

The Pakistani Floods of 2010

by The British Geographer

The Causes of the Flood

Physical Causes

From its headwaters in the Himalayas of Tibet, the River Indus flows northwest through India before turning sharply south across Pakistan. It finally discharges into the Arabian Sea, a journey of some 3,200km (2,000 miles). The River Indus has an annual flood caused by tropical monsoon rainfall. It's rich alluvium floodplain led to one of the cradles of civilization, 9000 years ago. However, this flood's magnitude was according to Professor Rajiv Sinha, from the Indian Institute of Technology, 5 or even 10 times stronger than normal.

The annual monsoon is caused by the movement of warm moisture laden air from the Indian Ocean toward areas of low pressure, marked out by the Inter-Tropical Convergent Zone (ITCZ) over the subcontinent. Here, the subcontinent is superheated, which creates strong rising thermals of low pressure. As warm air moves over the subcontinent it rises and dumps vast quantities of rainfall, which cools the surface and replenishes the vital soil moisture and ground water.

In July 2010, more than half the normal rains fell in just one week in an unprecedented sequence of days. Intense rainfall totaling in excess of 200mm fell in a 4-day period from 27th to 30th July along with above average rainfall in August. The recorded monsoon rainfall associated with La Nina was the highest in a 50-year period.



The total area affected by flooding was 796,095 square kilometers, approximately one fifth of Pakistan's total land area

There was much discussion over the exact causes of this level of rainfall. La Nina, which is a coupled ocean-atmosphere phenomenon that impacts southeast Pacific Ocean temperature but is also thought to increase Indian monsoon rainfall was thought to be a contributing factor. The cycle of El Nino and La Nina, which are both important global heat transfers seems to be occurring more frequently and is potentially a consequence of climate change. Climate change scientists are observing both greater spatial variation and severity in the monsoon rains. Scientists have observed in the last 30 years, a 40-60 mile northwest shift in the Pakistan monsoon. A second report in the New Scientist linked the severe monsoon to the affects of a phenomenon that was freezing the jet stream. This had in the same been previously associated with forest fires and heat waves in Russia.

A second contributing factor is the alluvial nature of the River Indus. The Indus is choked with vast quantities of sediment supplied by its Himalayan headwaters. When combined with raised levées, the sediment only serve to choke the river further, reducing its capacity and causing the likelihood of floods to increase.

Human Causes

Raised levées and protected banks contain the sediment and reduce the river capacity. In this way river management is seen to exacerbate river floods along the Indus. Western river management systems have been wrongly transferred to Asian rivers. For example, with UK rivers, due to their size and scale they transport far less sediment. Raising the UK riverbanks has relatively little impact on channel capacity and sedimentation. A similar problem is the use of concrete line riverbanks. Often in rich sediment filled riverbanks, the shifting sands lead to concrete banks being undermined and less effective in holding back floods. This problem is more associated with Bangladeshi river management.

Deforestation is also considered to be a major cause of the flood, with some commentators suggesting that it was key trigger. Deforestation rates vary in Pakistan from 2 percent to 2.4 percent annual rate. At this rate the country's forest cover would be reduced to half of its 1995 extent by 2019-24, says Pakistan's Food and Agriculture Organisation. Deforestation is known to aggravate flooding by reducing the ability of drainage basins to intercept inputs; consequently run-off rates and discharge are increased. Compounding this problem is the endemic culture of illegal logging and implicit support of officials through corrupt backhand payments. As a result the lush Swat valley, a region of Khyber-Pakhtunkhwa Province has been largely stripped of its natural forest. A local organisation, Sarhad Awami Forestry Ittehad (SAFI), has claimed that in parts of Malakand Agency, Khyber-Pakhtunkhwa, "more than 70 percent of forests were illegally cut down between 2007 and 2009, when Pakistani Taliban controlled the region.

Finally, there were also unconfirmed reports from some Pakistani agencies that India was responsible for releasing water from tens of its dams in the Indian occupied region of Kashmir. If this was the case the timing of this can only be seen as adding to the problem.

Effects of the Flood

Short Term

The flood affected the entire long course of the Pakistani section of the River Indus. In total one fifth of Pakistan's land areas was flooded.

- Over 1700 people died with a further 20 million people affected through damaged property, livelihoods and homelessness
- 1.2 million homes destroyed, 800 000



- people cut off from aid in remote regions
- Widespread food and freshwater shortages. The WHO reported that
- 10 million people were forced to drink unsafe water. 6 million suffering from hunger
- Floods submerged 17 million acres (69,000 km²) of Pakistan's most fertile cropland, killed 200,000 livestock and washed away massive amounts of grain.
- Floods damaged an estimated 2,433 miles (3,916 km) of highway and 3,508 miles (5,646 km) of railway and repairs are expected to cost at least 158 million USD and 131 million USD, respectively. Public building damage is estimated at 1 billion USD
- 10 000 schools were destroyed
- The total cost was estimated to be around €35 billion

Long Term

At this vast scale, it is sometimes difficult to distinguish between short and long-term impacts.

- **Lost Infrastructure Sets Pakistan Back Years** Some commentators suggested that the flood could set Pakistan back decades, further weaken its already weak civilian administration and add to the burdens on its military. **Rumors That Gov't Controlled Flooding Worsen Mistrust.** The Economist reported at the time disturbing stories of mistrust between the people and the central government. Dark but plausible accusations were circulating that well-connected people chose which areas were purposefully flooded to relieve pressure elsewhere; aid is being diverted to constituencies of powerful figures; woefully feeble flood-protection infrastructure was left badly maintained
- **Devastated Agriculture Will Cause Years of Food Shortage.** The Economist reports, "Hunger may prove to be a bigger problem. An estimated 23% of the year's harvest was washed away, including a quarter of the cotton crop, which matters to the economy. About 2.6 million acres of cultivated land have been drowned, says Pakistan's National Disaster Management Authority. Officials say that the rehabilitation will take three years, barring more floods. Food inflation will hurt even the driest of the poor."
- **This Flood Makes Pakistan More Susceptible to Future Floods.** Foreign Policy, suggest, the worse the damage from this year's round of seasonal flooding, the worse next year will be. "I don't know of Pakistan having any infrastructure to "prevent or alleviate" flooding. There are laws prohibiting the felling of trees for the timber industry, but they operate only within defined forest areas. We're not really doing anything about overdevelopment and the destruction of forest cover and watershed areas, so in the future we are going to see more of these tragic natural disasters."



Developments

There has been a massive and sustained bilateral and multilateral response to the Pakistan flood of 2010. The focus following the initial humanitarian effort has focused on recovery and capacity building. The key focus points have been to provide clean water and sanitation. 2,5 million people are still without clean water and sanitation. In addition road building, home construction, public building construction, including schools have been funded via 'work for cash' programs. 800 000 people remain without permanent housing. Farmers have been provided with tones of artificial fertilizer in order to speed up and encourage field recovery and crop yields.

The following outline comes from the UK Government's DFID as a summary report on its own efforts in the reconstruction of Pakistan.

In total the UK government is providing, mainly via aid agencies:

- Safe drinking water to 2.5 million people.
- Tents and shelter for some 1.3 million people.
- Toilets and sanitation for almost 500,000 people.
- Food packages for more than one million people in flood affected areas, in addition to nutritional support for half a million malnourished young children and pregnant/breastfeeding women.
- Wheat and vegetable seeds, fertilizer, animal stock feed, and veterinary services to more than 115,000 rural families to avoid further loss of animals and dependency on food aid for the next year or more.
- Basic health care for around 2.3 million people.
- Help for 200,000 children by repairing 1,500 schools damaged by the floods and providing 200 temporary facilities for children whose schools have been destroyed across Sindh and the Punjab, as well as accelerating a project to build forty schools in Khyber Pakhtunkhwa benefitting another 9,000 boys and girls.
- Health and hygiene education on how to avoid potentially fatal diseases for around one million people.
- Help for around one million people in rural areas to earn a living by providing jobs, skills training, as well as farming tools, seeds, and animals so families can restart their farms.
- Support to deliver 8,239 metric tonnes of food and other aid by UN helicopter airdrops, serving flood affected people across 160 different locations.
- Twelve planes (five Royal Air Force) flown in packed full of emergency aid.
- Homes, seeds and tools for more than half-a-million people recovering from the floods
- The UK Government also accelerated a project to provide new bridges to replace some of those destroyed by the floods; ten bridges were shipped over from the UK and are now in Khyber Pakhtunkhwa.