Anatomy of a flood, Kosi, India, 2008

More than 17 million people have been affected in India, Bangladesh and Nepal by the recent floods in South Asia. Around 3 million people have been rendered homeless and more than one million are now living in relief camps. Nature's rage and human misery have both been written about in such graphic details that one needs to consider how and why this great disaster happened, whether it was avoidable and what lessons might be gleaned from it.

The deluge took place in northern part of eastern India, where in August, the Himalayan river, Kosi, burst its embankment in two locations and shifted its course to draw a straight line from north to the south through a part of Bihar state to join the Ganga.

This is not the first time the Kosi river has breached its embankment; indeed, the Kosi has been described as the 'River of Sorrow'. Describing its descent onto the plains, the British administrator, and the author of the Imperial Gazetteer of India, L.S.S O'Malley, wrote in 1913:

> Sweeping down from the hills, it brings with it volumes of sand, which it heaps over the surface of the country, destroying the productive power of the land, choking the wells, and driving the villagers from their homesteads…. and changing the whole face of the country from a fruitful landscape to a wilderness of sand and swamp.

This rage of the Kosi made Christopher Hill, the American historian, describe Kosi as 'a different type of river'. Until the late 1800s, the river traced a violent and direct path through the districts of Purnea in North Bihar to the Ganga. Kosi's catchment is larger than that of any Himalayan river excepting the Indus and the Brahmaputra bringing the floodwaters of roughly 24,000 square miles of mountain basin. Yet, Kosi is less than 800 miles in length. It fury comes from the fact that it debouches onto the Gangetic plains through the Chatra Gorge in the Nepal foothills where the valley is only 5-8 km in width. Consequent to its passage through this narrow pass, the velocity and power of the Kosi increases to such an extent that the river roars through some 650 km of Purnea district, carrying thousands of tons of silt and sand and destroying everything in its path. The river has been known to rise 10 m within 24 hours and to broaden into a 25 km wide 'floating sea'. Through an east-west swathe of about 500 kms, the Kosi swung like a pendulum, leaving behind a mass of gravel, *kankar* (nodules of sandstone) and sandy silt known as the '*diara*lands' which over years became inhabited by people.

The Kosi's destructive abilities were because of the enormous amounts of water, laden with silt, sand and *kankar* that it brought down from the Himalayas. The massive amounts of silt caused the river to shift its course frequently. As the Kosi waters subsided in winter, the sand would settle and raise the bed of the river, forcing it to cut a new channel almost every year. Hindu mythology attributed demonic characteristics to the river, equating it with a ten-armed monster because if the many distributaries and channels through which it drained the North Bihar plains.

Mughal rulers built low-level embankments, locally called *bandhs*, which often broke and were temporary in nature. With the construction of the railways and roads, these embankments rose in height during the British rule. One more reason was the need to formalise land revenue collection through a system called the Permanent Settlement in the *diara*lands which otherwise were an essentially shifting maze of swamps. The compelling

driving force, however, was the tendency of seeing nature in India as an 'environmental laboratory' in which to test European ideologies. Unfamiliar with the seasonal fury of tropical rivers, the colonial British engineers saw them as uncivil and aberrant, needing control. Consequently more and higher embankments were built over the years till the villages became enclosed by – almost trapped within – often a series of embankments. Another British administrator, Captain F.C. Hirst in 1908 noted that 'Each succeeding generation has been compelled to raise the height of the embankments to make them keep pace with an ever increasing flood level.' Consequently by the time of Hirst's writing, the river was 'many feet above the surrounding country' and during the monsoons, 'the pent up waters deal death' to the villagers living in this region.

The embankments were meant originally in good faith to protect the villagers from the floods, but which prepared the way for disasters. D.K. Mishra, the leader of *Barh Mukti Abhiyan* (Freedom from Floods Movement) and an authority on the Kosi, describes this as 'a protection that never was'. Post-independent India largely followed this pattern; after the last great flood of 1953, the then Prime Minister Jawaharlal Nehru decided to embank the Kosi, and by 1957 several hundred kilometres of embankments 'shadowed' the main channels of the river. From a meager 160 km, the length of the embankments jumped to over 3,000 kms in 1998. Most of these embankments left adequate space within the two major embankments supposedly to contain the excess monsoon waters brought down by the river. This had the consequence of engineering an artificial sense of security; villagers began to live well within the embankments only to be inundated by the rising waters creating a false flood disaster year after year. Moreover, the Kosi experience of embankment came to be accepted as the norm for most other rivers of the Ganga and the Brahmaputra basin without any debate whatsoever on the need of such intervention.

The construction of embankments has never been justified even by official data; the so-called flood prone area in Kosi basin rose from 2.5 million hectares in 1952 to approximately 6.9 million hectares. Clearly the embankments have worsened the flood situation in a region where regular inundation is an integral part of the hydro-ecology. Rural life has moved from the utilisation of flood waters to seeing floods (and their cause, the rivers) as 'the problem' that needs to be solved by river control to ensure the well-being of people. When I went to see the Kosi floodplains as a resource person for a group of visiting researchers sponsored by the Panos Institute of UK, I was astonished to find areas that have been under stagnating waters for months since the monsoons because the higher riverbed prevents the flood waters from returning to the channel. Older villagers complained that the floods have become unpredictable and catastrophic, and longer in duration. From a rich riparian region, North Bihar in the last sixty years has been turned into one of the poorest parts of India, a regular source of migrant labour to the farms and factories of richer regions, and the rickshaw-pullers and manual workers in metropolitan India.

The recent flood in Kosi has invariably been compared by the Indian media to the one experienced by New Orleans when, unable to withstand the onslaught of Hurricane Katrina, the Mississippi breached its embankments. It is worthwhile to remember that even in the US there was early opposition to the construction of embankments. This is exemplified in the recommendations in 1850s of the Congress commissioned engineer Charles S. Ellet that large areas of the Mississippi floodplains be used as flood storage and overflow areas. However, in 1861, the conclusion of his contemporary, Andrew A. Humphrey of the US Army Corps of Engineers was accepted, embanking the river and isolating it from its floodplain. This

measure had far-reaching influence on the thinking and practices of river management in the world since. Hurricane Katrina certainly taught a lesson there.

What lessons does the Kosi flood teach us? The recent flood shows that anthropogenic causes have heightened and aggravated the flood impacts, and that 'flood control' as seen by the state may not necessarily be the only viable response to floods. The technology of such control relies overtly on insulating floodplains from rivers by embankments and dams. The current disaster devastating the lives of so many poor people emphasises the urgent need to rethink water management strategies and policies. The future well being of millions of rural Indians is at stake because it is well-known that the official philosophy of water management in India has been keenly in favour of the construction of capital-intensive large structures such as dams and embankments on rivers. The government is currently toying with the 'Riverlink Project', based on the idea of linking all rivers through a series of canals to create a gigantic watergrid for the transfer of water from one part of the country to another. The long-term environmental impacts of such a gigantic project can only be assumed.

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