

The Unforgettable Indus River Flood-2010: A Review

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Abstract: Floods are the unannounced natural disasters that destroy both lives and infrastructures. In July 2010 a huge and unpredictable flood struck Pakistan, especially the catchment area of the River Indus, extending from the north part of Khyber Pakhtun Khwa (KPK) Province south to the Arabian Sea. The top five rainfall intensities recorded at Risalpur, Islamabad, Murree, Cherat and Ghari Dopatta were 415mm, 394mm, 373mm, 372mm and 346mm, respectively. The Indus Flood-2010 affected nearly 20 million people spreading over 36 districts of the country. The death toll recorded was nearly 1,800 persons. More than 10 million people were subjected to contaminated drinking water. The destruction to cotton, rice, sugar cane, and animal fodder was recorded as 3,000 km², 800 km², 800 km², and 1000 km², respectively. And about five hundred thousand tons of wheat was destroyed. The Indus Flood of 2010 caused an estimated 43 billion US dollar loss to Pakistan and adversely affected its Gross Domestic Product (GDP). It brought on both the financial crises and socio-political concerns (such as infiltration of the Taliban in the form of a relief supporter). Though this flood has left everlasting impacts on the people of Pakistan, they could be better handled if the government and relief agencies were more determined, honest and committed.

Key words: Indus River, Flood of 2010, Rainfall intensity, flood damage statistics, Pakistan

Background

The prevention of floods is a universally known substantial impracticality, though flood protection, management and mitigation are vitally important. Disastrous floods affect people irrespective of status, class and conditions. Floods destroy precious human properties and wealth and leave a number of potential hazardous health impacts on the affected communities. Flood prevention, management and mitigation are complex interdisciplinary issues for which some satisfactory solutions have been advanced, but for others no likely answers are as yet forthcoming (Tallat, Hashmi and Ali 2011). But in spite of its negative impacts, the proper water resources management could help in using the flood water optimally during lean period.

During the last days of July 2010, extreme rainfall occurred over the northwest of Pakistan, in the upper part of the Indus river system (Figures 1, 2). In some areas, more than four times the normal monthly rainfall fell within three days. The instant rain intensity reached 300mm over a 36-hour period according to the Pakistan Meteorological Department (PMD). Similar, excessive precipitation rates were also observed over northern India. For the other parts of Pakistan and India, however, the rainfall was not heavier than in other years, and in Balochistan it was even below average.

Pakistan's Indus River basin was unfortunately badly affected by the heavy monsoon rain that occurred in all her four provinces during late July 2010. The floods were driven by unprecedented monsoon rain. The rainfall anomaly map published by NASA showed unusually intense monsoon rains attributed to La Niña. La Niña is a coupled ocean-atmosphere phenomenon that is the

counterpart of El Niño as part of the broader El Niño-Southern Oscillation climate pattern. During a period of La Niña, sea surface temperatures across the equatorial eastern central Pacific Ocean will be lower than normal by three to five degrees Centigrade. The PMD reported that over 200mm (7.9 inches) of rain fell over a 24-hour period in Khyber Pakhtun Khwa and Punjab. A record-breaking 274mm (10.8 inches) of rain fell in Peshawar during 24 hours; the previous record was 187mm (7.4 inches) in April 2009 (Ahmadani 2010; BBC 2010a). Nearly one-fifth of the total land of Pakistan including agricultural, residential and commercial areas was submerged, directly affecting more than 20 million people, causing a death toll of nearly 1,800 people (SRC 2010; BBC 2010b).

This worst flood not only caused damage to the infrastructure, communications systems, irrigation and water supply line, school, hospitals, etc., but it extensively and adversely affected the economic stability to the nation, amounting to an estimated 43 billion US dollar loss to Pakistan (Jakarta Globe 2010). Some of the deadliest floods recorded in Pakistan are noted on Table 1.

Table 1. Deadliest Floods of Pakistan

Year	Event	Death Toll
1950	1950 Flood – Pakistan	2,910
1977	Karachi flood	848
1992	Vajont Dam landslide and monsoon rainfall – India/Pakistan	1,834
1993	South Asian Monsoon Rain	3,084
2009	Karachi monsoon flood	26
2010	Monsoon flooding	1,800

The Indus Flood of 2010 was caused by heavy monsoon rainfall in the last week of July 2010 in the various parts of Khyber Pakhtun Khwa (KPK), Punjab, Gilgit-Baltistan and Azad Kashmir areas of Pakistan. It was an extreme monsoon rainfall in the last eight decades of Pakistan, as described by the PMD. Figure 1 shows the affected areas of Pakistan during Flood of 2010. And the top five rainfall intensities recorded by the PMD in different parts of the country during Flood of 2010 are shown in the Table 2 and Figure 2. Figures 3 and 4 illustrate the detailed rainfall pattern shift in Pakistan from 1961 to 2020. The figures indicate that the rainfall over the catchment areas of the eastern rivers has decreased or moved away. The probability of occurrence of heavy rainfall events that would lead to floods is more in the western rivers of Pakistan in the near future. The central parts of KPK and northwest Punjab are extremely vulnerable to the flash floods. This pronounced seasonal variation of rain is linked to a persistent south-westerly airflow over the

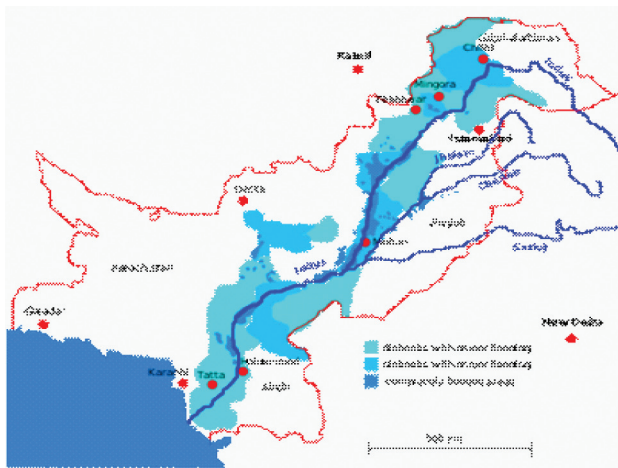


Figure 1. Flood-2010 Affected Areas of Pakistan (Pakistan Meteorological Department)

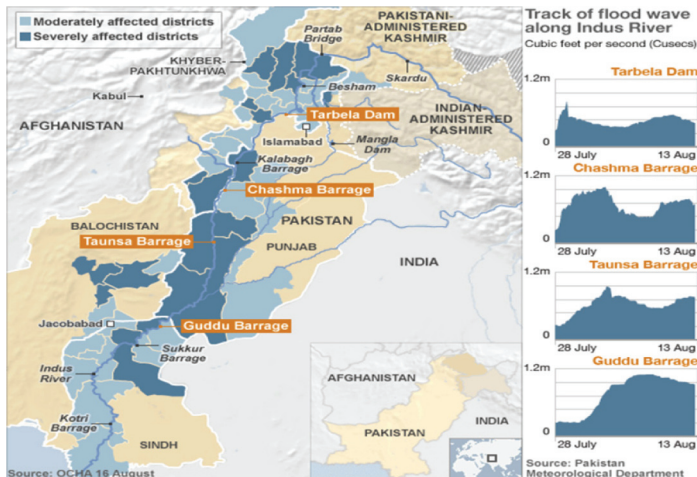


Figure 5. Indus Flood-2010 Hydrograph (Pakistan Meteorological Department)

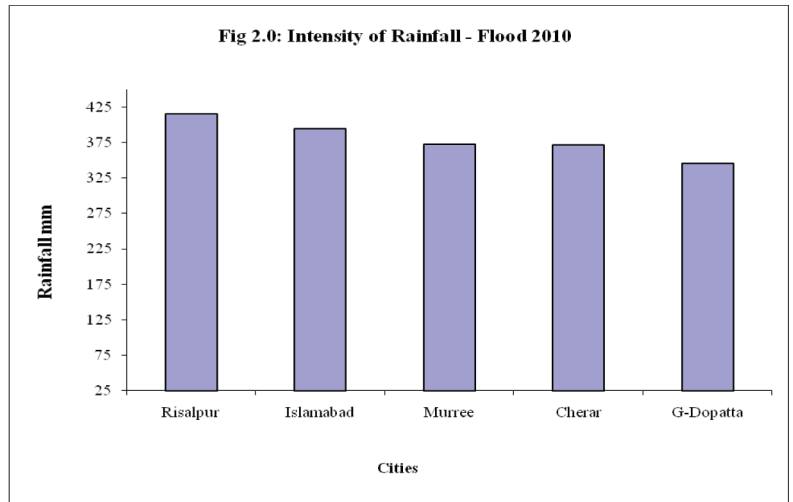


Figure 2. Intensity of Rainfall, Flood-2010 (Pakistan Meteorological Department)

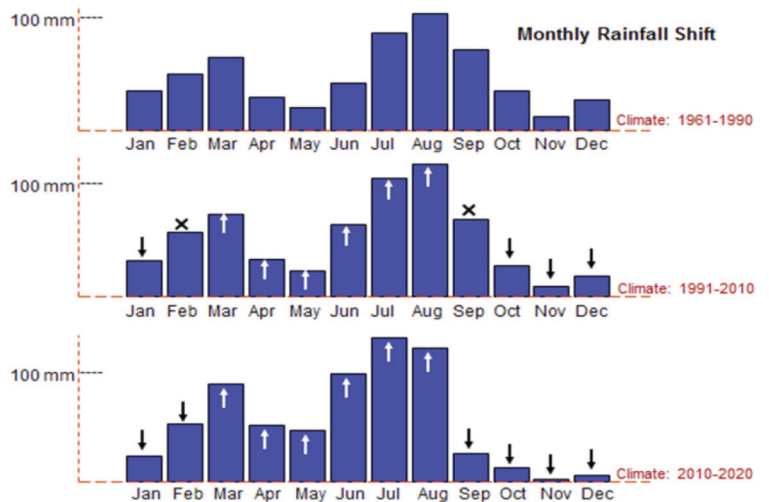


Figure 3. Monthly Rainfall Shift in Pakistan (Pakistan Meteorological Department)

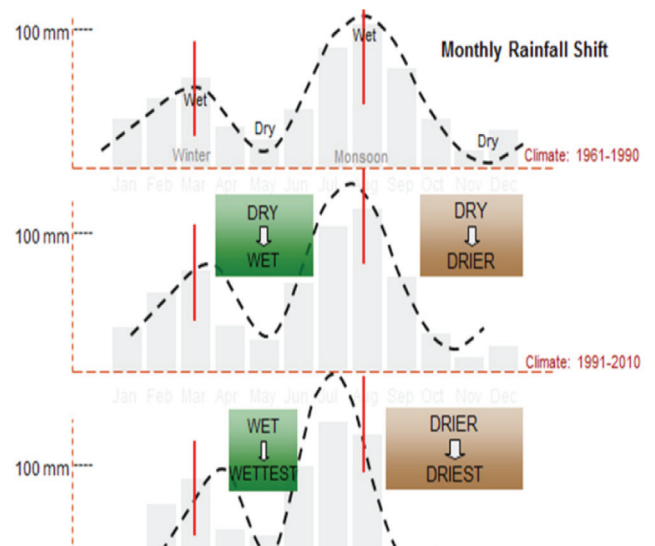


Figure 4. Monthly Rainfall Shift in Pakistan (Pakistan Meteorological Department)

Table 2. Rainfall Intensity during Flood-2010

City	Province	Rainfall (mm)
Risalpur	KPK	415
Islamabad	Capital	394
Murree	Punjab	373
Cherat	KPK	372
Garhi Dopatta	Azad Kashmir	346

Arabian Ocean and Bay of Bengal – the so-called Indian monsoon. This flow of already warm moist air picks up further large quantities of water vapor from the ocean surface. Since, the Tibetan plateau enforces the air to ascend and, hence, to condensate, large amounts of rain fall over Southeast Asia. Various factors combined, especially topography and upper-air wind, make that the annual monsoon a complex regional weather pattern.

The discharge of the Flood of 2010 for Tarbela Dam was 24,800m³/s. Based on the historic record a flood with a 66-year return period would have a discharge of 18,500m³/s. But the discharge of Tarbela Dam during Flood of 2010 shows that it was 30% higher than the historic values. Figure 5 shows the Flood of 2010 Hydrographs of four different stations of Pakistan.

Damage Caused by the Indus Flood of 2010

Some of the notable damages caused by the Indus Flood-2010 are these (Jakarta Globe 2010 SRC 2010):

- More than 20 million people severely affected.
- About 1,800 people died.
- More than 2,000 have received severe injuries.
- About six million people displaced.
- About 36 districts heavily affected.
- More than 10 million people forced to take polluted and unhygienic drinking water resulting in water borne diseases like gastroenteritis, diarrhea, skin infections, cholera, etc., as well as an outbreak of malaria.
- About four billion US dollar loss to the infrastructure, including 3916km of highways, 5646km of railways, and 5,000 schools, etc. (Holbrooke 2010).
- Nearly 0.6 million houses destroyed.
- About 10,000km electric power transmission lines damaged, resulting in 3.135 GW power shortfall.
- Over 500 million US dollar loss to the wheat crop.
- Destruction to cotton, rice, sugar cane, and animal fodder recorded as 3,000 km², 800 km², 800 km² and 1000 km², respectively; and 500 thousand tons of wheat was destroyed.

Impacts of the Flood of 2010

- Due to the large destruction to the agricultural field and products, the prices of the daily commodities rose beyond the level of the common man.
- The agricultural devastation was offset by maximum poppy cultivation, especially in the Federally Admin-

istrative Tribal Area and KPK Province.

- A huge financial burden on the country required to re-establish damaged infrastructure.
- Rise in Taliban insurgency due to their engagement in post-flood relief activities, mainly in the areas where either the interest of the government was missing or was seen to be corrupt (Hasnain 2010).
- The inefficiency of the local political leaders caused political unrest in most parts of the country, the flood effected people shows little attention towards their leaders promises now.
- This flood has created million of job chances/opportunities for youth.
- The GDP growth rate, rated at 4% before the Flood-2010, fell as predicted to a negative level.

Conclusions

The Indus Flood of 2010 was no doubt the most severe flood in the recent history of Pakistan, bringing destruction to a large extent in the country, destroying lives, infrastructure, agricultural land, communication systems, and much more. It left a number of potential water borne diseases in different part of the country by contaminating both the ground and surface water resources of the public water supply schemes. The destruction caused by the Flood-2010 in Pakistan could take longer time to cope up the required deficiencies; but greater determination by the government, optimum use of the available resources, proper and efficient management system, will power of the people, and honesty of the administration authorities could go a long way to counter balance and help mitigate its disastrous effects.

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The Independent Power Producers' Association, Nepal

IPPAN is a membership organization of the Independent Power Producers and other stakeholders involved in Nepal's hydropower development.

IPPAN's advocacy and lobbying efforts in the past led to:

- IPPAN's involvement in various committees formed by the Government to reform Nepal's power sector,
- IPPAN President as Co-chairman of the Infrastructure Working Group of the Nepal Business Forum
- Involvement of IPPAN in the drafting of the proposed Electricity Bill and NERC Bill.
- Cross Border Transmission Line Project at advanced level of Implementation
- Establishment of Hydropower Investment and Development Company Ltd.
- Cancellation of capital investment requirement during business registration/survey license period.
- Competitive and Transparent Bidding of

hydropower projects

- Cancellation of Local development Tax, Levies and Octroi etc.
- Government announcement of Income tax holidays
- Revision of Performance Bond by NEA

IPPAN organized various programs in the past which resulted in better visibility of IPPAN.

Notable among them are:

- The 4th International Hydropower Convention (2009)
- Power Summits 2008, 2007, and 2006
- Hydropower Project Financing 2008
- Friday Forum, interactive discussion program held fortnightly