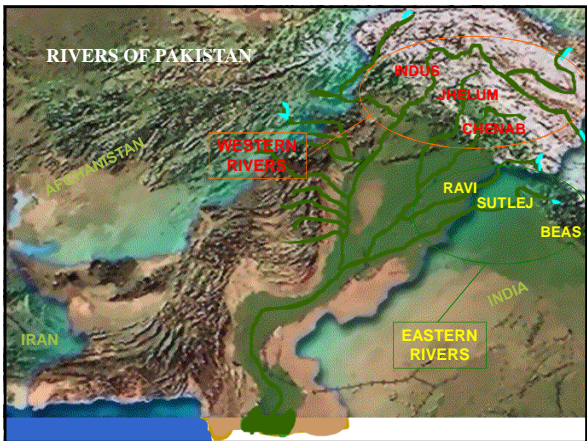


Floods and their Management in Pakistan

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- Pakistan River System
- Floods in Pakistan and the Damages
- Causes of Floods in Pakistan
- Most Flood Prone Areas/Districts in Pakistan
- Flood Management in Pakistan
- Future Flood Threats in Pakistan

Pakistan's River System



- ### Floods in Pakistan
- During the last sixty-one years Pakistan has suffered a cumulative financial loss of more than Rs 385 billion (US \$ 6 billion) on account of 15 major flood events
 - More than 7,800 precious lives have so far been lost besides
 - Dislocation of millions of people

Historical Flood Damages In Pakistan

Year	Value of Property Damaged (Rs in million)	Human Lives Lost	Villages affected
1950	11,282.00	2,190	10,000
1956	7,356.00	160	11,609
1957	6,958.00	83	4,498
1973	118,684.00	474	9,719
1976	80,504.00	425	18,390
1978	51,489.00	393	9,199
1988	25,630.00	508	1,000
1992	69,580.00	1,008	13,208
1995	8,698.00	591	6,852
2001	450.00	219	50
2003	5,175.00	484	4,376
2004	15.00	85	47
2005	Not reported	59	1,931
2006	Not reported	523	2,477
2007	Not reported	586	6,498
Total:	385,785.00	7,806	99,854

Causes of Floods in Pakistan

- Floods in rivers are caused by heavy concentrated monsoon rains
- Sometimes augmented by snowmelt flows
- Monsoon depressions originating in the Bay of Bengal (India) often result in heavy downpour
- Additional contribution by weather systems from Arabian Sea Seasonal Low, and Mediterranean Sea (Westerly Wave) producing destructive floods in one or more of the main rivers of the Indus System
- Flash floods due to cloud bursts, hill torrent flows etc.
- Temporary natural dams as a result of landslide or glacier movement also sometimes cause floods

Most Flood Prone Districts of Pakistan

River Indus: (Northern Areas & NWFP)

Most Flood Prone Districts include:

Gilgit, Skardu, Chilas, Dasu, Manshera, Peshawar, Mardan and Nowshera

River Indus: (Upstream Guddu)

Most Flood Prone Districts include:

Left Bank: Minawali, Bhakkar, Multan, Muzaffargarh, Khanpur and Rehim Yar Khan

Right Bank: D.G. Khan, Jampur and Rajanpur

Most Flood Prone Districts of Pakistan (contd.)

River Indus: (Downstream Guddu)

Most Flood Prone Districts include:

Left Bank: M Khairpur, Ghotki, Nawabshah, Hyderabad and Coastal Area

Right Bank: Kashmir, Shikarpur Sukkur, Larkana, Dadu, Shewan, Thatta, Badin and Garho Coastal Area (Karachi)

River Kabul:

Most Flood Prone Districts include:

Peshawar, Nowshera and Charsadda

River Jhelum: (Downstream Mangla)

Most Flood Prone Districts include:

Jhelum City, Khushab, Jhang, Gujrat and Sargodha

Most Flood Prone Districts of Pakistan (contd.)

River Chenab: (Downstream Marala)

Most Flood Prone Districts include:

Left Bank: Sialkot, Wazirabad, Hafizabad, Faisalabad and Multan

Right Bank: Gujrat, Sargodha, Jhang and Muzaffargarh

River Ravi:

Most Flood Prone Districts include:

Left Bank: Lahore, Sahiwal and Khaniwal

Right Bank: G Lahore, Sheikhupura, Faisalabad and Toba Tak Singh

Most Flood Prone Districts of Pakistan (contd.)

River Sutlej:

Most Flood Prone Districts include:

Left Bank: Kasur, Bahawalnagar, Bahawalpur City, Hasilpur, Bahawalpur City and Minchinabad

Right Bank: Ganga Singh Walla, Pakpattan, Burewala, Vehari and Mailsi

Flood Management In Pakistan

Flood Disaster Management Policy in Pakistan is aimed in achieving the following main objectives:

- Preparation and adaptation of a technically sound and economically viable strategy for reduction of floods and damages;
- Protection of cities, vital infrastructural installations, prioritized economic areas and other areas in that order;
- Exploring more effective use of existing flood control facilities;
- Improvements in Watershed and River Management Practices;
- Improvement in Flood Forecasting & Advance Warning System;
- Minimize adverse effects on natural ecosystem and environment;
- Community participation approach for effective flood preparedness, fighting and rehabilitation; and
- Flood adaptability

Structural Measures In Practice

These Include:

- Construction of Embankments
- Construction of Spurs/Battery Of Spurs
- Construction of Dikes/Gabion Walls/Flood Walls
- Construction of Dispersion/Diversion Structures
- Channelization of Flood Waters
- Construction of Delay Action Dams
- Construction of Bypass Structures

Non-Structural Measures In Practice

Improved Flood Forecasting System through :

- Effective Data Collection and Dissemination System
- Real Time Rain-Fall and River Flow Data Collection
- Weather Radar Prediction
- Modern System of Transmission of Flood Forecasts.

Improved Early Flood Warning System :

- Based on effective Flood Forecasts, early Flood Warning is issued
- Reliable interaction between all related Flood Control and Relief Agencies.
- In-time warning and evacuation arrangements by Provincial Relief Departments, District Administrations etc.

Future Flood Threats In Pakistan

- **Recent trend of Climate Change in Pakistan based on last 70 years climatic data indicates:**
 - i) Rise in mean daily temperature of 0.6 to 1.0 degree centigrade in arid coastal areas, arid western/northwestern mountains etc;
 - ii) 10-15% decrease both winter & summer rainfall in coastal belt;
 - iii) 18-32% increase in rainfall in monsoon zone (sub-humid and humid areas);

Future Flood Threats In Pakistan (Contd.)

- iv) Further decrease of 5% in relative humidity over arid plains of Balochistan;
- v) 3-5% decrease in cloud cover over central and southern Pakistan resulting in increase in sunshine;

The above will give rise to increase in frequency of extreme events such as heavy rains, flash floods, dust/thunderstorms, hailstorms, heat waves, density and persistence of fog.

Thank You