2014)

District Sialkot – Punjab (Flood 2014)

District Chiniot – Punjab (Flood 2014)



Landslides in Skardu – Gilgit Baltistan (Flood 2014)



2.38. 2015 Floods:

In 2015, torrential rains and cloudbursts triggered severe flooding across various parts of Pakistan, particularly in the Chitral Valley of Khyber Pakhtunkhwa and parts of Gilgit-Baltistan. The floods also impacted riverine and low-lying areas along the Indus River in Punjab and Sindh, as well as mountainous regions in Balochistan. Heavy rainfall in the upper catchments of major rivers and their tributaries resulted in flood flows that caused significant loss of life and damage to both private and public infrastructure.

The 2015 floods affected over 1.93 million people and 4,634 villages, damaging 10,716 homes and resulting in 238 fatalities as shown in table 46. Flash floods, triggered by cloudbursts and glacier melt/GLOFs, inundated several regions, especially the Chitral Valley and adjacent areas of Gilgit-Baltistan. These floods, which occurred overnight between July 15th and 16th and again on July 19th, caused extensive damage to villages, roads, bridges, water supply systems, public and private property, and agricultural crops.

Two major flood waves on the Indus River also affected low-lying areas of Districts Layyah, Muzaffargarh (Tehsil Kot Addu), Dera Ghazi Khan, Rajanpur, and Rahim Yar Khan along the river in Punjab. Additionally, districts in Sindh—Ghotki, Kashmore, Shikarpur, and Sukkur—were severely impacted by high to very high flood levels on both sides of the river (FFC, 2015).

Table 46: Country-Wide Losses/Damages due to Rain/Flood 2015

Province/Federal Agency	Villages Affected	Persons Affected	Houses Damaged	Persons Died	Persons Injured
Punjab	586	463,902	3,096	58	11
Sindh	3,203	1,001,696	Nil	Nil	Nil
KP	523*	361,244*	4,799	109	148
Balochistan	NR	69,976	1,176	16	34
AJ&K	17	NR	408	26	5
GB	286	35,717	812	10	21
FATA	19	900	425	19	13
Grand Total	**4,634**	**1,933,435**	**10,716**	**238**	**232**

Figures relate to District Chitral only, NR: Not Reported (FFC, 2015)

2.38.1. 2015-Rains/Flood Damages to Flood Protection Infrastructure and need for their Restoration/ Rehabilitation

In Punjab, major damage occurred to five flood protection structures within the D.G. Khan Zone, and minor damage was reported to seven structures in the Sargodha and Bahawalpur zones along the Indus River. The Punjab Irrigation Department estimated the cost of restoring these structures at approximately Rs. 503 million. In Sindh, floodwaters also caused substantial damage to flood protection infrastructure, with restoration costs for 30 schemes reported by the Punjab Irrigation Department totaling approximately Rs. 14,934 million.

In Chitral District, extreme rainfall, cloudbursts, and Glacier Lake Outburst Flood (GLOF) events caused severe flash floods along the Chitral River and its tributaries. These floods heavily damaged both public and private infrastructure, including 256 flood protection facilities, with estimated restoration costs of Rs. 1,448 million.

In Balochistan, flood flows from the Saliaza River damaged ongoing restoration efforts on the first and second line of defense embankments and the Toe Wall of the Inam Ghudai Flood Protection Bund in District Zhob. The Balochistan Irrigation Department estimated immediate restoration costs at Rs. 14.674 million, with an additional Rs. 131 million required for the extension and reinforcement of the riverbanks.

In Gilgit-Baltistan, the Public Works Department reported damage to roads and irrigation channels across various districts, with restoration costs estimated at Rs. 786 million, highlighting the widespread impact of the 2015 floods across the region (FFC, 2015).

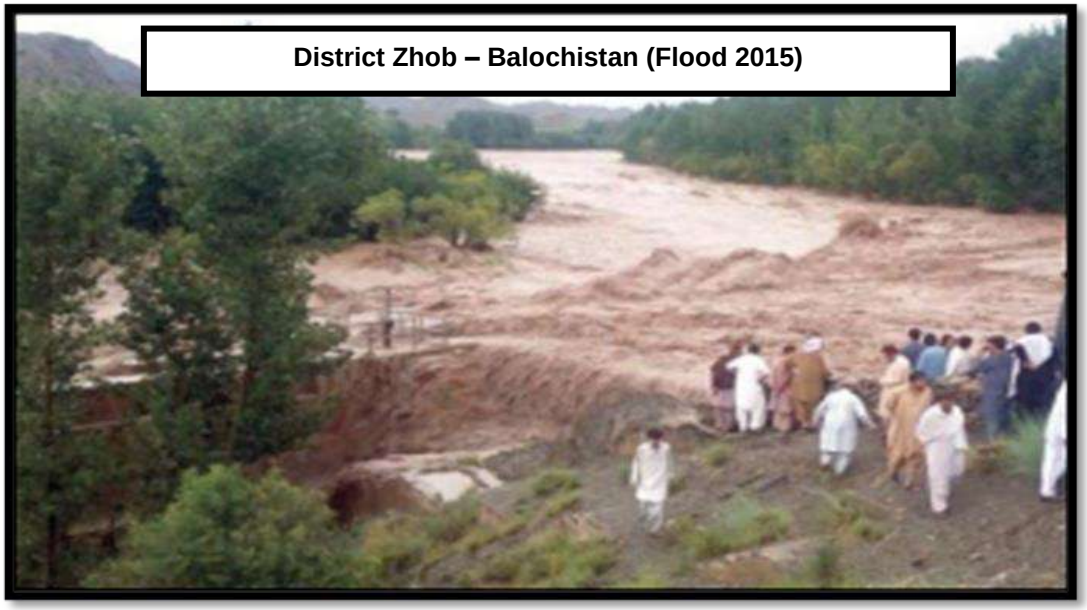
District D.G. Khan - Punjab (Flood 2015)

District Khairpur – Sindh (Flood 2015)

District Chitral – Khyber Pakhtunkhwa (Flood 2015)

District Chitral – Khyber Pakhtunkhwa (Flood 2015)

District Peshawar – Khyber Pakhtunkhwa (Flood 2015)



District Zhob – Balochistan (Flood 2015)

2.39. 2016 Floods:

The 2016 floods, caused by intense rainfall and flash floods, resulted in significant damage to both public and private infrastructure across Punjab, Khyber Pakhtunkhwa, Balochistan, parts of Sindh, and the federally administered regions, including Gilgit-Baltistan, FATA, and Azad Jammu & Kashmir (AJK). According to the National Disaster Management Authority (NDMA), the floods affected 45 villages, resulting in 153 fatalities, 113 injuries, and damage to 1,452 houses as shown in table 47.

Table 47: Country-Wide Losses/Damages due to Rain/Flood 2016

Province/Federal Agency	Villages Affected	Livestock Lost	Houses Damaged	Persons Died	Persons Injured
Punjab	29	NR	283	29	NR
Sindh	NR	NR	NR	NR	NR
KP	4	NR	617	69	87
Balochistan	11	40	507	18	23
AJ&K	NR	4	2	6	2
GB	1	150	42	3	1
FATA	NR	NR	NR 27 NR		
Islamabad	NR	NR	1	1	NR
Grand Total	**45**	**194**	**1,452**	**153**	**113**

(FFC, 2016)

2.39.1. Flood Protection Infrastructure damaged during flood season 2016 and planning for Restoration/ Rehabilitation:

During the 2016 monsoon season, no major damage to flood protection infrastructure was reported in Sindh, Khyber Pakhtunkhwa, the Federally Administered Tribal Areas

(FATA), or Azad Jammu & Kashmir (AJ&K). However, in Punjab, 45 flood protection structures within the Lahore, Sargodha, and D.G. Khan Irrigation Zones sustained damage. The Punjab Irrigation Department (PID) estimated the cost of rehabilitation at Rs. 566.958 million, and restoration work was completed following the end of the flood season.

In Balochistan, flood protection infrastructure in areas such as Lasbela, Panjgur, Sibi, Sabakzai, Lehri, Bhag Town, and Manjuthi was affected. The PID Balochistan estimated the restoration cost at Rs. 14 million. Additionally, the Gilgit-Baltistan Public Works Department (GB-PWD) reported flood-related damage to irrigation channels and protective infrastructure in the districts of Skardu, Shigar, Karmong, and Ghanche, with an estimated repair cost of Rs. 102 million (FFC, 2016).

District Sialkot – Punjab (Flood 2016)

District Karachi – Sindh (Flood 2016)

District Chitral – Khyber Pakhtunkhwa (Flood 2016)

District Quetta – Balochistan (Flood 2016)

District Gilgit - Gilgit Baltistan (Flood 2016)

2.40. 2017 Floods:

During the 2017 monsoon season (July-September), Pakistan experienced below-normal rainfall, with a national deficiency of -22.48% (Source: Pakistan Meteorological Department). The rainfall patterns were highly variable both in terms of time and location. While July and August are typically the wettest months, below-normal rainfall was observed in both July and September.

In July 2017, the country experienced a rainfall deficit of -21.36%, with the largest shortfall in G-B and Azad Jammu & Kashmir (AJK), which saw a -51.77% reduction. Rainfall in other provinces was also below normal: Sindh (-7.68%), Punjab (-14.43%), KP (-31.43%), and Balochistan (-32.05%).

In August 2017, the deficit increased to -25.65% nationwide, with the most significant reductions occurring in Balochistan (-56.86%), Sindh (-44.37%), G-B and Kashmir (-36.83%), and Punjab (-20.52%).

September 2017 saw a national rainfall deficit of -17.31%, with the largest shortfalls in G-B and Kashmir (-54.14%), Sindh (-49.27%), Balochistan (-27.23%), and KP (-23.47%). However, Punjab experienced slightly above-normal rainfall, with a 7.78% increase as shown in figure 21.

Regarding river flows, the overall flood situation remained normal across most major rivers during the monsoon season. The river-specific flood status was as follows:

- **River Indus**: Did not exceed medium flood levels at Kalabagh, Chashma, Taunsa, and Guddu. It remained at low flood levels at Tarbela, Sukkur, and Kotri.
- **River Chenab**: Reached low flood levels at Marala, Khanki, and Qadirabad, while remaining normal at Trimmu and Panjnad throughout the season.

- **River Jhelum**: Flow remained normal throughout the monsoon season.
- **River Ravi**: Flow remained normal throughout the monsoon season.
- **River Sutlej**: Flow remained normal throughout the monsoon season.
- **River Kabul at Nowshera**: Did not exceed low flood levels (FFC, 2017)

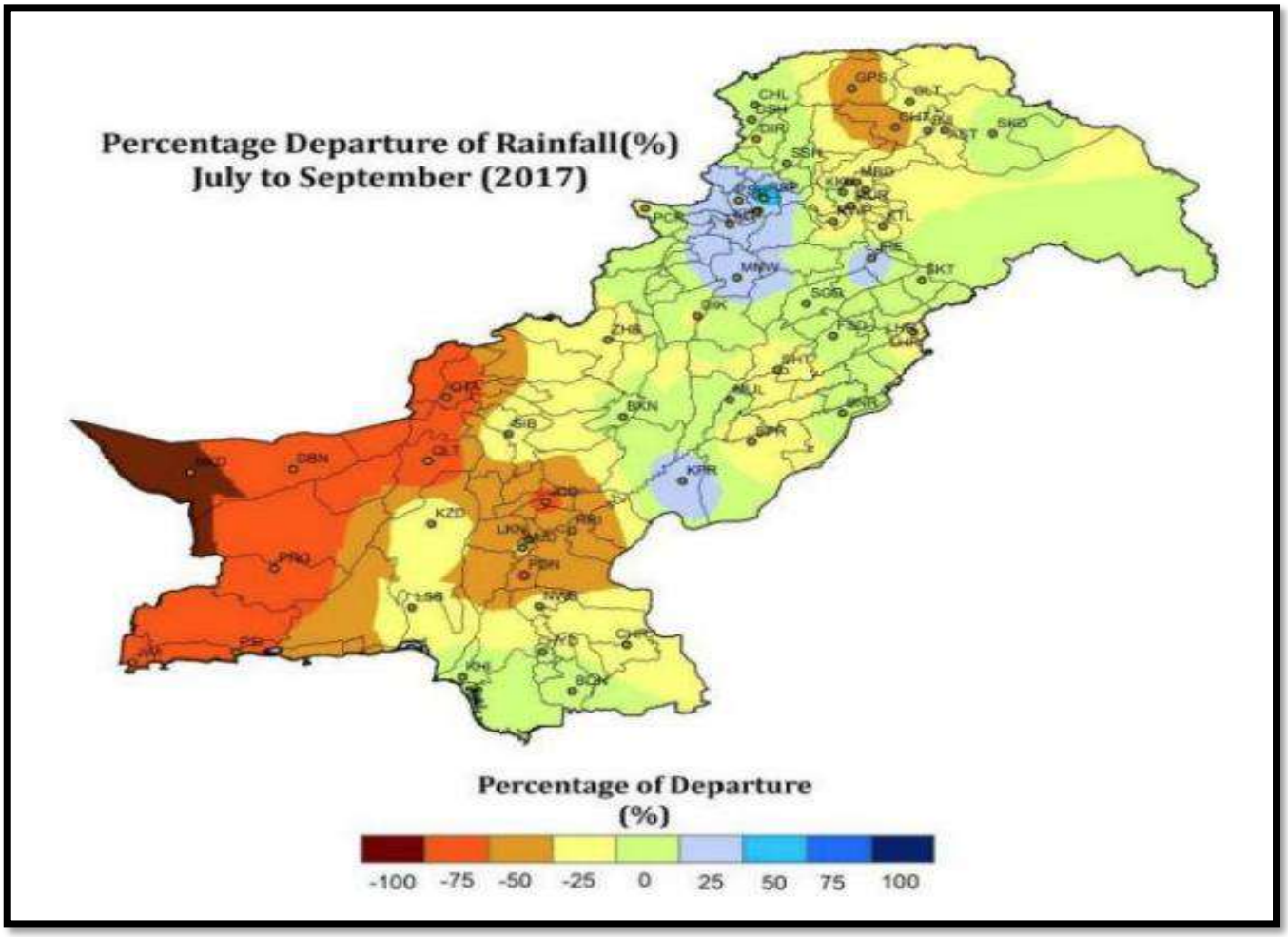


Figure 21: Area weighted (%) rainfall during (July-September) 2017 (FFC, 2017)

In total, 172 people lost their lives and 167 were injured due to rain or flood-related incidents in 2017. Punjab and Sindh each reported the highest number of deaths, with 38 fatalities each. Khyber Pakhtunkhwa (KP) suffered the most significant property damage, with 232 houses damaged, despite a lower death toll of 28. Balochistan recorded 26 deaths and 36 damaged houses, though injury data is not provided. Azad Jammu and Kashmir (AJ&K), Gilgit-Baltistan (GB), and the Federally Administered Tribal Areas (FATA) also reported considerable impacts, with GB having the highest number of damaged houses (55) among these regions. Islamabad had the lowest reported damage, with 3 deaths and one house affected as highlighted in table 48.

Table 48: Country-Wide Losses/Damages due to Rain/Flood 2017

Province/Federal Agency	Persons Died	Persons Injured	Houses Damaged
Punjab	38	83	34
Sindh	38	22	43
KP	28	33	232
Balochistan	26	-	36
AJ&K	13	5	30
GB	8	4	55
FATA	18	20	9
Islamabad	3	-	1
Grand Total	**172**	**167**	**440**

(FFC, 2017)

2.40.1. Infrastructure damages of 2017 Floods and planning for their Rehabilitation

During the 2017 monsoon season, no significant damage occurred to flood protection infrastructure in Punjab, Sindh, Khyber Pakhtunkhwa, FATA, or Azad Jammu & Kashmir (AJ&K). However, in Balochistan, flood protection bunds at Patar Colony, Jari Wari, Kundi Wari, and the Lasbela Canal minor sustained damage. The restoration cost for these damages, as estimated by the Irrigation Department of the Government of Balochistan, amounts to Rs 96 million. In Gilgit-Baltistan, 45 flood protection structures were also reported to have been damaged, with an estimated restoration cost of Rs 139.919 million (FFC, 2017).

2.41. 2018 Floods:

According to data provided by the National Disaster Management Authority (NDMA), the monsoon season of 2018 brought heavy rainfall and flash floods that resulted in loss of life and damage to both public and private infrastructure across Punjab, Khyber Pakhtunkhwa, Balochistan, Gilgit-Baltistan, and Azad Jammu & Kashmir.

In the floods of 2018, a total of 88 people died, 158 were injured, and 362 houses were damaged due to flooding during the year. Khyber Pakhtunkhwa (KP) experienced the highest number of house damages at 182, along with 22 deaths and 40 injuries, indicating it was among the hardest-hit areas. Azad Jammu and Kashmir (AJ&K) followed with 21 fatalities, 30 injuries, and 60 houses damaged. Punjab also faced significant impacts, with 31 deaths and 72 injuries, though only 8 houses were reported damaged. Gilgit-Baltistan (GB) saw major property loss with 100 houses damaged, despite a lower casualty figure of 4 deaths and 1 injury. FATA reported 9 deaths, 15 injuries, and 12 houses damaged. As shown in table 49. Data for Sindh and Balochistan is either missing or unreported. Overall, the 2018 floods caused

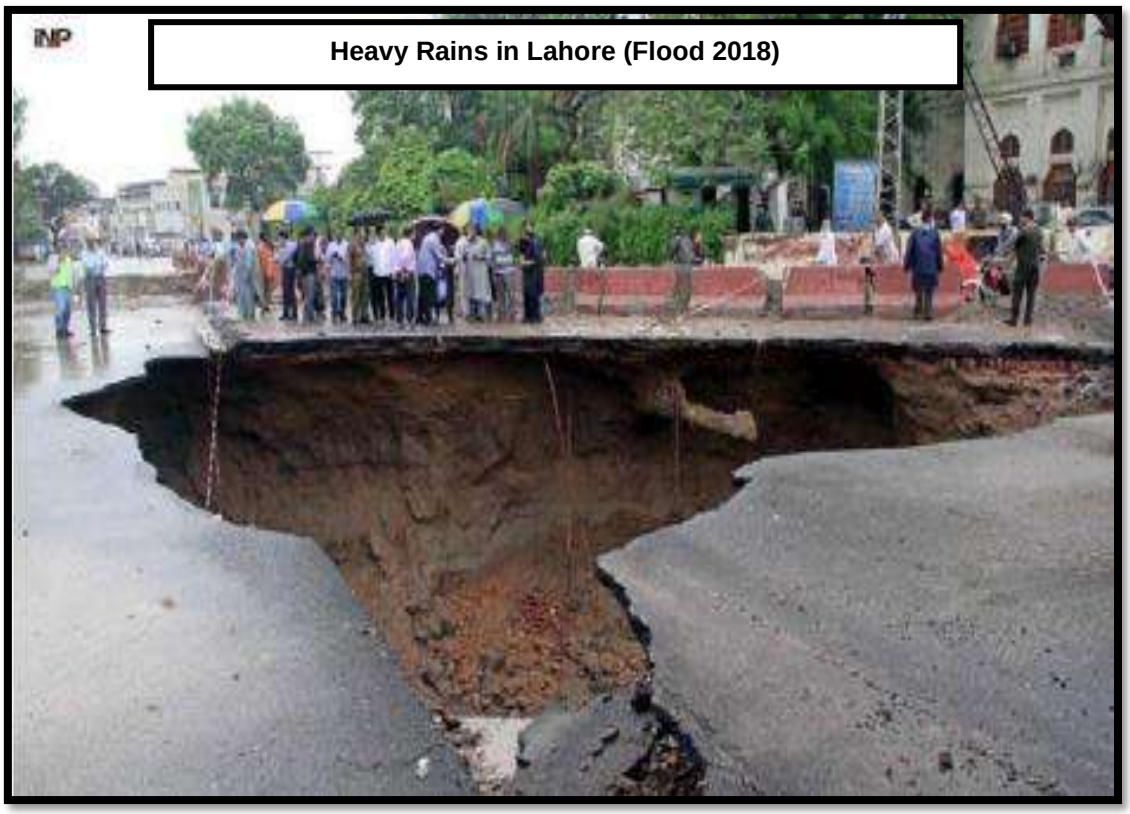
substantial human and material losses, with KP, AJ&K, and GB bearing the brunt of the destruction.

Table 49: Country-Wide Losses/Damages due to Rain/Flood 2018

Province/Region	Persons Died	Persons Injured	Houses Damaged
Punjab	31	72	8
Sindh	-	-	-
KP	22	40	182
Balochistan	1	-	-
AJ&K	21	30	60
GB	4	1	100
FATA	9	15	12
Grand Total	**88**	**158**	**362**

(FFC, 2018)

As reported by the relevant authorities, no major damage was sustained by flood protection infrastructure in Punjab, Sindh, Khyber Pakhtunkhwa, Balochistan, FATA, and Azad Jammu & Kashmir during the 2018 monsoon season. However, approximately 100 minor flood protection structures in Gilgit-Baltistan were affected, according to the Gilgit-Baltistan Public Works Department (GB-PWD). Restoration efforts, with an estimated cost of Rs. 293 million, were subsequently initiated by the GB-PWD (FFC, 2018).



2.42. 2019 Floods:

The significant human and property losses across different provinces and regions during the floods of 2019 are highlighted in table 50. A total of 235 people died and 169 were injured due to flooding, while 272 houses were damaged nationwide. Khyber Pakhtunkhwa (KP), including merged areas, was the most severely affected, with 78 deaths, 69 injuries, and 94 houses damaged. Sindh reported the second-highest death toll at 63, though with relatively lower injuries (17) and just one house damaged. Azad Jammu and Kashmir (AJ&K) also faced substantial losses, recording 42 deaths, 18 injuries, and 62 damaged houses. Gilgit Baltistan experienced considerable property damage with 110 houses affected, along with 8 deaths and 12 injuries. Punjab (including Islamabad Capital Territory) reported 32 deaths, 43 injuries, and minimal structural damage with only 5 houses affected. Balochistan saw 12 deaths and 10 injuries, with no house damage reported. Overall, the 2019 floods were particularly deadly, with KP, Sindh, and AJ&K suffering the highest human toll, and Gilgit Baltistan experiencing major damage to housing infrastructure.

Table 50: Country-Wide Losses/Damages due to Rains/Floods 2019

Province/Region	Persons Died	Persons Injured	Houses Damaged
Punjab (including ICT)	32	43	5
Sindh	63	17	1
KP (including merged areas)	78	69	94
Balochistan	12	10	-
AJ&K	42	18	62
Gilgit Baltistan	8	12	110
Grand Total	**235**	**169**	**272**

(FFC, 2019)

According to reports from the relevant agencies, the flood protection infrastructure in Punjab, Sindh, Khyber Pakhtunkhwa, Balochistan, Ex-FATA, and Azad Jammu & Kashmir remained largely unaffected during the 2019 monsoon season, with no significant damage reported (FFC,2019).

2.43. 2020 Floods:

During the 2020 monsoon season (July to September), rainfall levels were above average in northern Pakistan during July. In August, the trend shifted, with significantly higher-than-normal rainfall observed in the southern regions of Sindh. This was largely due to moisture influx from the Arabian Sea, which led to intense rainfall and urban flooding along Sindh's coastal areas. Although the Pakistan Meteorological Department (PMD) had forecasted above-normal rainfall across the country for September 2020, the month largely remained dry, except for some rainfall in the southern regions (FFC, 2020).

The 2020 floods in Pakistan caused extensive destruction, with 410 deaths, 400 injuries, and over 134,000 houses damaged—Sindh alone accounted for over 133,000 damaged homes. In addition to human and residential losses, infrastructure suffered significantly, with 41 roads and bridges damaged, 28 mosques, shops, or hotels affected, and 7 power houses disrupted across various regions as shown in table 51.

Table 51: Country-Wide Losses/Damages due to Rains/Floods 2020

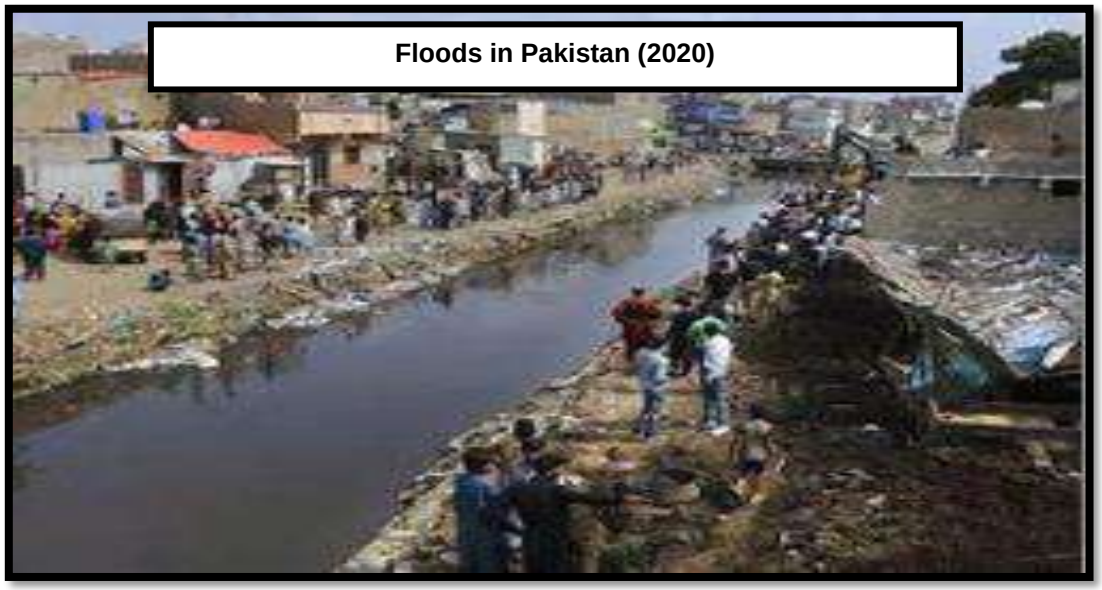
Province/Region	Persons Died	Persons Injured	Houses Damaged	Roads/ Bridges	Masjid/ Shops/Hotels	Power Houses
Punjab (Incl. ICT)	104	175	220	-	17(S)	-
Sindh	145	96	133,279	-	-	-
KP (incl. merged areas)	116	101	178	3(b)	4(M), 2(S)	-
Balochistan	21	17	906	13 (R), 3(B)	2 (H)	1
AJ&K	12	09	50		1(S),1(H)	4
Gilgit Baltistan	12	02	258	22(B)	1(M)	2
Grand Total	**410**	**400**	**134,891**	**41**	**28**	**7**

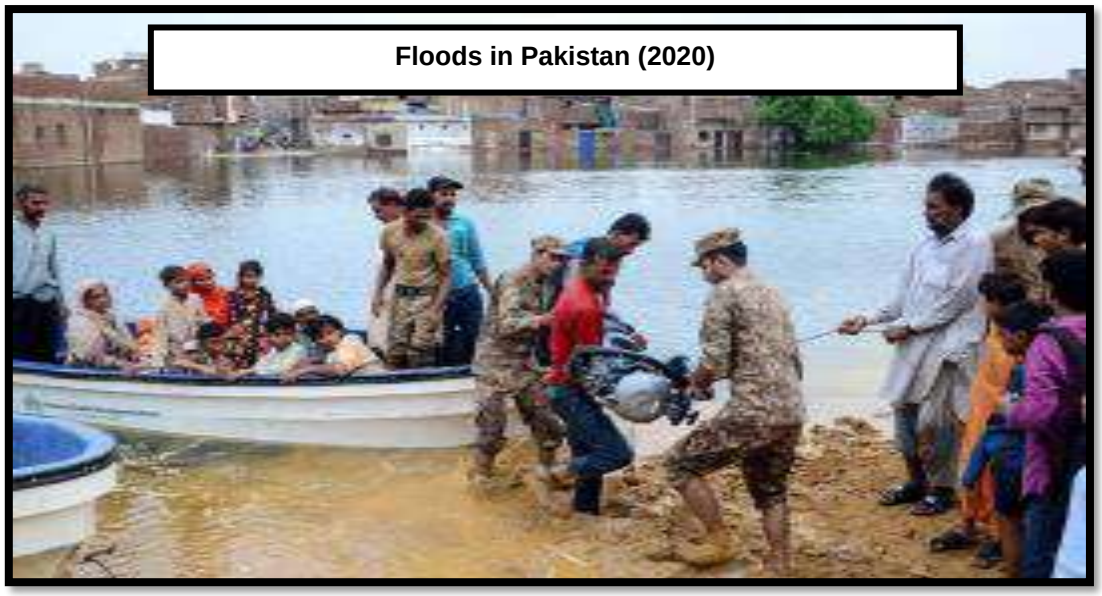
(FFC, 2020)

2.43.1. Infrastructure Damaged and Planning for Restoration/ Rehabilitation:

Relevant agencies reported that the flood protection infrastructure in Punjab, Sindh, Khyber Pakhtunkhwa, Balochistan, Ex-FATA, and Azad Jammu & Kashmir remained largely intact during the 2020 monsoon season, with no significant damage observed (FFC, 2020).


Floods in Pakistan (2020)


Floods in Pakistan (2020)


Floods in Pakistan (2020)

Floods in Pakistan (2020)

Floods in Pakistan (2020)

Urban Flooding in Karachi (Floods 2020)

2.44. 2021 Floods:

During the 2021 monsoon season (July to September), rainfall across the country remained close to normal. Due to reduced precipitation and lower snowmelt, the Water and Power Development Authority (WAPDA) was able to fill Tarbela Dam for only a single day, while Mangla Reservoir did not reach its Maximum Conservation Level.

Despite the generally mild season, significant urban flooding was reported in Sector E-11 of Islamabad and in Abbottabad city, Khyber Pakhtunkhwa. On July 28, 2021, a cloudburst in Islamabad triggered intense rainfall that led to flash flooding in various parts of the federal capital, resulting in two fatalities. Several vehicles were swept away, and water inundated the basements of homes and commercial buildings in Sectors E-11, F-10, and D-12. A personal weather station in E-11/4 recorded 116 mm of rainfall during the event.

Infrastructure damage included two bridges—Ayub Bridge and Nowshera Bridge—in Abbottabad District (Khyber Pakhtunkhwa), and one bridge in Sibi District (Balochistan). Additionally, a Glacial Lake Outburst Flood (GLOF) event in Gilgit-Baltistan caused road damage and temporarily cut off access to main highways, impeding relief and rescue operations. The Karakoram Highway also faced multiple blockages due to landslides.

According to the National Disaster Management Authority (NDMA), despite the overall normal rainfall, the season resulted in 198 fatalities. The twin cities of Islamabad and Rawalpindi experienced heavy rain on July 28, 2021, leading to high flood levels in Lai Nullah. At 8:10 AM, the water level at Kattarian Bridge reached 21 feet (Evacuation Level), while at Gawalmandi Bridge it rose to 17 feet by 9:10 AM. The rainfall subsided shortly afterward, allowing conditions to return to normal.

Later, on September 11, 2021, another spell of heavy rain increased the water level in Lai Nullah to 19 feet (Alert Level) at Kattarian Bridge and 15 feet at Gawalmandi Bridge. The floodwaters were effectively managed, and no damage was reported by field authorities (FFC, 2021).

Table 52 highlights the country-wide losses/damages due to floods in 2021 which resulted in 198 deaths, 299 injuries, and 836 houses damaged nationwide. Khyber Pakhtunkhwa (KP) and Balochistan were among the hardest-hit regions, with significant loss of life and property. Additionally, 22 roads and bridges, 37 mosques, shops, or hotels, and one power house were damaged, reflecting the widespread infrastructural impact.

Table 52: Country-Wide Losses/Damages due to Rains/Floods 2021

Province/Region	Persons Died	Persons Injured	Houses Damaged	Roads/ Bridges	Masjid/ Shops/Hotels	Power Houses
Punjab (incl.ICT)	55	146	54	-	-	-
Sindh	15	07	150	-	-	-
KP (incl. merged areas)	89	133	124	1(R), 2(B)	-	-
Balochistan	24	09	437	6(R), 1(B)	-	-
AJ&K	09	04	56	-	14(S),3(H)	-
Gilgit Baltistan	06	0	15	6(R), 6(B)	20(S)	1
Grand Total	**198**	**299**	**836**	**22**	**37**	**1**

(FFC, 2021)

2.44.1. Infrastructure Damaged and Planning for Restoration/ Rehabilitation

As per reports from the relevant authorities, the flood protection infrastructure in Punjab, Sindh, Khyber Pakhtunkhwa, Balochistan, Ex-FATA, and Azad Jammu & Kashmir remained largely unaffected during the 2021 monsoon season, with no significant damage reported (FFC, 2021).

2.45. 2022 Floods:

Beginning in June 2022, Pakistan experienced unprecedented monsoon rainfall—reportedly ten times higher than the national average—which triggered a large-scale flooding crisis. The Prime Minister described the disaster as the most severe in the nation's history. On August 26, 2022, a national state of emergency was declared, initially designating 84 districts—primarily in Balochistan, Sindh, and Khyber Pakhtunkhwa—as calamity-affected. By October, this number had increased to 94 districts. The floods had a catastrophic humanitarian and economic impact, affecting approximately 33 million people, with an estimated 7.9 million displaced from their homes. Significant portions of Sindh and parts of other provinces remained submerged for extended periods.

Government estimates reported over 1,700 fatalities and approximately 12,900 injuries. Housing infrastructure was heavily impacted, with around 800,000 homes completely destroyed and another 1.3 million damaged. Additionally, more than one million livestock were lost. The total economic cost of the damage and losses caused by the floods has been assessed at approximately USD 30.1 billion (Harvey et al., 2022)

In 2022, Pakistan experienced record-breaking rainfall, with Sindh receiving 703.1 mm (426% above normal) and Balochistan 320.7 mm (450% above normal), causing severe flooding. Other regions like Punjab, KP, and Gilgit Baltistan also saw significantly above-normal rainfall, while Islamabad and AJ&K recorded slightly below-normal levels as shown in table 53 whereas figure five shows total rainfall recorded nationwide during the 2022 Floods.

Table 53: Province-wise Rainfall actually observed across Pakistan in 2022

Sr.No.	Province/Region	Rainfall Occurred (mm)	Rainfall Occurred (%age above Normal)
1.	***Sindh***	703.1mm	426% above normal
2.	***Balochistan***	320.7mm	450% above normal
3.	***Punjab***	393.5mm	70% above normal
4.	***Khyber Pakhtunkhwa***	341.1mm	33% above normal
5.	***Islamabad***	1,199.46mm	17% less than normal
6.	***Gilgit Baltistan***	81.1mm	104% above normal
7.	***Azad Jammu & Kashmir***	382.6mm	2% less than normal

(Annual Flood Report 2022)

The pre-monsoon rainfall began on June 13, 2022, and continued until June 25, 2022. This was followed by four major rainfall spells during the 2022 monsoon season, which occurred as follows and is shown in figure 23:

1. **First Spell:** June 29 to July 9, 2022
2. **Second Spell:** July 23 to July 28, 2022
3. **Third Spell:** August 5 to August 13, 2022
4. **Fourth Spell:** August 23 to August 26, 2022

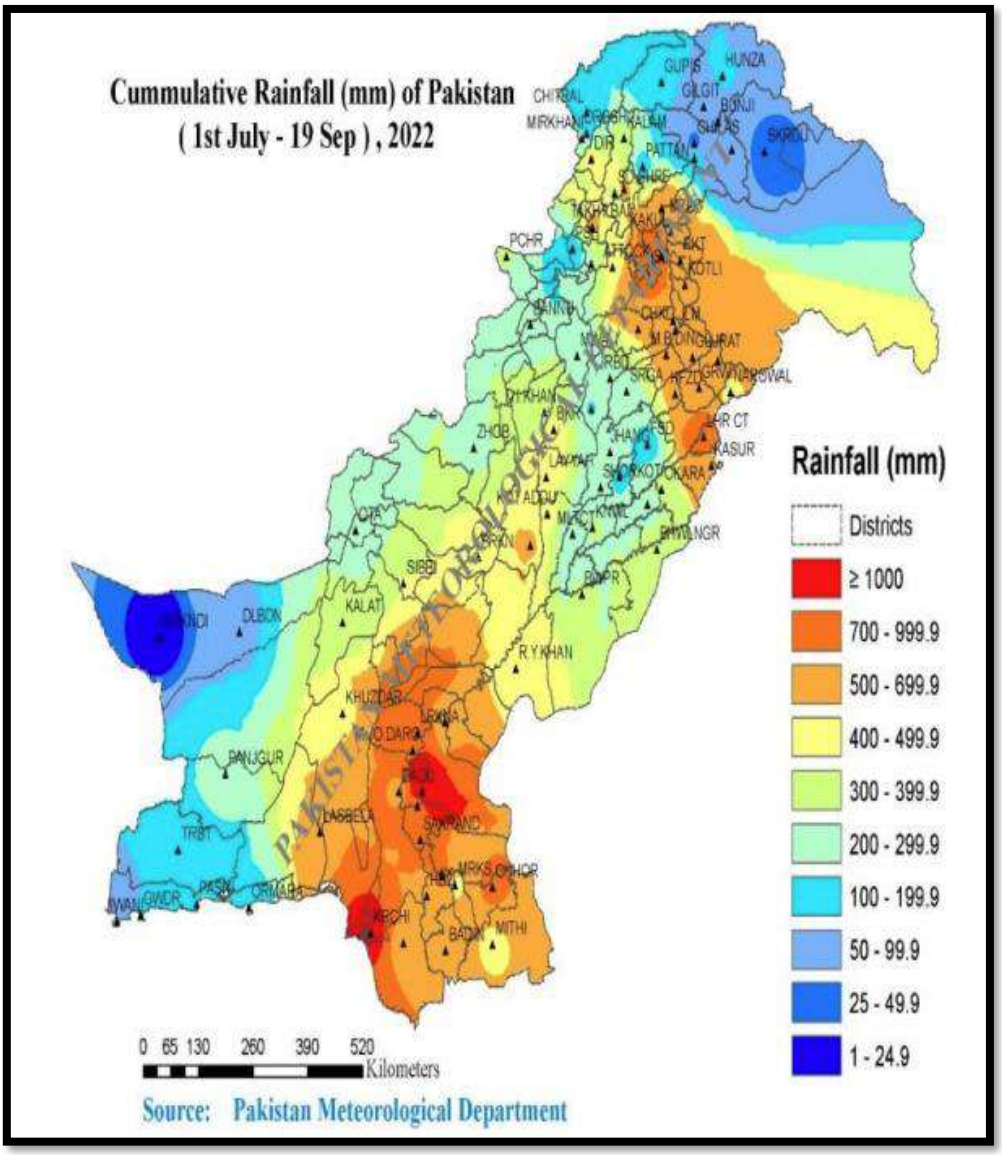


Figure 22: Cumulative Rainfall actually observed across the country (Flood 2022) (FFC, 2022 : Report on the Hydraulic Characteristics of 2022 Floods)

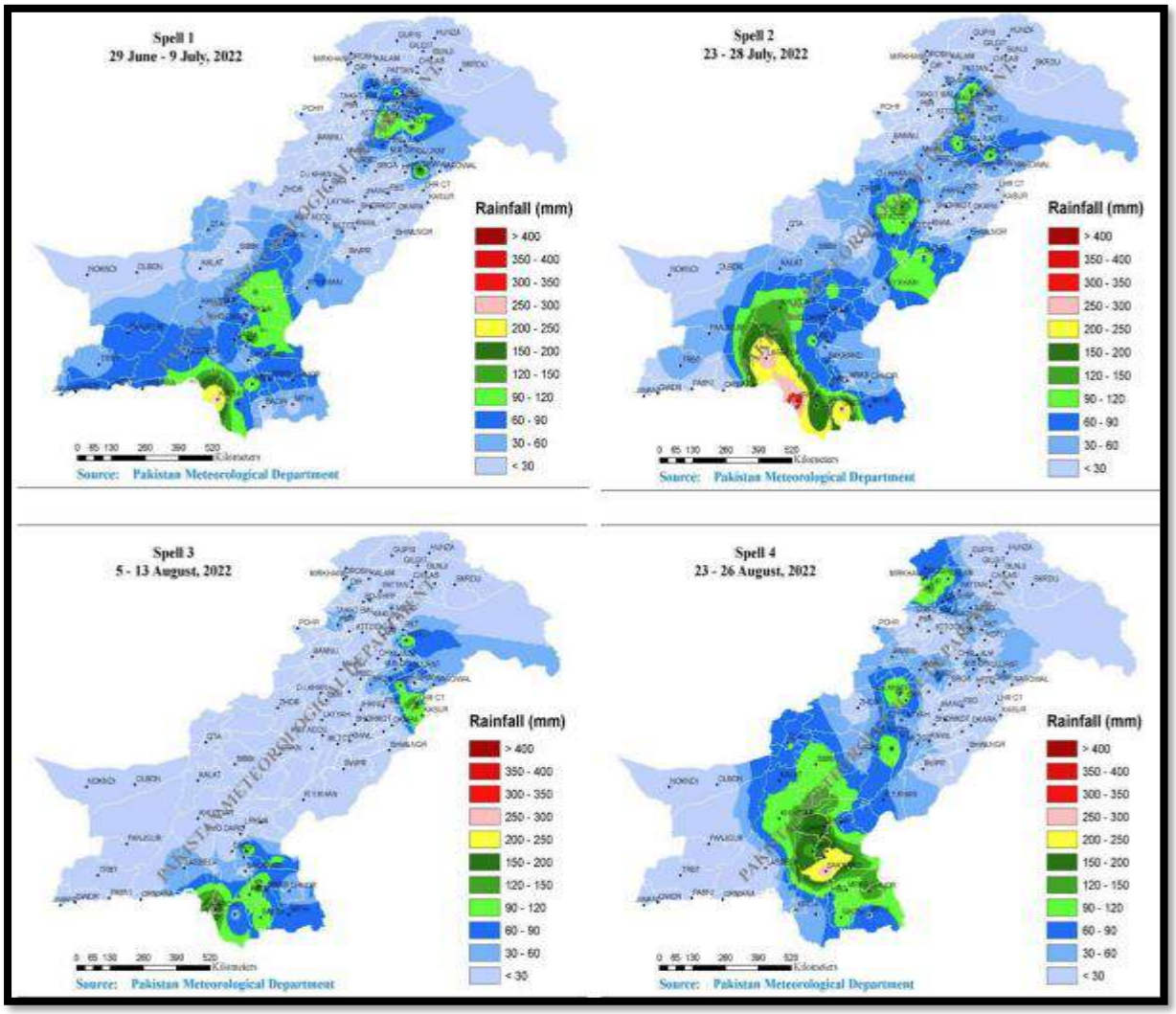


Figure 23: Four major rainfall spells during the 2022 monsoon season (FFC, 2022)

Figure 24 illustrates a bar chart comparing the July–September 2022 rainfall (in blue bars) with the annual average rainfall (in grey bars) across various cities in Pakistan. The chart highlights an exceptional increase in rainfall during this period, especially in cities like Padidan, Mithi/Do, and Lasbela, where the rainfall exceeded 1000 mm, significantly surpassing their typical annual averages. This drastic rise is evident across nearly all listed cities, indicating abnormal monsoon behavior in 2022. The disparities between the blue and grey bars emphasize the severity of the anomaly, suggesting extreme weather conditions and potential implications for urban flooding and disaster preparedness across the country.

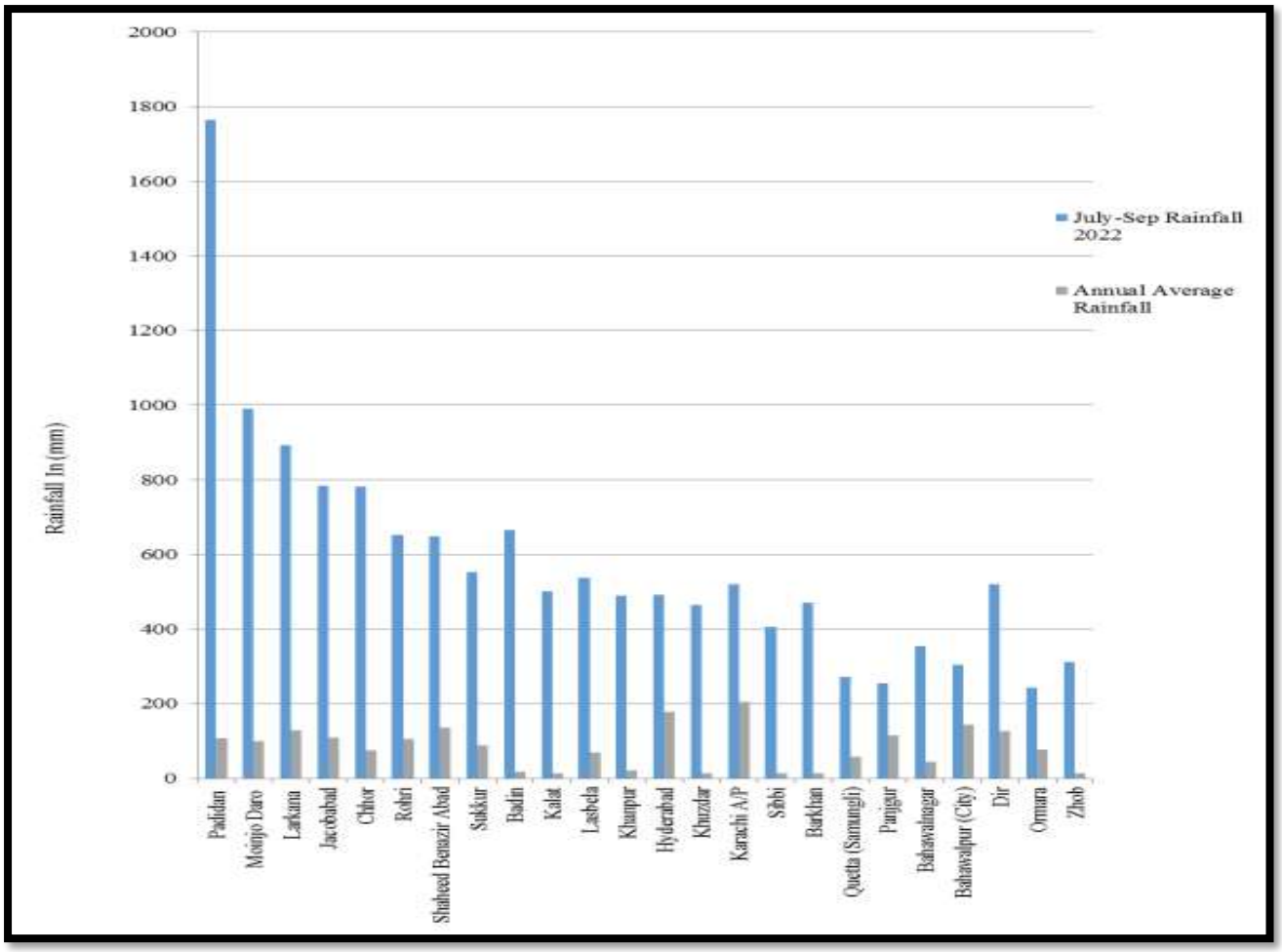


Figure 24: Bar chart showing cities with exceptional high rainfall in 2022 (FFC, 2022).

Out of the 25 most impoverished districts in Pakistan, 19 were declared calamity-affected following the 2022 floods. Initial assessments indicate that the disaster may lead to a rise in the national poverty rate by approximately 3.7% to 4.0%, potentially pushing an additional 8.4 to 9.1 million people below the poverty line.

Among the hardest-hit sectors, housing sustained the highest level of damage, estimated at PKR 1.2 trillion (USD 5.6 billion). This was followed by the agriculture, food, livestock, and fisheries sector, which suffered losses amounting to PKR 800 billion (USD 3.7 billion), and the transport and communications sector, with damages valued at PKR 701 billion (USD 3.3 billion).

In terms of recovery and reconstruction requirements, the transport and communications sector top the list, needing an estimated PKR 1.1 trillion (USD 5.0 billion). This was followed by agriculture and related sectors at PKR 854 billion (USD 4.0 billion), and housing at PKR 592 billion (USD 2.8 billion).

Provincially, Sindh and Balochistan bear the brunt of the reconstruction needs, accounting for approximately 50% and 15% of the total requirements, respectively (FFC, 2022; PDNA, 2022).

The map (figure 25) illustrates the extent of housing damage across districts in Pakistan during the 2022 floods, with varying shades of red representing the number of damaged houses. The darkest red areas—primarily located in southern Sindh, eastern Balochistan, and parts of southern Punjab—experienced the most severe impact, with over 50,000 to 130,000 houses damaged per district. Moderate damage (30,000–50,000 houses) is seen in parts of Balochistan, Sindh, and Khyber Pakhtunkhwa. Lighter shades correspond to districts with fewer damaged homes, with some areas showing damage below 1,000. The map highlights the disproportionate impact on southern Pakistan, especially Sindh and Balochistan

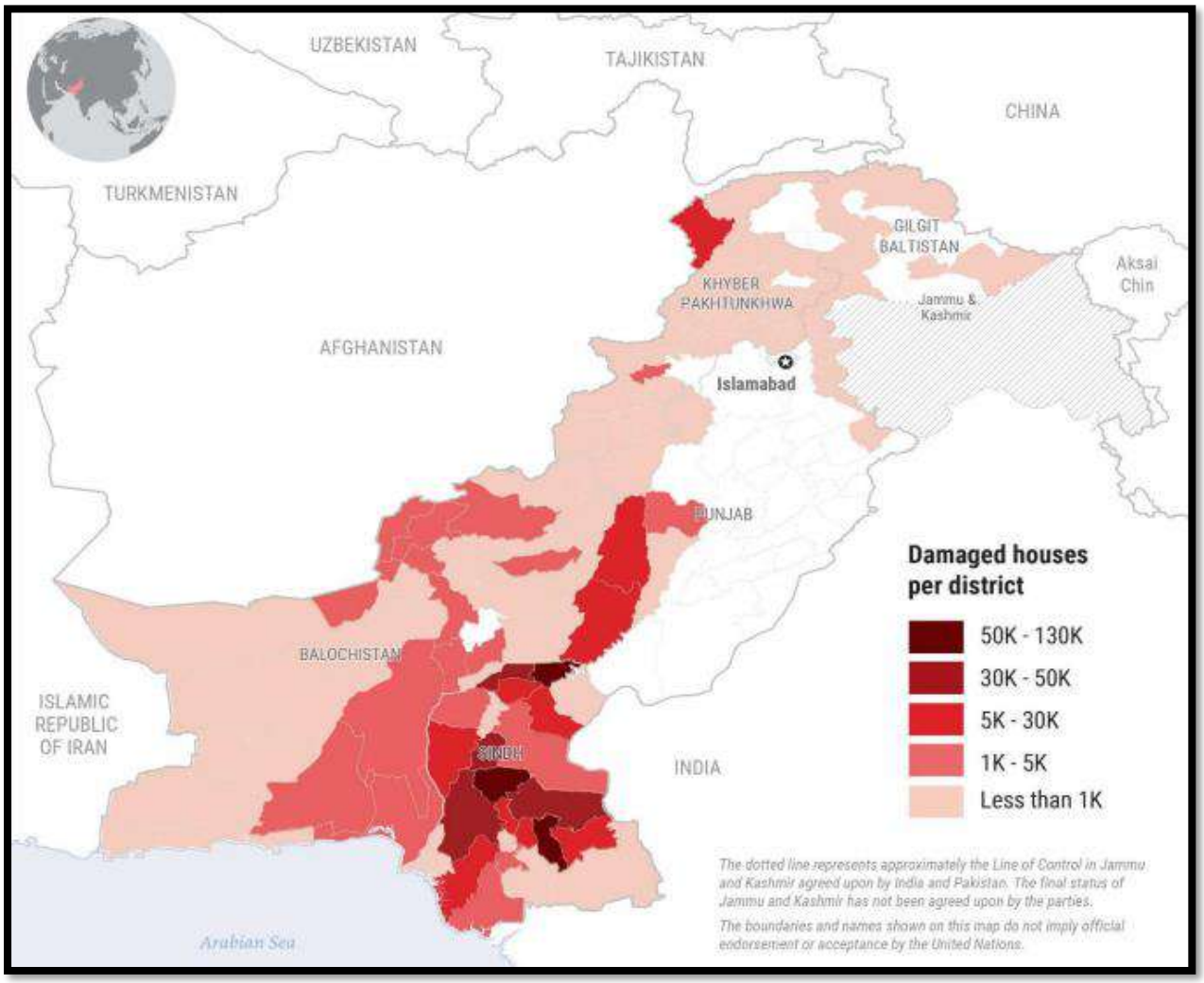


Figure 25: Extent of housing damage across districts in Pakistan during the 2022 floods (IN-OCHA, 2022)

As of October 2022, the estimated total damage from the floods in Pakistan amounted to USD 14.9 billion, with economic losses reaching USD 15.2 billion and recovery needs totaling USD 16.3 billion. Sindh was the hardest-hit region, incurring the highest damage (USD 9.1 billion) and losses (USD 11.4 billion), followed by significant impacts in Balochistan. Cross-provincial needs were also notably high at USD 4.5 billion, indicating widespread infrastructure and recovery requirements across regions as shown in table 54.

Table 54: Estimated damage, loss and needs by region as of October 2022

Region	Damage (Million USD)	Loss (Million USD)	Needs (Million USD)
Balochistan	1,625	2,516	2,286
Khyber Pakhtunkhwa	935	658	780
Punjab	515	566	746
Sindh	9,068	11,376	7,860
Cross-provincial	2,731	67	4,540
Special regions	32	49	48
Total	**14,906**	**15,233**	**16,261**

(Harvey et al., 2022)

Figure 26 presents a sector-wise breakdown of the damage, loss, and recovery needs caused by the 2022 floods in Pakistan, totaling $14.9 billion in damage, $15.2 billion in losses, and $16.3 billion in recovery needs. The Housing sector experienced the highest damage at $5.6 billion (37.5%), showing the widespread destruction of homes. In contrast, the Agriculture, Food, Livestock, and Fisheries sector suffered the greatest losses—over $9.2 billion (60.7%), due to the floods' impact on crops, livestock, and food supply chains. When it comes to rebuilding and recovery, the largest financial needs are identified in Transport and Communications (30.7%), Agriculture (24.6%), and Housing (16.9%), showing priorities for infrastructure restoration, food system recovery, and housing reconstruction. Each sector is grouped under broader categories—social, infrastructure, productive, and cross-cutting—to highlight where interventions are most needed.

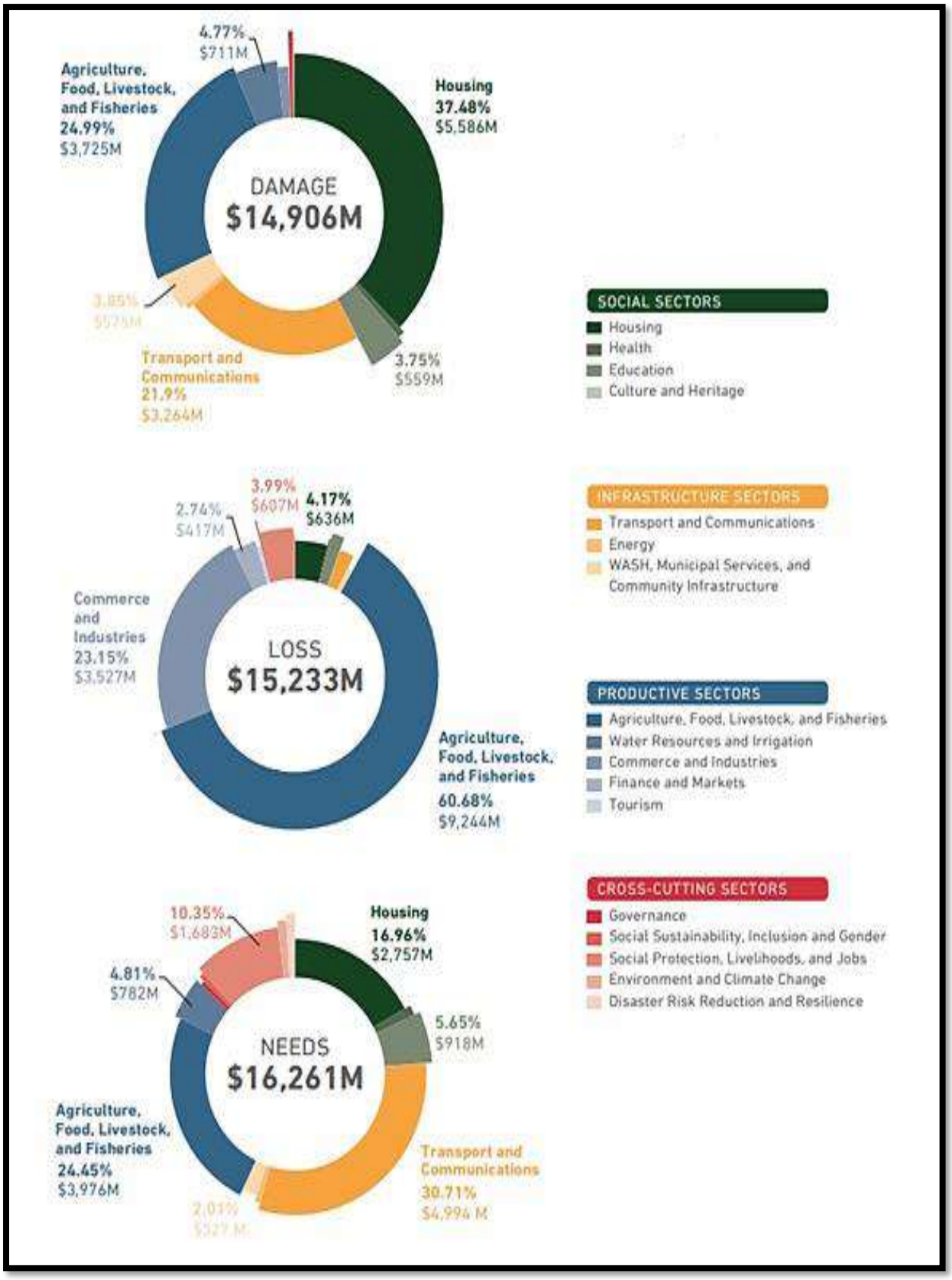


Figure 26: Distribution of Damage, Loss and Needs by Sector in 2022 Floods (PDNA, 2022)

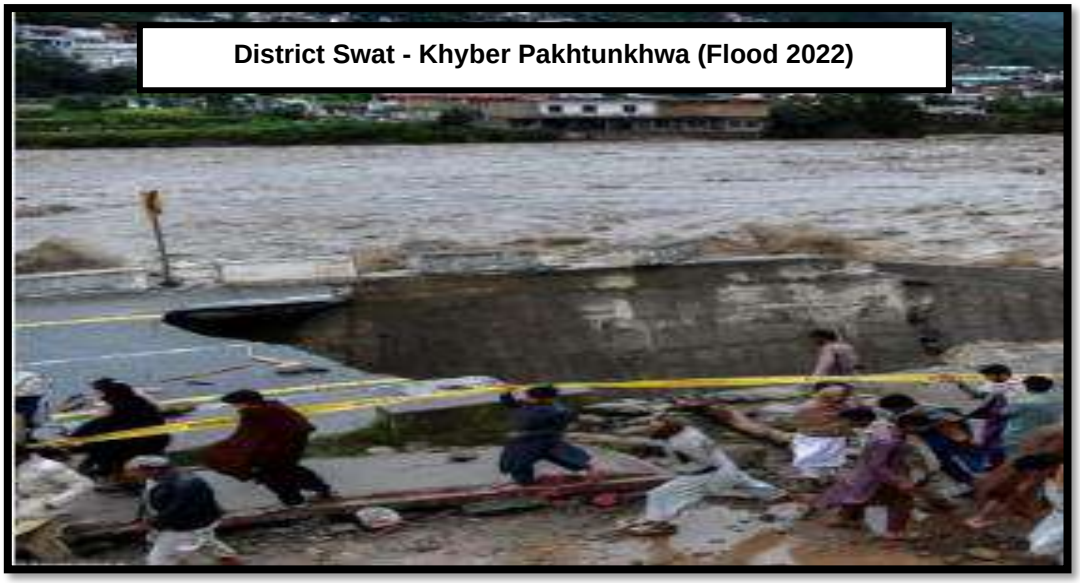
District Dadu – Sindh (Flood 2022)

District Jafarabad - Balochistan (Flood 2022)

District Rajanpur - Punjab (Flood 2022)

Munda Headworks before 2022 Floods

Munda Headworks collapse during 2022 Floods



District Swat - Khyber Pakhtunkhwa (Flood 2022)

2.46. 2023 Floods:

During the 2023 monsoon season, the River Sutlej experienced high to exceptionally high flood levels, primarily due to cumulative water releases from India's Pong Dam (which regulates the River Beas) and Bhakra Dam (which controls the River Sutlej). On August 19, 2023, the river reached an exceptionally high flood stage at Ganda Singh Wala, with peak discharge recorded at 278,297 cusecs. Similarly, a very high flood level was observed at Sulemanki on August 22, with a peak discharge of 191,053 cusecs, and a high flood level was reached at Islam on August 25, where flows peaked at 151,904 cusecs. These flood conditions led to the inundation of surrounding villages, particularly in the Kasur district, where standing crops, residential structures, and embankments suffered considerable damage.

Data illustrated in Figure 27 shows a comparison of flood peaks on Sutlej River which highlights that the inflows at Sulemanki and Islam barrages during 2023 were the highest recorded since 2010.

The extreme flooding in the Sutlej River that year resulted in significant agricultural and infrastructural losses, largely driven by combined outflows from upstream Indian dams. From August 17, 2023 onward, persistent heavy monsoon rains further intensified the flooding situation. The elevated water levels breached embankments and submerged numerous settlements along the Sutlej River, leading to the displacement of over 162,257 individuals. An estimated 62,012 hectares/ 153,231 acres of land, including vast areas of standing crops, were submerged. In response, the Provincial Disaster Management Authority (PDMA) in Punjab established 178 relief camps and 95 medical facilities to support affected populations. The river reached an "extremely high" flood level near Bahawalnagar, impacting approximately 90 villages located along its banks (FFC, 2023; Kamal & Piracha, 2024; NDMA, 2024).

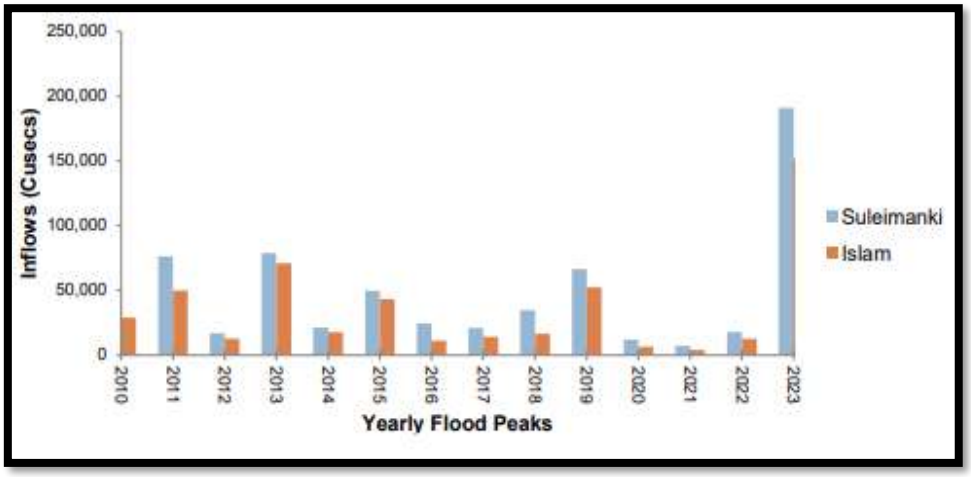


Figure 27: Comparison of Flood Peaks on Sutlej River (FFC, 2023)

The graph (figure 28) shows River Sutlej's water flow at different locations (Harike, Ferozepur, G.S. Wala, Suleimanki, Islam) between 16 August and 4 September 2023.

A peak discharge of approximately 910,000 cusecs from Pong and Bhakra Dams occurred between 15–19 August, causing a sharp rise in flows. Another significant release of 126,260 cusecs was recorded on 23 August, with relatively steady levels until 27 August. Water levels gradually declined thereafter across all locations.

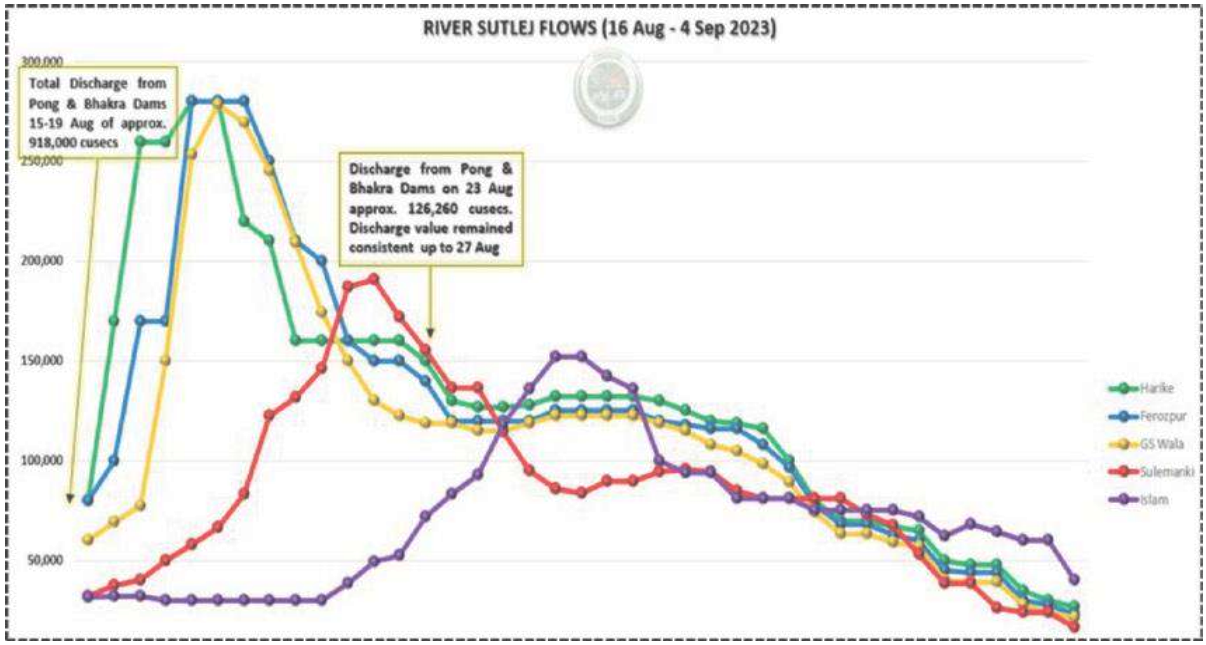


Figure 28: Hydrograph of River Sutlej During August 2023 Flood Event (NDMA, Ops Wing)

The 2023 floods in Pakistan caused significant human and infrastructure losses across all provinces, with 226 deaths and 349 injuries reported nationwide. Balochistan was the hardest hit, with over 4,100 houses damaged, 22 km of roads destroyed, and 697 livestock lost. In total, 5,813 houses, nearly 24 km of roads, and 1,260 livestock were affected across the country. Punjab, KP, and Sindh also reported notable human casualties and damage to homes and livestock as shown in table 55.

Table:55 Country-Wide 2023 Flood Damages

Province/Region	Persons Died	Persons Injured	Houses Damaged	Roads (Km)	Bridges	Livestock
Punjab (including ICT)	85	195	91	0	0	3
Sindh	27	10	342	0	0	213
Khyber Pakhtunkhwa (incl. Merged Areas)	68	95	598	0	0	285
Balochistan	21	27	4193	22	4	697
AJ&K	18	20	482	0	0	25
Gilgit Baltistan	7	2	107	1.92	1	37
Grand Total	**226**	**349**	**5,813**	**23.92**	**5**	**1,260**

(FFC, 2023)

Floods in Pakistan (2023)

2.47. 2024 Floods:

In 2024, Pakistan experienced an exceptionally severe monsoon season, typically occurring between July and September, which resulted in widespread destruction and significant humanitarian consequences. In several regions, rainfall levels reached as high as 318% above normal. According to the Pakistan Meteorological Department, precipitation during the first two months of the season was approximately 60% higher than the seasonal average. The intense rainfall led to elevated water levels in multiple rivers, triggering flash floods, landslides, and urban inundation across various districts.

Historically, the monsoon season in Pakistan brings heavy rains that often result in flooding and damage to infrastructure, homes, and agricultural areas. However, the 2024 monsoon proved particularly devastating. Numerous districts experienced severe weather events, including cloudbursts, lightning strikes, and structural collapses, contributing to a substantial loss of life and property.

The humanitarian toll was significant. A total of 280 lives were lost across the country, with fatalities occurring in both urban and rural areas. Many deaths in remote, mountainous regions were attributed to sudden landslides and flash floods, which provided little time for evacuation or response. Urban centres also suffered heavily, with incidents of electrocution and roof collapses due to rising floodwaters and exposed electrical infrastructure.

In addition to the tragic loss of human life, 523 individuals sustained injuries ranging from minor cuts and fractures to serious trauma caused by collapsing structures and floodborne debris. The agricultural and livestock sectors were also adversely affected, with the loss of 677 animals, posing a severe blow to rural livelihoods that depend heavily on animal husbandry. This season underscored the urgent need for improved

early warning systems, climate-resilient infrastructure, and comprehensive disaster preparedness strategies (ACAPS, 2024; Fareed & Qadir, 2024).

The 2024 monsoon season had far-reaching impacts across Pakistan, with Balochistan, Sindh, and Khyber Pakhtunkhwa (KP) among the most affected provinces. The widespread damage highlighted critical weaknesses in infrastructure, housing, and the resilience of rural livelihoods. Balochistan experienced the most extensive road damage, with over 206 kilometers of roadway affected, while KP faced significant connectivity issues due to the destruction of 14 bridges—disruptions that underscore the urgent need for resilient infrastructure, particularly in isolated, mountainous areas.

In terms of housing, Sindh suffered the most severe destruction, with 39,145 homes damaged, including 10,234 that were completely demolished. Balochistan followed with 17,388 houses reported damaged. These figures reflect substantial deficiencies in flood-resilient housing design and land-use planning across both provinces. Rural populations, particularly in Sindh, endured further hardship due to the considerable loss of livestock, posing a serious threat to communities dependent on agriculture and animal husbandry for their livelihoods as shown in figure 29 (Fareed & Qadir, 2024).

Province/ Region	Road km	Bridges	Partially House Damaged	Fully House Damaged	Total House Damaged	Livestock
Balochistan	206	7	15,797	1591	17,388	799
KP	0	14	716	263	979	152
Punjab	0	0	192	100	292	107
Sindh	293	3	26,252	12,893	39,145	1125
GB	2.210	14	109	65	174	80
AJ&K	0.283	4	159	62	221	20
Total	501.49	42	43,225	14974	58,199	2,283

Figure 29: Infrastructure damages in Provinces (2024 Floods) (Fareed & Qadir, 2024)

During the 2024 monsoon season, no major flood events—categorized as High to Exceptionally High Floods—were recorded in any of the rivers within the Indus River

System. However, Medium Flood Levels were observed in the River Indus across the Kalabagh, Chashma, Taunsa, Guddu, Sukkur, and Kotri reaches. Similarly, the River Chenab experienced a Medium Flood Stage in the Mara-Khanki reach, while the River Kabul recorded the same at the Nowshera-Warsak stretch. The River Jhelum remained at a Low Flood Stage near Mangla, and the River Ravi continued to flow at a Normal Stage throughout the season.

On August 8, 2024, heavy rainfall within the Lai Nullah catchment area led to a significant rise in water levels in Rawalpindi and Islamabad. At Kattarian Bridge, the gauge reached the Evacuation Level of 22.7 feet, while Gawalmandi Bridge recorded 19.0 feet, also at the Evacuation threshold.

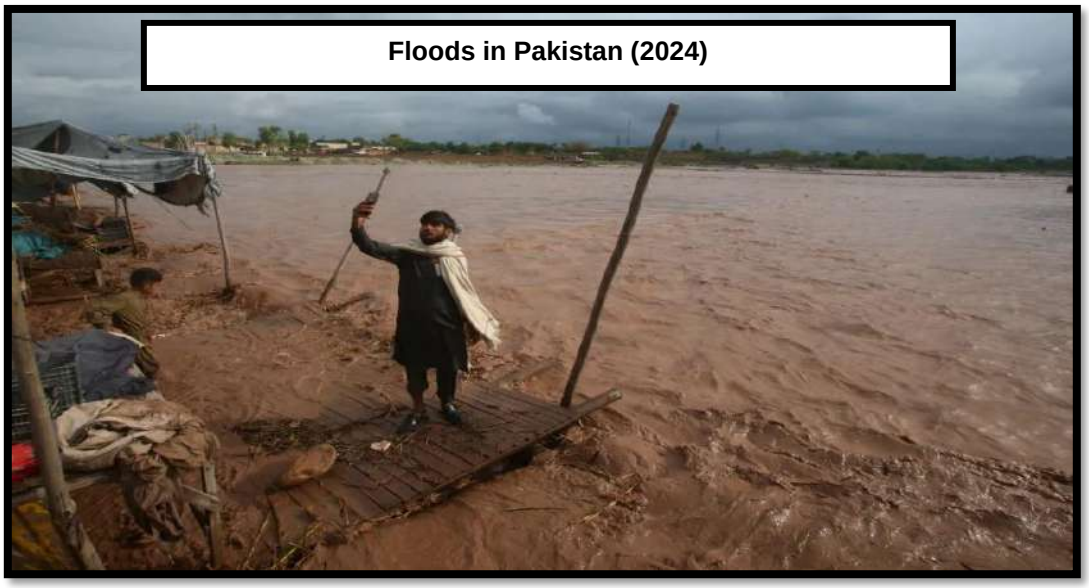
In addition, several localized flooding incidents occurred across Sindh, Balochistan, and Punjab. These were effectively managed by the respective Provincial Irrigation Departments, as well as the Provincial and District Disaster Management Authorities (PDMAs and DDMAs).

Key lessons from the 2024 monsoon season emphasize the importance of enhanced coordination among all relevant departments for future flood preparedness and response. It also highlights the urgent need to remove encroachments from flood channels and to expedite the restoration of infrastructure damaged during the 2022 floods, which in many cases remains unaddressed (Kamal & Piracha, 2024).

Floods in Pakistan (2024)


Floods in Pakistan (2024)


Floods in Pakistan (2024)


Floods in Pakistan (2024)

2 Pakistan Floods- Lessons Learnt & Way Forward:

For the sake of way forward for effective flood control planning and management in Pakistan floods of 2010 and 2022 have been considered, being the most recent one in Pakistan's history, for lesson learnt and to suggest recommendations /way forward for actions in future

3.1. Key Lessons Learned from 2010 Floods:

- PMD's inherited capability constraints - Capacity building for Medium Range Forecasting from existing 2-3 days to 10 days and installation of additional weather radars at Chitral, Cherat, Quetta, Pasni/Gwadar;
- Lack of storage dams and least attention to watershed management;
- Deferred maintenance of flood protection infrastructure;
- Lack of escape channels and aged Infrastructure/Barrages (none of the barrages except Taunsa was remodeled during past 63 years);
- Capacity constraints of NDMA and PDMAs (the then newly born entities);
- Inadequate budget allocation for maintenance of existing flood protection infrastructure; &
- Institutions at Federal and Provincial levels were not adequately prepared to cope with such an unprecedented flood in the context of global climate change.
- Inadequate implementation of national response and contingency plans, as well as ineffective early warning systems at the district and community levels, revealed gaps in disaster preparedness, emergency response mechanisms, and mitigation measures.
- The affected communities lacked disaster preparedness awareness, including understanding localized hazards, flood risk reduction strategies, and emergency response protocols. This knowledge is crucial for populations living in flood-prone areas.
- Flood management approach revolves primarily around river floods with limited attention to flash floods
- Inter-provincial, inter agency coordination lacks depth and real time action at the most critical time.

3.2. Key lessons learned from 2022 Floods:

- Need of comprehensive Plan for Remodeling of already constructed drains (MNV, RBOD-I, RBOD-II and RBOD-III) in view of exceptional rainfall of 2022.

- Non implementation of national flood management plan like NFPP-IV resulted into non-integrated and pre-emptive flood management approach
- Major urban cities in the four provinces got huge drainage issues. Enhanced Flood Resilience of major cities through structural interventions not given attention at the city government level
- FF&EW System similar to Lai Nullah Flood Forecasting System in Rawalpindi & Islamabad was long required for major urban centres earlier identified in national plans. Despite hectic pursuance at the national level, this was not done at the provinces level indicating least priority.
- Inadequate and outdated drainage structures and systems
- Construction of Large Dams along major rivers & Flood Dispersal/Diversion Structures along major Hill Torrents including flood carrying channels remained a neglected area resulting into major flood inundation in the hill torrent areas, especially in Punjab, Sindh and Balochistan.
- River Flood Plain Management Act formulated in 2015/2016 for removal of encroachments remained partially implemented (only Punjab and KP) resulting into mahor encroachment issues, especially in Sindh
- Sporadic and very heavy rainfall and the resulted high floods in the tributary river of Indus upstream KP highlighted deficiencies in forecasting requiring local forecasting facilities like Mobile Weather Radars for hilly areas.
- Flash floods generated by the local secondary and tertiary rivers highlighted the need of installation of Flood Telemetry along these rivers including the Hill Torrents &
- Continuous and abnormal drainage issues in Sindh highlighted the need of expanding gauging system for drains in Sindh province.
- Institutional capacities remained on traditional mode with relevant disaster management and water related institutions employing procedures, tools not conversant with present day requirements.

3 Recommendations and Strategies

4.1. Strengthening Climate Resilience Through Adaptive Infrastructure and Early Warning Systems in Pakistan

One of the most critical needs for Pakistan is to strengthen its climate adaptation and resilience efforts. With increasingly unpredictable and extreme weather events, there is an urgent necessity to design and implement infrastructure that can withstand flooding and other climate-related hazards. Climate-resilient infrastructure includes elevated roads, flood-proof buildings, and fortified river embankments, especially along the Indus River system. Additionally, the establishment of comprehensive early

warning systems is essential. These systems must integrate satellite forecasting, real-time hydrological data, and robust communication mechanisms to alert communities before disasters strike. In the northern mountainous regions, where glacial lake outburst floods (GLOFs) are becoming more frequent due to climate change, the government should intensify efforts to identify vulnerable lakes, install drainage systems, and train local populations on evacuation procedures. These efforts can significantly reduce the human and economic toll of climate-induced disasters.

4.2. Addressing Urban Flooding Through Sustainable Infrastructure and Smart Planning

Urban flooding, particularly in cities like Karachi, Lahore, and Rawalpindi, has emerged as a major threat due to rapid urbanization and poor planning. Modernizing drainage infrastructure is essential to managing excessive rainfall and preventing waterlogging. This involves upgrading outdated stormwater systems, building additional drainage channels, and incorporating nature-based solutions such as permeable pavements and rain gardens. At the same time, urban planning must be reformed to enforce strict zoning regulations that prevent construction in high-risk floodplains and natural waterways. Geographic Information System (GIS) tools should be used for effective land-use planning and flood risk mapping. Preventing illegal encroachments and ensuring that future development adheres to hydrological safety standards are vital components of a long-term flood mitigation strategy.

4.3. Enhancing Transboundary Water Cooperation for Effective Flood Management in the Indus Basin

Given that the Indus River system is shared between Pakistan and India, effective transboundary water cooperation is crucial for flood management. The Indus Waters Treaty (IWT), which has governed water sharing since 1960, must be revitalized to include provisions for flood-related coordination. Improved dialogue and technical exchange between both countries can facilitate the timely sharing of upstream hydrological data, dam discharges, and rainfall forecasts. This information is vital for issuing timely flood warnings in downstream areas. In addition to bilateral engagement, regional cooperation through platforms such as the South Asian Association for Regional Cooperation (SAARC) should be strengthened to promote climate-resilient water management at the basin level.

4.4. Promoting Reforestation and Watershed Management for Flood Risk Reduction and Environmental Sustainability

Reforestation and watershed management are also central to reducing flood risk. Forests play a critical role in absorbing rainfall and reducing surface runoff. Expanding forest cover through national initiatives like the "10 Billion Tree Tsunami" is a necessary step, but these efforts should prioritize planting in riparian zones, hill slopes, and areas prone to soil erosion. In coastal regions, especially in the Indus Delta,

mangrove restoration can help buffer against tidal flooding and storm surges. Additionally, integrated watershed management practices such as constructing check dams, terracing hillsides, and promoting soil conservation can help retain water upstream and minimize the risk of downstream flooding. These ecological measures not only mitigate floods but also contribute to long-term environmental sustainability.

4.5. Mobilizing International Climate Finance and Partnerships for Flood Mitigation and Adaptation in Pakistan

Finally, international support and access to climate finance are essential for Pakistan to implement comprehensive flood mitigation and adaptation strategies. The country should actively seek funding from multilateral mechanisms such as the Green Climate Fund (GCF), the Adaptation Fund, and the Loss and Damage Fund established under the United Nations Framework Convention on Climate Change (UNFCCC). Developing well-structured, bankable proposals aligned with Pakistan's Nationally Determined Contributions (NDCs) will be key to attracting financial assistance. Implementing a Risk Finance model would make Pakistan less vulnerable to climate-related disasters such as floods. Damages from the 2022 floods surpassed the $33 billion mark. Hence, a Risk Finance model, that includes products such as Catastrophe Bonds and Insurance Schemes, would give Pakistan guaranteed funds. This would reduce reliance on spot assistance and minimize disruption to economic activity.

Lessons can be derived from the Philippines - a country with a similar economy and vulnerability to natural catastrophes like Pakistan. The Philippines has experienced up to 1.1% GDP losses due to natural disasters. Through a balanced Risk Finance strategy that includes Catastrophe Bonds and Parametric Insurance tools, the Philippines has been able to finance these economic losses. After Typhoon Rai struck in 2022, the country was qualified to be issued with a $52.5 million from a Catastrophe Bond. In the event Pakistan adopts the same model of disaster finance, it stands to reduce its GDP losses by 1% every year (Altaf, 2022; Domingo & Manejar, 2023).

Moreover, international partnerships can provide technical assistance and capacity-building support to strengthen the institutional response to disasters. Collaborations with the UN, international financial institutions, and donor countries can facilitate training programs, technology transfer, and the creation of resilient infrastructure. Public-private partnerships should also be explored to enhance investment in disaster preparedness and recovery.

Pakistan's increasing vulnerability to floods demands a comprehensive and integrated approach that combines engineering, environmental conservation, governance reform, and international cooperation. Without significant policy shifts and strategic investments, the socio-economic consequences of flooding will continue to escalate. With the right interventions, however, Pakistan can not only mitigate future disasters but also build a more resilient and climate-adaptive future.

5. National Roadmap for Resilience to Floods

S.No.	National Roadmap for Resilience to Floods
1.	Implementation of 4th National Flood Protection Plan (NFPP-IV) at the earliest possible.
2.	Implementation of National Master Plan on Flood Telemetry Network (Total of 707 flood telemetry stations for secondary and tertiary rivers to manage flash floods and to improve PMD's forecasts) with emphasis on improved Flood Telemetry along Hill Torrents (D.G. Khan, Rajanpur & Kirther Range), Secondary & Tertiary Rivers.
3.	Installation of Automatic Weather Stations (especially in Balochistan).
4.	PMD to also early implement World Bank funded Pakistan Hydro-met & Climate Resilience Service Project including new weather radars as well.
5.	Establishment of six (06) Regional Flood Forecasting & Warning Centers each in Khyber Pakhtunkhwa, Sindh, Balochistan, Gilgit-Baltistan (GB) and Azad Jammu & Kashmir (AJ&K) – aiming at better forecasting of flash floods and taming of hill torrent heavy discharges.
6.	Construction of small water storages to help manage flood waters to pass safely.
7.	Flood Dispersal Structures along major Hill Torrents including retrofitting of existing flood protection infrastructure.
8.	Enhanced Flood Resilience of major cities (20 No. Already identified) through structural interventions.
9.	Urban Flood Management SOPs should formulated be by the District Administrations/PDMAs/GBDMA/SDMA.
10.	Replication of Urban Flood Forecasting & Early Warning System similar/alike Lai Nullah FF & EW System of Rawalpindi & Islamabad in other major cities (at least in the 20 major cities identified already).
11.	Physical / Model studies of Bridges/ Barrages including Reach wise River Survey, Feasibility Study & Model Study of Major Rivers to ensure safe passage of super floods and to ensure sustainability of flood protection and river training works.
12.	River Acts should be enacted in all the provinces and existing land use regulations be implemented strictly in letter and spirit to avoid major loss of life and property in future floods.
13.	Flood Plain Maps, already in place and circulated widely among the provinces, can help determine the extent of inundation and must be used for flood warning in respective districts by the DDMAs. The maps indicate the areas that may submerge at certain flood level/ river discharge.
14.	Large scale forestation in upper catchments of all the rivers for reducing flood intensity in upper reaches and support combating climate change impacts.
15.	Institutional Capacity Building and Strengthening all related federal as well as provincial institutions to effectively deal with flood protection and management issues.

16.	A separate head on Flood Management/Disaster Management under Annual PSDP for flood management/disaster management initiatives/projects/programmes to also ensure less reliance of international donors.
17.	New Drainage Structures capable of taking highest/prolonged flood flows to rivers/sea to be constructed in undrained high flood areas.
18.	Existing reservoirs SOPs revised in 2015 be implemented.
19.	Adequate conveyance capacity within river and urban channels to be restored.
20.	Immediate formulation and implementation of National Watershed Management Plan.
21.	Adequate conveyance capacity within river and urban channels to be restored.
22.	Implementation of RBOD-II to: Improve livelihood of local fishermen; Save ecology of Manchar lake; Reduce salinity of land of Sindh and Baluchistan and make it useful for agriculture; Minimize the flooding and its effects.
23.	Realization of benefits of Nai Gaj Dam in Dadu district to reduce floods in Sindh province.
24.	Construction of 53 dams in Sindh under Sindh Climate Resilient Projects to support water resources development, availability of water for the local communities for irrigation, drinking purposes and ensuring flood mitigation and reduction.
25.	Chashma Right Bank Canal (CRBC) modernization and up gradation.
26.	Completion of Feasibility on enhancing capacity of Hub Dam.
27.	Feasibility study and detailed design/Construction of feasible dam on Swat River in Kalam or Upstream.
28.	Formulation of National Flood Drainage Plan.
29.	Dredging of Drains and improve Drainage Capacity of Farmlands in areas prone to torrential and pluvial flash floods.
30.	Forecasting Technology for Snow and Glacial Lakes Outburst (GLOFs).
31.	Development & integration of Glacio-hydrological & Hydro-power model for assessment of impact of climate change on snow/glacier melt and hydropower generation on existing and proposed projects of WAPDA on Indus Cascade.
32.	Construction Management of River-Related projects of Provinces to incorporate flood governance i.e. providing outlets for flood flows and space for flood storage.
33.	Development of rainstorm & flash flood analysis models for small watersheds/ catchments of hill torrents.
34.	Build a National High-Resolution Comprehensive Database containing all elements of hydro metrology/ climatology.
35.	Assessment of various flood generation processes and regional climate change analysis (PMD/GCISC etc.).

36.	Re-assessment of flow capacity and velocity of rivers (Through a separate study).
37.	Study on watershed management of dry land hill torrents.
38.	Analysis of existing Flood Management SOPs of important irrigation and drainage structures.
39.	Linking all the ongoing and upcoming projects with cross cutting issues of flood risk.
40.	Strengthening water governance at 'sub-basin' and 'basin' scale (through IRSA).
41.	Providing flood shelters in low lying areas of Sindh province.
42.	Introduce Nature based solutions through spatial catchment planning in hill torrent areas and land-use rights for community-based rainwater harvesting, improved vegetation/grazing and flood dispersion structures for water use and flood control.
43.	Updating of existing flood forecasting systems to incorporate the impact of newly introduced major infrastructure works (bridges, dikes etc.).
44.	Extension of present flood forecasting system to cover pluvial flooding.
45.	An audit of legal frameworks and mandates to clarify the mandate of different organizations to eliminate overlaps in national and provincial strategic control.
46.	Disaster Risk Reduction should be considered as a development issue through the Sendai Framework. They emphasized the necessity of understanding the significance of intensive development on the Indus River Flood DRR to safeguard flood plains with concentrated populations and resources.

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ANNEX-I

HISTORIC MINMUM & MAXIMUM PEAK DISCHARGES IN MAJOR RIVERS OF PAKISTAN

River	Site	Design Capacity	Historic Max.Flood	Max of 1955	Max of 1957	Max of 1959	Max of 1973	Max of 1975	Max of 1976
INDUS	**Tarbela**	**15,00,000**	**6,04,000 30-7-2010**	----------	----------	----------	4,20,000	----------	3,04,000 3-8-76
	Kalabagh	**9,50,000**	**9,50,000 14-7-42**	5,23,000 19-8-55	4,48,618 ----7-57	5,99,804 - ----7-59	5,64,000 20-7-73	6,02,541 21-8-75	8,61,965 2-8-76
	Chashma	**9,50,000**	**10,36,673 2-8-2010**	----------	----------	----------	5,10,000 22-7-73	555,300 23-8-75	7,86,600 3-8-76
	Taunsa	**11,00,000**	**9,59,991 28-8-2010**	----------	5,26,000	5,13,000	5,67,623 29-7-73	5,24,495 26-8-75	6,75,233 7-8-76
	Guddu	**12,00,000**	**11,99,672 15-8-76**	----------	----------	----------	10,83,742 18-8-73	10,02,496 30-8-75	11,99,672 15-8-76
	Sukkur	**9,00,000**	**11,61,000 16-8-76**	8-05-000 30-8-55	7,70,260 4-8-57	9,72,000 12-8-59	10,77,000 21-8-73	10,25,000 2-9-75	11,61,000 16-8-76
	Kotri	**8,50,000**	**9,81,000 14-8-56**	7,91,000 6-9-55	5,42,196 11-8-57	6,58,268 18-8-59	7,86,000	4,76,000	7,65,000
JHELUM	**Mangla**	**10,60,000**	**10,90,000 10-9-92**	1,75,000 19-7-55	1,56,530	10,45,000 4-7-59	2,20,000 9-8-73	1,09,000 29-8-75	4,80,060 3-8-76
	Rasul	**8,50,000**	**9,52,170 10-9-92**	2,10,000 30-8-55	1,75,000 20-7-57	8,76,000 5-7-59	2,69,976 9-8-73	1,25,597 30-8-75	2,69,330 4-8-76
CHENAB	**Marala**	**11,00,000**	**11,00,000 26-8-57**	3,44,090 6-10-55	11,00,000 26-8-57	8,70,795 5-7-59	7,70,000 9-8-73	5,82,600 16-7-75	5,49,400 1-8-76
	Khanki	**8,00,000**	**10,86,460 27-8-57**	2,30,490 4-8-55	10,86,460 27-8-57	10,21,018 6-7-59	10,00,496 10-8-73	6,66,241 16-7-75	6,15,043 2-8-76
	Qadirabad	**9,00,000**	**9,48,530 11-9-92**	----------	----------	----------	8,54,341 10-8-73	6,69,819 17-7-75	6,28,741 2-8-76
	Trimmu	**6,45,000**	**9,43,225 8-7-59**	2,87,598 2-9-55	5,59,575 30-8-57	9,43,225 8-7-59	7,52,910 12-8-73	4,58,247 20,7,75	7,06,433 10-8-76
	Panjnad	**7,00,000**	**8,02,516 17-8-73**	5,50,000 15-10-55	5,60,000 2-9-57	4,93,368 11-7-59	8,02,516 17-8-73	4,77,846 29-7-75	7,10,000 12-8-76
RAVI	**Madhopur**	----------	**9,20,000 25-9-88**	6,30,000 5-10-55	2,11,260 26-8-57	3,92,000 5-7-59	----------	----------	----------
	Jassar	**2,75,000**	**6,80,000 5-10-55**	6,80,000 5-10-55	3,28,000 27-8-57	2,97,000 6-7-59	2,27,500 10-8-73	2,06,300 17-7-75	1,70,150 9-8-76
	RaviSyphon	**4,50,000**	**6,59,000 6-10-55**	----------	----------	----------	2,16,000	1,66,000	1,82,000
	Shahdara	**2,50,000**	**5,76,000 22-9-88**	5,42,000 6-10-55	1,88,200 28-8-57	2,00,000 7-7-59	2,37,380 11-8-73	1,83,330 18-7-75	1,70,175 10-8-76
	Balloki	**2,25,000**	**3,36,200 28-9-1988**	2,75,000 8-10-55	1,68,700 30-8-57	1,63,516 9-7-59	2,43,908 13-8-73	1,80,205 20-7-75	2,53,974 11-8-76
	Sidhani	**1,50,000**	**3,30,210 2-10-88**	1,76,000 7-10-55	1,12,543 1-9-57	1,04,991 12-7-59	2,10,339 18-8-73	1,22,251 25-7-75	2,44,348 15-8-76
SUTLEJ	**Ferozpur**	----------	**8,36,764 7-10-55**	8,36,764 7-10-55	2,77,440 6-9-57	1,83,344 30-7-59	----------	----------	----------
	G.S.Wala	----------	**25.0 feet 9-9-1995**	----------	----------	----------	----------	----------	21.5 feet 4-9-76
	Sulemanki	**3,25,000**	**5,98,872 8-10-55**	5,98,872 8-10-55	2,10,422 7-9-57	1,51,974 24-9-59	1,77,081 15-8-73	48,688 21-9-75	1,18,582 6-9-76
	Islam	**3,00,000**	**4,92,581 11-10-55**	4,92,581 11-10-55	1,89,023 9-9-57	1,53,151 27-9-59	1,66,453 17-8-73	46,996 23-9-75	1,11,427 8-9-76

HISTORIC MINMUM & MAXIMUM PEAK DISCHARGES IN MAJOR RIVERS OF PAKISTAN

River	Site	Design Capacity	Historic Max.Flood	Max of 1988	Max of 1992	Max of 1993	Max of 1994	Max of 1995	Max of 1996
INDUS	**Tarbela**	**15,00,000**	**6,04,000 30-7-2010**	4,50,000 4-8-88	5,00,000 10-9-92	3,70,000 10-7-93	4,20,000 24-7-94	4,80,000 26-7-95	4,02,000 14-8-96
	Kalabagh	**9,50,000**	**9,50,000 14-7-42**	6,05,000 2-8-88	8,49,245 10-9-92	3,77,491 11-7-93	5,03,946 13-7-94	5,51,553 27-7-95	4,75,000 17-8-96
	Chashma	**9,50,000**	**10,36,673 2-8-2010**	5,80,000 3-8-88	6,68,336 11-8-92	4,05,180 15-7-93	5,46,636 11-8-94	5,76,709 28-7-95	4,98,875 17-8-96
	Taunsa	**11,00,000**	**9,59,991 28-8-2010**	5,60,000 28-7-88	6,55,079 14-9-92	3,81,000 28-7-93	5,73,520 15-7-94	6,07,884 29-7-95	5,21,708 19-8-96
	Guddu	**12,00,000**	**11,99,672 15-8-76**	11,62,653 30-7-88	10,86,919 18-9-92	6,26,410 31-7-93	7,73,305 29-7-94	9,88,665 3-8-95	7,90,163 22-8-96
	Sukkur	**9,00,000**	**11,61,000 16-8-76**	11,18,856 31-7-88	10,68,072 20-9-92	5,69,160 2-8-93	7,57,350 2-8-94	9,58,929 7-8-95	7,57,390 24-8-96
	Kotri	**8,50,000**	**9,81,000 14-8-56**	6,48,290 11-8-88	6,89,309 30-9-92	4,20,417 5-8-93	8,26,369 25-8-94	7,99,447 18-8-95	4,15,000 29-8-96
KABUL	**Nowshera**			-	-	-	-	1,49,300 26-7-95	1,17,200 16-6-96
JHELUM	**Mangla**	**10,60,000**	**10,90,000 10-9-92**	4,25,515 16-7-88	10,90,000 10-9-92	3,36,110 10-7-93	2,91,550 4-8-94	3,02,322 27-7-95	2,14,700 20-6-96
	Rasul	**8,50,000**	**9,52,170 10-9-92**	2,61,664 17-7-88	9,52,170 10-9-92	1,07,108 11-7-93	1,48,135 28-7-94	2,86,076 28-7-95	1,36,712 27-6-96
CHENAB	**Marala**	**11,00,000**	**11,00,000 26-8-57**	7,50,975 25-9-88	8,45,090 10-9-92	4,09,490 11-7-93	4,12,520 20-9-94	4,39,970 27-7-95	7,66,860 23-8-96
	Khanki	**8,00,000**	**10,86,460 27-8-57**	8,64,220 26-9-88	9,10,512 10-9-92	4,30,410 11-7-93	4,25,160 20-7-94	6,30,517 28-7-95	8,51,269 24-8-96
	Qadirabad	**9,00,000**	**9,48,530 11-9-92**	8,92,299 26-9-88	9,48,530 11-9-92	4,43,053 11-7-93	4,37,067 21-7-94	6,44,697 29-7-95	8,53,231 24-8-96
	Trimmu	**6,45,000**	**9,43,225 8-7-59**	5,84,110 19-7-88	8,88,117 14-9-92	3,36,761 13-7-93	3,33,499 23-7-94	6,29,561 1-8-95	5,43,708 27-8-96
	Panjnad	**7,00,000**	**8,02,516 17-8-73**	5,07,345 27-7-88	7,44,152 18-8-92	3,35,136 20,7,93	2,66,949 25-7-94	6,05,523 5-9-95	5,71,746 31-8-96
RAVI	**Madhopur**	----------	**9,20,000 25-9-88**	9,20,000 25-9-88	1,55,000 10-9-92	4,50,000 10-7-93	1,75,000 7-7-94	3,32,000 5-9-95	1,32,000 23-8-96
	Jassar	**2,75,000**	**6,80,000 5-10-55**	1,21,800 25-9-88	1,48,543 11-9-92	1,30,470 11-7-93	1,73,000 21-7-94	2,20,000 5-9-95	1,51,080 23-8-96
	RaviSyphon	**4,50,000**	**6,59,000 6-10-55**	3,25,040 27-9-88	80,683 12-9-92	1,28,188 13-7-93	1,01,791 22-7-94	2,57,000 6-9-95	1,96,080 25-8-96
	Shahdara	**2,50,000**	**5,76,000 22-9-88**	5,76,000 27-9-88	62,641 12-9-92	91,415 14-7-93	54,101 22-7-94	1,71,520 7-9-95	1,82,340 25-8-96
	Balloki	**2,25,000**	**3,36,200 28-9-1988**	3,89,845 28-9-88	1,12,157 13-9-92	1,49,392 15,7,93	1,15,635 12-8-94	2,22,800 8-9-95	2,35,000 26-8-96
	Sidhani	**1,50,000**	**3,30,210 2-10-88**	3,30,210 2-10-88	95,510 16-9-92	1,20,274 19-7-93	1,06,321 28-8-94	2,12,340 12-9-95	1,95,362 30-8-96
SUTLEJ	**Ferozpur**	----------	**8,36,764 7-10-55**	----------	1,51,423 1-9-92	2,20,028 13-7-93	1,71,033 26-8-94	3,56,590 7-9-95	62,850 24-8-96
	G.S. Wala	----------	**25.0 feet 9-9-1995**	21.6 feet	21.6 feet 01-9-92	22.1 feet 13-7-93	21.5 feet 26-8-94	25.0 feet 9-9-95	19.8 feet 25-8-96
	Sulemanki	**3,25,000**	**5,98,872 8-10-55**	3,99,453 30-9-88	1,97,293 3-9-92	1,62,092 16-7-93	1,37,854 27-8-94	3,01,865 10-9-95	77,559 27-8-96
	Islam	**3,00,000**	**4,92,581 11-10-55**	3,08,425 4-10-88	1,82,637 7-9-92	89,705 19-7-93	92,630 31-8-94	1,83,902 14-9-95	47,559 27-8-96

HISTORIC MINMUM & MAXIMUM PEAK DISCHARGES IN MAJOR RIVERS OF PAKISTAN

River	Site	Design Capacity	Historic Max.Flood	Max of 1997	Max of 1998	Max of 1999
INDUS	**Tarbela**	**15,00,000**	**6,04,000 30-7-2010**	4,00,000 17-8-97	3,65,000 13-7-98	3,82,000 4-9-99
	Kalabagh	**9,50,000**	**9,50,000 14-7-42**	6,60,590 8-8-97	4,80,700 15-7-98	4,63,700 10-8-99
	Chashma	**9,50,000**	**10,36,673 2-8-2010**	6,37,636 28-8-97	5,10,200 14-7-98	5,48,300 11-8-99
	Taunsa	**11,00,000**	**9,59,991 28-8-2010**	5,36,199 31-8-97	5,28,500 18-7-98	4,09,700 13-8-98
	Guddu	**12,00,000**	**11,99,672 15-8-76**	8,31,287 6-9-97	6,67,500 22-7-98	4,19,800 17-8-99
	Sukkur	**9,00,000**	**11,61,000 16-8-76**	8,01,170 8-9-97	6,28,700 23-7-98	3,90,000 19-8-99
	Kotri	**8,50,000**	**9,81,000 14-8-56**	3,21,180 13-9-97	2,95,900 1-8-98	2,20,700 23-8-99
KABUL	**Nowshera**			9,68,00 22-7-97	1,21,700 13-7-98	6,16,00 21-7-99
JHELUM	**Mangla**	**10,60,000**	**10,90,000 10-9-92**	5,48,670 27-8-97	1,20,600 16-7-98	1,23,900 7-8-99
	Rasul	**8,50,000**	**9,52,170 10-9-92**	5,49,598 27-8-97	75,500 24-7-98	22,800 15-9-99
CHENAB	**Marala**	**11,00,000**	**11,00,000 26-8-57**	7,75,525 28-8-97	1,48,200 13-7-98	1,90,300 7-8-99
	Khanki	**8,00,000**	**10,86,460 27-8-57**	8,47,650 28-8-97	1,32,700 17-7-98	1,60,200 7-8-99
	Qadirabad	**9,00,000**	**9,48,530 11-9-92**	8,37,442 28-8-97	1,56,500 11-7-98	1,42,400 8-8-99
	Trimmu	**6,45,000**	**9,43,225 8-7-59**	6,77,417 1-9-97	1,60,600 13-7-98	82,500 22-7-99
	Panjnad	**7,00,000**	**8,02,516 17-8-73**	5,27,662 4-9-97	1,58,400 21-7-98	47,800 17-8-99
RAVI	**Madhopur**	----------	**9,20,000 25-9-88**	1,21,000 28-8-97	----------	----------
	Jassar	**2,75,000**	**6,80,000 5-10-55**	1,57,600 28-8-97	34,500 23-9-98	20,400 7-8-99
	RaviSyphon	**4,50,000**	**6,59,000 6-10-55**	1,59,200 30-8-97	55,900 24-9-98	40,600 8-8-99
	Shahdara	**2,50,000**	**5,76,000 22-9-88**	1,23,080 30-8-97	58,200 24-9-98	45,500 11-8-99
	Balloki	**2,25,000**	**3,36,200 28-9-1988**	1,76,950 31-8-97	90,500 25-9-98	74,800 22-8-99
	Sidhani	**1,50,000**	**3,30,210 2-10-88**	1,33,237 3-9-97	59,200 27-9-98	38,900 24-8-99
SUTLEJ	**Ferozpur**	----------	**8,36,764 7-10-55**	58,192 30-8-97	----------	----------
	G.S. Wala	----------	**25.0 feet 9-9-1995**	19.0 feet 30-87-97	19,000 feet 13-7-98	16,700 feet 10-7-99
	Sulemanki	**3,25,000**	**5,98,872 8-10-55**	55,501 31-8-97	91,100 26-9-98	38,600 16-8-99
	Islam	**3,00,000**	**4,92,581 11-10-55**	40,838 3-9-97	66,800 30-9-98	14,300 17-8-99

HISTORIC MINMUM & MAXIMUM PEAK DISCHARGES IN MAJOR RIVERS OF PAKISTAN

River	Site	Design Capacity	Historic Max.Flood	Max of 2000		Max of 2001		Max of 2002	
				Inflow	Outflow	Inflow	Outflow	Inflow	Outflow
INDUS	Tarbela	15,00,000	6,04,000 30-7-2010	3,89,000 1-8-2000	1,99,200 1-7-2000	2,81,000 24-7-2001	2,29,900 22-8-2001	3,48,000 15-8-2002	2,90,900 14-8-2002
	Kalabagh	9,50,000	9,50,000 14-7-42	2,68,700 2-8-2000	2,61,100 2-8-2000	4,20,300 24-7-2001	4,17,200 24-7-2017	3,87,100 14-8-2002	3,79,600 14-8-2002
	Chashma	9,50,000	10,36,673 2-8-2010	3,48,000 2-8-2000	2,54,800 2-8-2000	3,27,700 25-7-2001	3,00500 25-7-2017	3,63,800 15-8-2002	3,48,800 15-8-2002
	Taunsa	11,00,000	9,59,991 28-8-2010	2,30,200 5-7-2000	2,03,100 5-7-2000	2,81,900 27-7-2001	2,81,900 27-7-2017	3,35,200 17-8-2002	3,06,700 17-8-2002
	Guddu	12,00,000	11,99,672 15-8-76	2,09,000 6-8-2000	1,71,600 6-8-2000	2,62,900 30-7-2001	2,30,100 30-7-2017	2,84,200 21-8-2002	2,55,100 21-8-2002
	Sukkur	9,00,000	11,61,000 16-8-76	1,70,800 8-8-2000	1,17,700 8-8-2000	2,22,000 31-7-2001	1,68,900 31-7-2017	2,37,500 23-8-2002	1,81,100 23-8-2002
	Kotri	8,50,000	9,81,000 14-8-56	66,500 12-8-2000	47,800 12-8-2000	93,300 5-8-2001	62,800 03-9-2017	1,20,000 11-9-2002	84,300 11-9-2002
KABUL	Nowshera			4,73,00 3-8-2000	47,300 3-8-2000	7,1,600 24-7-01	71,600 24-7-2017	4,86,00 14-8-2002	90,000 14-8-2002
JHELUM	Mangla	10,60,000	10,90,000 10-9-92	2,30,700 1-8-2000	42,200 22-9-2000	95,400 23-7-2001	42,800 15-9-2017	1,45,500 2-9-2002	66,900 22-8-2002
	Rasul	8,50,000	9,52,170 10-9-92	40,700 22-7-2000	37,800 22-7-2000	40,000 24-7-2001	37,800 24-7-2017	54,400 3-9-2002	34,700 13-8-2002
CHENAB	Marala	11,00,000	11,00,000 26-8-57	2,47,600 22-7-2000	2,23,400 22-7-2000	1,64,500 23-7-2001	1,32,500 23-7-2017	2,37,800 14-8-2002	2,24,800 14-8-2002
	Khanki	8,00,000	10,86,460 27-8-57	3,09,300 23-7-2000	3,03,300 23-7-2000	1,39,400 24-7-2001	1,31,900 24-7-2017	2,42,400 14-8-2002	2,40,400 14-8-2002
	Qadirabad	9,00,000	9,48,530 11-9-92	3,02,900 23-7-2000	2,91,300 23-7-2000	1,36,100 15-8-2001	1,18,100 15-8-2017	2,38,200 14-8-2002	2,26,400 14-8-2002
	Trimmu	6,45,000	9,43,225 8-7-59	1,28,200 26-7-2000	1,16,200 26-7-2000	85,800 18-8-2001	72,400 18-8-2017	1,25,400 17-8-2002	1,08,600 17-8-2002
	Panjnad	7,00,000	8,02,516 17-8-73	75,200 7-8-2000	63,400 7-8-2000	57,300 22-8-2001	46,600 22-8-2017	68,200 22-8-2002	56,800 21-8-2002
RAVI	Madhopur	----------	9,20,000 25-9-88	----------		----------		----------	
	Jassar	2,75,000	6,80,000 5-10-55	34,500 28-7-2000		46,100 15-8-2001		69,500 14-5-2002	
	RaviSyphon	4,50,000	6,59,000 6-10-55	41,200 30-7-2000		44,100 15-8-2001		42,100 15-8-2002	
	Shahdara	2,50,000	5,76,000 22-9-88	51,800 29-7-2000		41,000 16-8-2001		37,000 15-8-2002	
	Balloki	2,25,000	3,36,200 28-9-1988	71,500 30-7-2000	46,500 30-7-2000	76,200 16-8-2001	46,900 16-8-2017	57,700 15-8-2002	28,100 15-8-2002
	Sidhani	1,50,000	3,30,210 2-10-88	51,100 2-8-2000	37,200 2-8-2000	45,600 19-8-2001	30,600 19-8-2017	31,000 18-8-2002	16,100 18-8-2002
SUTLEJ	Ferozpur	----------	8,36,764 7-10-55	----------		----------		----------	
	G.S. Wala	----------	25.0 feet 9-9-1995	15,500 feet 20-7-2000		16,000 feet 17-8-2001		8,500 3-9-2002	
	Sulemanki	3,25,000	5,98,872 8-10-55	28,800 22-7-2000	16,000 22-7-2000	26,300 20-8-2001	13,600 20-8-2017	16,600 20-7-2002	2,100 20-9-2002
	Islam	3,00,000	4,92,581 11-10-55	14,500 27-7-2000	13,800 27-7-2000	4,900 23-8-2001	3,500 23-8-2017	6,500 31-8-2002	

HISTORIC MINMUM & MAXIMUM PEAK DISCHARGES IN MAJOR RIVERS OF PAKISTAN

River	Site	Design Capacity	Historic Max.Flood	Max of 2003		Max of 2004		Max of 2005	
				Inflow	Outflow	Inflow	Outflow	Inflow	Outflow
INDUS	Tarbela	15,00,000	6,04,000 30-7-2010	3,40,000 26-7-2003	3,50,000 21-7-2003	2,69,900 16-7-2004	2,69,900 16-7-2004	3,91,000 15-7-2005	3,72,900 16-7-2005
	Kalabagh	9,50,000	9,50,000 14-7-42	4,07,400 3-8-2003	3,99,400 03-8-2003	2,52,600 10-7-2004	2,45,100 10-7-2004	5,23,100 2-7-2005	5,15,100 02-7-2005
	Chashma	9,50,000	10,36,673 2-8-2010	4,83,200 5-8-2003	4,63,800 05-8-2003	2,43,200 11-7-2004	2,20,300 11-7-2004	5,38,000 18-7-2005	5,33,200 20-7-2005
	Taunsa	11,00,000	9,59,991 28-8-2010	4,31,300 6-8-2003	4,21,200 06-8-2003	2,06,600 14-7-2004	1,82,400 14-7-2004	5,31,200 20-7-2005	5,31,200 20-7-2005
	Guddu	12,00,000	11,99,672 15-8-76	3,96,200 2-8-2003	3,65,300 02-8-2003	1,67,900 18-7-2004	1,32,500 18-7-2004	5,48,100 23-7-2005	5,15,900 23-7-2005
	Sukkur	9,00,000	11,61,000 16-8-76	3,35,900 7-8-2003	2,97,700 07-8-2003	1,26,100 20-7-2004	64,800 20-7-2004	5,08,400 25-7-2005	4,47,400 25-7-2005
	Kotri	8,50,000	9,81,000 14-8-56	2,40,900 11-8-2003	2,31,400 11-8-2003	47,100 5-7-2004	9,000 5-7-2004	3,10,500 12-8-2005	2,74,300 12-8-2005
KABUL	Nowshera			6,73,00 7-7-2003	4,07,400 03-8-2003	4,76,00 18-8-2004	47,600 18-8-2004	1,69,600 01-7-2005	1,69,600 1-7-2005
JHELUM	Mangla	10,60,000	10,90,000 10-9-92	1,73,000 21-7-2003	85,300 4-9-2003	76,300 7-8-2004	42,800 22-7-2004	1,22,000 13-7-2005	95,700 16-7-2005
	Rasul	8,50,000	9,52,170 10-9-92	69,900 5-9-2003	52,900 05-9-2003	39,000 7-8-2004	15,800 4-9-2004	94,900 17-7-2005	92,200 17-7-2005
CHENAB	Marala	11,00,000	11,00,000 26-8-57	1,48,800 15-8-2003	1,37,200 15-8-2003	1,25,400 17-8-2004	93,200 17-8-2004	3,45,500 7-7-2005	3,33,700 07-7-2005
	Khanki	8,00,000	10,86,460 27-8-57	1,80,900 5-8-2003	1,72,600 05-8-2003	1,15,100 17-8-2004	1,06,900 17-8-2004	3,68,100 8-7-2005	3,68,100 08-7-2005
	Qadirabad	9,00,000	9,48,530 11-9-92	1,87,300 5-8-2003	1,69,300 05-8-2003	1,12,000 18-8-2004	90,000 18-8-2004	3,79,600 8-7-2005	3,69,800 8-7-2005
	Trimmu	6,45,000	9,43,225 8-7-59	1,37,700 8-8-2003	1,22,800 08-8-2003	52,600 20-8-2004	42,800 20-8-2004	1,71,100 11-7-2005	1,62,100 11-7-2005
	Panjnad	7,00,000	8,02,516 17-8-73	93,900 12-8-2003	81,400 12-8-2003	33,900 25-8-2004	19,400 25-8-2004	1,01,700 22-7-2005	87,700 22-7-2005
RAVI	Madhopur	----------	9,20,000 25-9-88	----------		----------		----------	
	Jassar	2,75,000	6,80,000 5-10-55	37,900 5-8-2003	37,900 5-8-2003	30,600 18-8-2004		40,200 8-7-2005	
	RaviSyphon	4,50,000	6,59,000 6-10-55	40,700 23-9-2003	40,700 23-9-2003	37,600 19-8-2004		30,700 8-7-2005	
	Shahdara	2,50,000	5,76,000 22-9-88	38,800 5-8-2003	38,800 5-8-2003	51,900 2-8-2004		30,200 17-8-2005	
	Balloki	2,25,000	3,36,200 28-9-1988	74,000 6-8-2003	44,700 06-8-2003	71,400 20-8-2004	40,400 20-8-2004	53,300 9-7-2005	25,200 8-7-2005
	Sidhani	1,50,000	3,30,210 2-10-88	40,700 9-8-2003	25,500 09-8-2003	27,700 20-8-2004	12,800 23-8-2004	31,400 17-8-2005	6,200 17-8-2005
SUTLEJ	Ferozpur	----------	8,36,764 7-10-55	----------		----------		----------	
	G.S. Wala	----------	25.0 feet 9-9-1995	15,000 feet 7-9-2003	15,000 7-9-2003	6,000 feet 0-9-2004		15,000 feet 12-8-2005	
	Sulemanki	3,25,000	5,98,872 8-10-55	21,500 9-9-2003	7,000 09-9-2003	17,000 10-8-2004	4,200 10-8-2004	32,900 13-8-2005	18,000 13-8-2005
	Islam	3,00,000	4,92,581 11-10-55	3,100 15-9-2003	1,700 15-9-2003	2,100 16-8-2004	8,00 16-8-2004	18,300 16-8-2005	16,400 16-8-2005

HISTORIC MINMUM & MAXIMUM PEAK DISCHARGES IN MAJOR RIVERS OF PAKISTAN

River	Site	Design Capacity	Historic Max.Flood	Max of 2006		Max of 2007		Max of 2008	
				Inflow	Outflow	Inflow	Outflow	Inflow	Outflow
INDUS	Tarbela	15,00,000	6,04,000 30-7-2010	4,48,000 6-8-2006	3,71,800 5-8-2006	3,08,000 1-7-2007	2,92,600 03-8-2007	3,08,000 5-8-2008	2,58,500 12-8-2008
	Kalabagh	9,50,000	9,50,000 14-7-42	4,97,600 6-8-2006	4,89,600 6-8-2006	3,67,900 16-8-2007	3,59,900 16-8-2007	3,46,600 5-8-2008	3,36,500 5-8-2008
	Chashma	9,50,000	10,36,673 2-8-2010	5,87,800 6-8-2006	5,84,700 06-8-2006	4,05,700 15-8-2007	4,03,400 15-8-2007	3,45,900 21-7-2008	3,21,300 21-7-2008
	Taunsa	11,00,000	9,59,991 28-8-2010	6,12,300 9-8-2006	6,12,300 9-8-2006	3,54,900 18-8-2007	3,35,400 18-8-2007	2,79,300 8-8-2008	2,63,300 8-8-2008
	Guddu	12,00,000	11,99,672 15-8-76	5,96,400 13-8-2006	5,70,500 13-8-2006	3,47,400 22-8-2007	3,22,600 22-8-2007	2,79,500 13-8-2008	2,56,200 13-8-2008
	Sukkur	9,00,000	11,61,000 16-8-76	5,54,100 16-8-2006	5,14,000 16-8-2006	3,03,600 24-8-2007	2,58,700 24-8-2007	2,50,100 15-8-2008	1,91,700 15-8-2008
	Kotri	8,50,000	9,81,000 14-8-56	3,37,200 27-8-2006	3,56,500 25-8-2006	1,57,300 28-82007	1,28,400 28-8-2007	2,36,000 20-8-2008	2,00,000 20-8-2008
KABUL	Nowshera			1,62,100 5-8-2006	1,62,100 5-8-2006	1,34,400 1-7-2007	1,34,400 1-7-2007	9,42,00 7-8-2008	94,200 7-8-2008
JHELUM	Mangla	10,60,000	10,90,000 10-9-92	1,42,000 4-8-2006	1,42,000 4-8-2006	1,57,300 28-8-207	43,400 8-7-2007	1,00,100 31-7-2008	44,500 25-9-2008
	Rasul	8,50,000	9,52,170 10-9-92	1,83,300 13-7-2006	1,65,900 13-7-2006	99,800 14-8-2007	34,100 7-7-2007	42,600 16-9-2008	20,600 16-9-2008
CHENAB	Marala	11,00,000	11,00,000 26-8-57	3,33,000 3-9-2006	3,33,000 3-9-2006	48,900 14-8-2007	1,13,800 12-8-2007	1,97,000 31-7-2008	1,63,500 31-7-2008
	Khanki	8,00,000	10,86,460 27-8-57	4,22,700 4-9-2006	4,18,700 4-9-2006	1,46,500 12-8-2007	1,41,100 14-8-2007	2,02,500 31-7-2008	1,93,400 31-7-2008
	Qadirabad	9,00,000	9,48,530 11-9-92	4,53,200 4-9-2006	4,43,200 4-9-2006	1,50,800 14-8-2007	61,900 1-7-2007	2,07,400 1-8-2008	1,90,400 1-8-2008
	Trimmu	6,45,000	9,43,225 8-7-59	2,70,300 7-9-2006	2,66,300 7-9-2006	83,900 1-7-2007	55,300 2-7-2007	67,800 6-8-2008	54,200 6-8-2008
	Panjnad	7,00,000	8,02,516 17-8-73	2,02,900 11-9-2006	1,89,000 11-9-2006	67,000 2-7-2007	36,700 5-7-2007	53,100 28-8-2008	37,100 28-8-2008
RAVI	Madhopur	----------	9,20,000 25-9-88	----------		----------		----------	
	Jassar	2,75,000	6,80,000 5-10-55	36,400 3-9-2006	36,400 3-9-2006	22,900 4-7-2007		38,600 20-8-2008	
	RaviSyphon	4,50,000	6,59,000 6-10-55	29,300 2-9-2006	29,300 2-9-2006	38,000 24-7-2007		32,000 17-8-2008	
	Shahdara	2,50,000	5,76,000 22-9-88	23,600 28-7-2006	23,600 28-7-2006	30,600 1-7-2007		32,000 18-8-2008	
	Balloki	2,25,000	3,36,200 28-9-1988	67,500 3-9-2006	41,300 3-9-2006	65,400 1-7-2007	37,900 1-7-2007	90,700 18-8-2008	67,200 18-8-2008
	Sidhani	1,50,000	3,30,210 2-10-88	25,600 1-8-2006	10,700 1-8-2006	30,000 19-8-2007	14,700 19-8-2007	53,600 24-8-2008	38,700 24-8-2008
SUTLEJ	Ferozpur	----------	8,36,764 7-10-55	----------		----------		----------	
	G.S. Wala	----------	25.0 feet 9-9-1995	15,500 feet 6-9-2006	15,500 6-9-2006	11,500 feet 9-8-2007		19,900 feet 17-8-2008	
	Sulemanki	3,25,000	5,98,872 8-10-55	23,800 10-9-2006	9,100 10-9-2006	24,200 8-8-2007	9,100 8-8-2007	102,700 18-8-2008	90,100 18-8-2008
	Islam	3,00,000	4,92,581 11-10-55	3,300 4-7-2006	1,800 4-7-2006	5,100 13-7-2007	2,800 13-7-2007	38,900 25-8-2008	35,800 25-8-2008

HISTORIC MINMUM & MAXIMUM PEAK DISCHARGES IN MAJOR RIVERS OF PAKISTAN

River	Site	Design Capacity	Historic Max.Flood	Max of 2009		Max of 2010		Max of 2011	
				Inflow	Outflow	Inflow	Outflow	Inflow	Outflow
INDUS	Tarbela	15,00,000	6,04,000 30-7-2010	3,04,000 29-7-2009	3,06,000 16-8-2009	8,33,000 30-7-2010	6,04,000 30-7-2010	2,72500 26-8-2011	2,68500 16-9-2011
	Kalabagh	9,50,000	9,50,000 14-7-42	3,56,800 17-8-2009	3,48,300 17-8-2009	9,37,000 30-7-2010	9,36,453 30-7-2010	2,93800 26-7-2011	2,68400 26-7-2011
	Chashma	9,50,000	10,36,673 2-8-2010	3,85,000 19-8-09	3,80,800 19-8-2009	1,036,673 1-8-2010	1,036,673 2-8-2010	3,56,500 28-7-2011	3,49,700 28-7-2011
	Taunsa	11,00,000	9,59,991 28-8-2010	3,46,400 21-8-2009	3,20,300 21-8-2009	9,59,991 2-8-2010	9,59,991 2-8-2010	2,49,200 31-8-11	2,23,200 31-8-2011
	Guddu	12,00,000	11,99,672 15-8-76	2,65,200 25-8-2009	2,32,300 25-8-2009	1,148,738 8-8-2010	1,148,200 8-8-2010	2,72,300 4-9-2011	2,72,200 4-9-2011
	Sukkur	9,00,000	11,61,000 16-8-76	1,95,700 26-8-2009	1,34,600 26-8-2009	1,130,995 10-8-2010	1,108,795 10-8-2010	2,60,800 6-9-2011	2,60,800 6-9-2011
	Kotri	8,50,000	9,81,000 14-8-56	1,20,500 31-8-2009	1,15,800 31-8-2009	9,64,897 27-8-2010	9,39,442 27-8-2010	2,60,400 16-9-2011	2,60,400 16-9-2011
KABUL	Nowshera			-	9,59,00 21-7-2009	-	2,49,100 10-8-2010	-	7,200 12-8-2011
JHELUM	Mangla	10,60,000	10,90,000 10-9-92	71,900 28-7-2009	81,300 16-8-2009	3,44,400 30-7-2010	2,25,496 30-7-2010	1,41,300 16-9-11	1,31,300 16-9-2011
	Rasul	8,50,000	9,52,170 10-9-92	63,600 27-6-2009	56,800 17-8-2009	2,63,795 30-7-2010	2,63,795 30-7-2010	1,05,800 17-9-11	9,69,00 17-9-2011
CHENAB	Marala	11,00,000	11,00,000 26-8-57	1,28,900 28-7-2009	93,200 28-7-2009	3,14,378 6-8-2010	2,82,418 6-8-2010	1,50,400 16-9-2011	1,42,500 16-9-11
	Khanki	8,00,000	10,86,460 27-8-57	1,05,400 29-7-2009	97,100 29-7-2009	3,34,437 7-8-2010	3,27,637 7-8-2010	1,71,400 17-9-11	1,42,500 17-9-2011
	Qadirabad	9,00,000	9,48,530 11-9-92	98,400 29-7-2009	76,400 29-7-2009	3,29,483 7-8-2010	3,19,733 7-8-2010	1,71,400 17-9-2011	1,66,400 17-9-2011
	Trimmu	6,45,000	9,43,225 8-7-59	62,300 21-8-2009	43,800 21-8-2009	3,28,926 11-8-2010	3,23,026 11-8-2010	1,32,900 20-9-11	1,27,800 20-9-2011
	Panjnad	7,00,000	8,02,516 17-8-73	32,700 26-8-2009	17,800 26-8-2009	3,10,117 13-8-2010	3,10,117 13-8-2010	1,51,300 24-9-11	1,38,300 24-9-2011
RAVI	Madhopur	----------	9,20,000 25-9-88	----------	----------	----------	----------		
	Jassar	2,75,000	6,80,000 5-10-55	----------	10,100 29-7-2009	----------	21,100 21-8-2010		24,300 13-8-2011
	RaviSyphon	4,50,000	6,59,000 6-10-55	----------	23,900 30-8-2009		41,200 21-8-210		42,300 14-8-2011
	Shahdara	2,50,000	5,76,000 22-9-88	----------	22,200 13-8-2009	----------	41,900 21-8-2010		43,000 14-8-2011
	Balloki	2,25,000	3,36,200 28-9-1988	46,000 31-7-209	14,000 31-7-2009	69,900 23-8-2010	41,200 23-8-2010	7,21,60 15-8-11	4,40,00 15-8-11
	Sidhani	1,50,000	3,30,210 2-10-88	24,000 24-8-2009	8,500 24-8-2009	27,600 28-7-2010	16,800 28-7-2010	30,300 19-8-11	2,39,00 2-9-11
SUTLEJ	Ferozpur	----------	8,36,764 7-10-55	----------	----------	----------	----------		
	G.S. Wala	----------	25.0 feet 9-9-1995	----------	----------	----------	----------		
	Sulemanki	3,25,000	5,98,872 8-10-55	19,900 27-8-2009	3,400 3-8-2009	58,300 30-9-2010	44,300 30-9-2010	82, 000 29-8-11	76,200 29-8-11
	Islam	3,00,000	4,92,581 11-10-55	4,300 10-9-2009	1,200 10-9-2009	31,500 20-9-2010	28,900 20-9-2010	49,900 4-9-11	49,900 4-9-11

River	Site	Design Capacity	Historic Max.Flood	Max of 2012		Max of 2013		Max of 2014	
				Inflow	Outflow	Inflow	Outflow	Inflow	Outflow
INDUS	**Tarbela**	**15,00,000**	6,04,000 30-7-2010	295000 04-8-12	278000 05-8-12	3,92,000 14-8-13	3,38,100 14-8-13	**299,000 28-7-13**	240,100 15-8-14
	Kalabagh	**9,50,000**	9,50,000 14-7-42	285300 18-7-12	277000 17-7-12	4,79,603 13-8-13	4,72,303 13-8-13	258,292 25-7-14	249,992
	Chashma	**9,50,000**	10,36,673 2-8-2010	298300 08/-7-12	285500 08-7-12	6,37,842 14-8-13	6,20,672 14-8-13	282,012 17-8-14	257,632
	Taunsa	**11,00,000**	9,59,991 28-8-2010	243400 10-9-12	235400 10-9-12	5,16,017 17-8-13	5,16,017 17-8-13	261,010 30-7-14	233,110
	Guddu	**12,00,000**	11,99,672 15-8-76	236100 12-9-12	236100 10-9-12	5,67,418 20-8-13	5,42,100 20-8-13		
	Sukkur	**9,00,000**	11,61,000 16-8-76	214800 14-9-12	210000 14-9-12	5,10,875 24-8-13	4,54,995 24-8-13		
	Kotri	**8,50,000**	9,81,000 14-8-56	166000 21-9-12	138800 21-9-12	3,81,696 30-8-13	3,44,866 30-8-13		
KABUL	**Nowshera**			-	1,00,700 8-712	-	1,55,100 15-6-13		
JHE LUM	**Mangla**	**10,60,000**	10,90,000 10-9-92	115000 18-9-12	44700 05-8-12	1,79,000 13-8-13	45,214 13-8-13	634,000 5-9-14	500,000 5-9-14
	Rasul	**8,50,000**	9,52,170 10-9-92	42500 04-8-12	31400 05-8-12	43,080 19-9-13	23,610 19-9-13	516,000	516,000
CHENAB	**Marala**	**11,00,000**	11,00,000 26-8-57	183200 04-8-12	149200 04-8-12	3,39,910 15-8-13	3,69,690 15-8-13	861,000	858,000 6-9-14
	Khanki	**8,00,000**	10,86,460 27-8-57	194800 04-8-12	186400 04-8-12	4,10,331 15-8-13	4,10,331 15-8-13	947,000	947,000
	Qadirabad	**9,00,000**	9,48,530 11-9-92	194800 05-8-12	180800 05-8-12	4,07,803 15-8-13	4,03,403 15-8-13	904,000 7-9-14	904,000
	Trimmu	**6,45,000**	9,43,225 8-7-59	87800 07-8-12	73700 07-8-12	2,72,609 20-8-13	2,67,609 20-8-13	626,000 10-9-14	626,000
	Panjnad	**7,00,000**	8,02,516 17-8-73	65600 17-9-12	65600 17-9-12	3,17,261 25-8-13	3,17,261 25-8-13		
RAVI	**Madhopur**	----------	9,20,000 25-9-88				-		
	Jassar	**2,75,000**	6,80,000 5-10-55	-	30500 26-8-12		67,700 16-8-13		
	RaviSyphon	**4,50,000**	6,59,000 6-10-55	-	39800 24-8-12		73,600 18-8-2013		
	Shahdara	**2,50,000**	5,76,000 22-9-88	-	40800 22-8-12		74,880 17-8-13		
	Balloki	**2,25,000**	5,33,00 9-7-2005	60800 23-8-12	29300 23-8-12	1,17,770 18-8-13	97,970 18-8-13	132,000 9-9-14	118,000
	Sidhani	**1,50,000**	3,30,210 2-10-88	28600 14-9-12	24600 14-9-12	87,904 23-8-13	73,504 23-8-13		
SUTLEJ	**Ferozpur**	----------	8,36,764 7-10-55	-	-		-		
	G.S. Wala	----------	25.0 feet 9-9-1995	-	-		-		
	Sulemanki	**3,25,000**	5,98,872 8-10-55	21700 30-8-12	16900 9-9-12	82,370 22-8-13	78,846 22-8-13		
	Islam	**3,00,000**	4,92,581 11-10-55	14200 13-9-12	12700 13-9-12	70,932 25-8-13	70,932 25-8-13		

RIVER	SITES	Max of 2017		CLASSIFICATION
		IN FLOW	OUT FLOW	
INDUS	Tarbela	3,44,000	3,36,000	Low Flood
	Kalabagh	4,27,460	4,19,460	Medium Flood
	Chashma *	4,58,245	4,46,361	Medium Flood
	Taunsa	4,29,861	4,23,861	Medium Flood
	Guddu	4,59,811	4,28,640	Medium Flood
	Sukkur	3,90,863	3,33,108	Low Flood
	Kotri	2,51,298	2,10,923	Low Flood
KABUL	Nowshera		87,000	Medium Flood
JHELUM	Mangla	94,000	67,882	Normal
	Rasul	60,260	39,230	Normal
CHENAB	Marala	2,08,616	1,87,472	Medium Flood
	Khanki	1,78,546	1,70,021	Medium Flood
	Qadirabad	1,79,842	1,57,842	Medium Flood
	Trimmu	1,02,145	89,345	Normal
	Panjnad	78,988	63,488	Normal
RAVI	Jassar		46,439	Normal
	Shahdara		39,313	Normal
	Balloki	69,890	36,790	Normal
	Sidhnai	31,967	26,954	Normal
	G.S.WALA			
	BAKARKE			
SUTLEJ	Suleimanki	33,934	20,893	Normal
	Islam	16,971	14,221	Normal

HISTORIC MINMUM & MAXIMUM PEAK DISCHARGES IN MAJOR RIVERS OF PAKISTAN

RIVER	SITES	IN FLOW (Max of 2018)	OUT FLOW (Max of 2018)	CLASSIFICATION
INDUS	Tarbela	2,95,000	2,42,300	Normal
	Kalabagh	3,19,154	3,11,154	Low Flood
	Chashma *	3,35,912	3,19,912	Low Flood
	Taunsa	2,97,265	2,76,215	Low Flood
	Guddu	2,56,035	2,27,270	Low Flood
	Sukkur	2,11,595	1,56,025	Normal
	Kotri	1,02,375	60,740	Normal
KABUL	Warsak		54,638	Medium Flood
	Nowshera		1,05,300	Medium Flood
JHELUM	Mangla	1,22,000	69,127	Normal
	Rasul	59,543	39,230	Normal
CHENAB	Marala	2,01,878	1,68,278	Medium Flood
	Khanki	1,89,820	1,82,025	Medium Flood
	Qadirabad	1,94,031	1,72,031	Medium Flood
	Trimmu	93,680	81,680	Normal
	Panjnad	57,464	42,664	Normal
RAVI	Jassar		66,641	Low Flood
	R.SYPHON		37,936	Normal
	Shahdara		37,587	Normal
	Balloki	68,030	39,310	Normal
	Sidhnai	24,157	8,857	Normal
	G.S.WALA		17.70	Normal
	BAKARKE		623.80	Normal
SUTLEJ	Suleimanki	46,586	34,722	Normal
	Islam	18,535	16,460	Normal

HISTORIC MINMUM & MAXIMUM PEAK DISCHARGES IN MAJOR RIVERS OF PAKISTAN

RIVER	SITES	IN FLOW (Max of 2021)	OUT FLOW (Max of 2021)	CLASSIFICATION
INDUS	Tarbela	3,51,000	2,70,000	Low Flood
	Kalabagh	2,97,809	2,91,309	Low Flood
	Chashma	3,52,707	3,44,907	Low Flood
	Taunsa	3,29,989	3,06,489	Low Flood
	Guddu	3,06,296	2,66,344	Low Flood
	Sukkur	2,50,345	19,3,045	Normal
	Kotri	1,30,590	95,085	Normal
KABUL	Nowshera		87,400	Low Flood
JHELUM	Mangla	1,09,000	80,315	Low Flood
	Rasul	53,260	31,420	Normal
CHENAB	Marala	1,93,750	1,71,150	Medium Flood
	Khanki	1,89,683	1,83,688	Low Flood
	Qadirabad	1,87,812	1,67,812	Medium Flood
	Trimmu	1,23,167	1,06,967	Normal
	Panjnad	75,250	59,725	Normal
RAVI	Jassar		20,200	Normal
	Shahdara		36,477	Normal
	Balloki	59,679	32,200	Normal
	Sidhnai	39,394	11,215	Normal
SUTLEJ	Suleimanki	20,198	7,212	Normal
	Islam	5,221	3,971	Normal

HISTORIC MINMUM & MAXIMUM PEAK DISCHARGES IN MAJOR RIVERS OF PAKISTAN

RIVER	SITES	IN FLOW (Max of 2022)	OUT FLOW (Max of 2022)	CLASSIFICATION
INDUS	**Tarbela**	2,93,000	2,14,000	Normal
	Kalabagh	2,26,934	2,194,34	Normal
	Chashma	3,01,613	2,96,213	Low Flood
	Taunsa	2,12,840	1,76,518	Normal
	Guddu	3,12,816	2,88,705	Low Flood
	Sukkur	2,69,200	2,49,050	Low Flood
	Kotri	1,02,745	95,015	Normal
KABUL	**Nowshera**		95,400	Medium Flood
	Warsak		70,000	Low Flood
JHELUM	**Mangla**	95,000	40,720	Normal
	Rasul	17,240	15,800	Normal
CHENAB	**Marala**	1,42,650	1,33,650	Low Flood
	Khanki	1,60,874	1,54,890	Medium Flood
	Qadirabad	1,71,290	1,52,290	Medium Flood
	Trimmu	98,074	90,574	Normal
	Panjnad	56,815	54,815	Normal
RAVI	**Jassar**		41,183	Normal
	Shahdara		22,864	Normal
	Balloki	46,055	24,655	Normal
	Sidhnai	22,742	21,642	Normal
SUTLEJ	**Suleimanki**	24,670	17,462	Normal
	Islam	13,326	12,501	Normal

HISTORIC MINMUM & MAXIMUM PEAK DISCHARGES IN MAJOR RIVERS OF PAKISTAN

RIVER	SITES	Peak of 2023	
INDUS	Tarbela	319400	24-7-23
	Kalabagh	365549	25-7-23
	Chashma	415651	25-7-23
	Taunsa	539908	27-7-23
	Guddu	461353	30-7-23
	Sukkur	410860	31-7-23
	Kotri	220908	09-8-23
KABUL	Nowshera	100600	24-7-23
	Warsak		
JHELUM	Mangla	35741	24-8-23
	Rasul	23,610	24-8-23
CHENAB	Marala	192960	19-7-23
	Khanki	204041	20-7-23
	Qadirabad	185749	20-7-23
	Trimmu	116786	25-7-23
	Panjnad	145404	05-8-23
RAVI	Jassar	71010	20-7-23
	Shahdara	39780	24-7-23
	Balloki	58870	29-7-23
	Sidhnai	43758	02-8-23
SUTLEJ	Suleimanki	191053	21-8-23
	Islam	151904	25-8-23

HISTORIC MINMUM & MAXIMUM PEAK DISCHARGES IN MAJOR RIVERS OF PAKISTAN

River	Sites	Peak Inflows in Monsoon-2024		Peak Outflows in Monsoon-2024		Classification
		Inflow	Date & Time	Outflow	Date & Time	
INDUS	Tarbela	350,000	08-08-2024 @ 0600 hrs	329,000	07-08-2024 @ 2359 hrs	Low. Flood
	Kalabagh	401,723	09-08-2024 @ 1200 hrs	393,739	09-08-2024 @ 1200 hrs	Med. Flood
	Chashma	432,686	09-08-2024 @ 1800 hrs	417,763	09-08-2024 @ 1800 hrs	Med. Flood
	Taunsa	442,170	11-08-2024 @ 0600 hrs	440,296	08-08-2024 @ 1200 hrs	Med. Flood
	Guddu	431,371	12-08-2024 @ 1800 hrs	405,430	22-08-2024 @ 0600 hrs	Med. Flood
	Sukkur	401,060	23-08-2024 @ 1800 hrs	385,010	23-08-2024 @ 1800 hrs	Med. Flood
	Kotri	342,368	04-09-2024 @ 0600 hrs	335,618	04-09-2024 @ 0600 hrs	Med. Flood
KABUL	Nowshera			114,200	05-08-2024 @ 0600 hrs	Med. Flood
	Warsak			64,000	16-06-2024 @ 0600 hrs	Med. Flood
JHELUM	Mangla	176,000	30-08-2024 @ 0600 hrs	78,558	16-06-2024 @ 2359 hrs	Low. Flood
	Rasul	67,835	30-08-2024 @ 2359 hrs	66,960	30-08-2024 @ 2359 hrs	Normal
CHENAB	Marala	178,650	15-08-2024 @ 1200 hrs	160,950	15-08-2024 @ 1200 hrs	Med. Flood
	Khanki	171,329	15-08-2024 @ 2359 hrs	163,215	15-08-2024 @ 2359 hrs	Med. Flood
	Qadirabad	163,219	16-08-2024 @ 0600 hrs	145,219	16-08-2024 @ 0600 hrs	Low. Flood
	Trimmu	96,280	19-08-2024 @ 1200 hrs	87,030	19-08-2024 @ 1200 hrs	Normal
	Panjnad	72,320	22-08-2024 @ 1200 hrs	64,320	22-08-2024 @ 1200 hrs	Normal
RAVI	Jassar			40,440	16-08-2024 @ 1200 hrs	Normal
	Shahdara			28,014	17-08-2024 @ 0600 hrs	Normal
	Balloki	56,340	18-08-2024 @ 2359 hrs	31,080	18-08-2024 @ 2359 hrs	Normal
	Sidhnai	33,795	03-09-2024 @ 1200 hrs	24,711	30-08-2024 @ 2359 hrs	Normal
	Suleimanki	24,941	04-08-2024 @ 1800 hrs	12,559	04-08-2024 @ 1800 hrs	Normal
	Islam	12,549	22-08-2024 @ 1200 hrs	11,145	18-08-2024 @ 1200 hrs	Normal

HISTORIC MINMUM & MAXIMUM PEAK DISCHARGES IN MAJOR RIVERS OF PAKISTAN

RIVER	SITES	IN FLOW (2025) 8-7-2025	OUT FLOW (2025) 8-7-2025
INDUS	Tarbela	287,000	283,400
	Kalabagh	340,768	332,784
	Chashma	370,532	349,332
	Taunsa	247,736	231,236
	Guddu	170,048	133,273
	Sukkur	126,140	75,270
	Kotri	47,490	17,985
KABUL	Nowshera		49,400
	Warsak		
JHELUM	Mangla	22,000	8,000
	Rasul	4,585	0
CHENAB	Marala	71,285	44,262
	Khanki	59,672	52,304
	Qadirabad	66,112	47,612
	Trimmu	26,376	13,576
	Panjnad	14,330	2,000
RAVI	Jassar		4,660
	Shahdara		9,990
	Balloki	32,465	6,915
	Sidhnai	17,632	6,532
SUTLEJ	Suleimanki	11,894	1,276
	Islam	1,231	1,231