Indus floods, 2010: why did the Sindhu break its agreement? September 1, 2010

Posted by southasiamasala in : Lahiri-Dutt, Kuntala, Pakistan , trackback

Kuntala Lahiri-Dutt

Something as simple and as small as the fluttering of the wings of a butterfly might set off a tornado in another, far away, place. The 'butterfly effect' is a metaphor about 'sensitive dependence on initial conditions' and outlines how a small change in the initial condition of the system can potentially cause a chain of events leading to large-scale alterations of or major upheavals in weather events. Was it the flap of the wings of a butterfly that led to the disastrous floods of the Indus? Well, almost so.

If indeed it was an unpredictable (and small) event like the flapping of the wings of a butterfly, were the consequences preventable? What other atmospheric phenomena were connected to the floods in Pakistan? Connected with these questions is yet another point one needs to contemplate: whether it was just the one flood or a series of floods gushing down the channel of the Indus? Lastly, who was affected and with whom does the ultimate responsibility of dealing with the unprecedented scale of the rains lie?

Satellite view of the Indus River Valley - irrigated areas are green. Source: Wikipedia

A pinch of geography would introduce us into the answers more clearly and would explain why Pakistan received such an extraordinary amount of rain during this rainy season. The Indian monsoon winds can be viewed as a giant

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sea-breeze with ocean moisture sucked in by rising hot air over the South Asian plains. It is also influenced by large scale weather patterns such as the jet stream in the northern hemisphere. To put it simply, jet streams are swiftly flowing, narrow, westerly streams of air currents located high above the earth's surface - at least 7-12 kilometres above ground - near the tropopause or the transition zone between the troposphere (the lowest layer of the atmosphere where weather phenomena happens) and the stratosphere (the layer immediately above where temperatures actually increase with height). The jet stream that controls the Asian Monsoons lies approximately on the Tibetan plateau where the warm equatorial air, after rising and flowing pole-ward for about 10-15 kilometres, descends on the subtropical areas to flow back equator-ward. This jet stream wobbles north and south as it flows around the Northern Hemisphere. As it shifts, the jet stream drags the weather systems along.

This year, the meteorologists noticed a change in this normal behavior of the jet stream. In mid-July, the jet stream came to a halt as a consequence of Rossby Waves, which are powerful spinning wind currents created by the earth's rotation. Normally, these meandering waves are overpowered by the jet stream's force, but this year their strength was more than that of the jet stream. Such unusual occurrences - called 'blocking events' - had taken place in the past, and had resulted in unusual weather phenomena. This year, as the jet stream became stationary, unusually hot summers led to the breakout of wildfires in Western Russia, and unprecedented rains poured down the slopes of the Western Himalayas. Gushing quickly down the tributaries into the Indus River the rainwaters gave rise to floods of catastrophic proportions. This happened because as the jet stream became static, it froze the weather systems that sat inside the peaks and troughs of its meanders. The warm air to the south of the jet stream got sucked north into the peaks, whereas the troughs drew in dry air from the north. The blocking event coincided with the summer monsoon, which brought unusually heavy amounts of rain on the mountains that girdle the north of the country. Thus, it would seem that it is weather, certainly *not* climate change, that was initially responsible for the Indus floods; whether or not, however, this blocking event was a consequence of the long-term effects of climate change rather than simply an abnormal weather pattern is impossible to answer. Scientific knowledge about the monsoons is still full of holes; in particular our knowledge about how the jet stream, the moisture-bearing clouds and the highly erodible mountains interact remains incomplete. The intensity of the localized rainfall was fantastic - four months worth of rainfall had fallen in just a couple of days. What we do not know is the extent to which this was an unusual natural event. Some areas in Northern Pakistan received more than three times their annual rainfall in a matter of 36 hours. What we realize is that floods were inevitable.

However, it was not just the northern hemisphere subtropical jet stream that caused the enormity of the floods in the Indus valley. Rivers are essentially channels to drain out water. Being one of the largest rivers of the world, the Indus should have been able to carry out the excess waters into the Arabian Sea which it joins near Karachi. Why could the river not flush out the excess waters? This is where human intervention - in terms of water resource planning and infrastructure development - played an important role in the floods. To increase the area under irrigation, more and more waters of the Indus River have been diverted in recent decades into nearby farms. Many of these farms are owned by the richer farmers who have, with state support and over the years, built levees or embankments along the river to protect their farms from the occasional floods. Not only in Pakistan, but in all countries in South Asia the local councils and the water resource planning authorities have supported such 'straight-jacketing' of rivers. These water infrastructures hold the key to understanding the mechanics not only of the Indus floods, but the floods that frequently wash away villages and cause

devastation in the Gangetic plains. Let us probe more deeply why and how.

We tend to forget that the Himalayas is one of the youngest mountain ranges in the world and since it has undergone huge tectonic upheavals, it is extremely fragile. The Himalayan rocks are soft, highly susceptible to erosion by heavy rains. Consequently, rivers like the Indus that originate in the Himalayas bring down enormous quantities of sediments in the form of sand, silt and clay as well as water. Engineers and water planners, experts who build these infrastructures, however, plan for only water and give minimal attention to this sediment load that gets carried within the banks of the river channel. Each human interference into a natural river system has its consequence: when excessive amounts of water are drawn out of its channel, a river channel becomes less efficient and loses its ability to quickly move the water. When levees are built along the banks, the sediments get deposited on the river bed, which gradually rises above the surrounding plains. Not only does this enhance the flood risk, the levees standing as walls also make it difficult for the floodwater to return back into the channel once it has spilled over.

In the last few decades, the water and irrigation infrastructures over the Indus have increased in size and number, and have tried to contain the rainwaters from where they rush down the hill slopes to 'protect' the habitations and farming lands located on the Indus plains. Indeed over two thirds of the Indus flow is diverted for irrigation. A number of tributaries, for example, join the Indus from the west. These are fast-flowing hill torrents that bring down huge quantities of silt during the monsoons. With funding from the Asian Development Bank and the World Bank, a series of barrages have been built along the hill slopes to prevent the waters of these rivers from reaching the Indus. Many of these barrages added waters to the already inflated Indus and contributed to further worsening of the flood situation.

Besides the frozen jet stream that caused the unusual rains, it is the water infrastructure on not only the Indus River but also on its tributaries that is to blame for the scale of human impact of the floods in Pakistan. Thus, one can safely say that the floods were partly 'anthropogenic' in that they were caused by careless planning of water resources. Such water planning is based on a purely technocentric view of the world, professing an ad-hoc style of engineering that is based on imperfect knowledge and imperfect science. Such planning certainly benefits some segments of the rural communities, specifically those rich farmers who own the farming lands and who now harvest more than one crop; but when it fails, these very barrages can plunge innumerable people's lives into utter distress. The political ecology of the water infrastructure is such that those who benefit from it are usually not those who suffer from the floods; although the water resource planning is done in the name of improving the lot of the poor, it is them who suffer most when the technology fails.

A popular view circulating in the media is that the loss of lives and livelihoods was due to the encroachment of the river bed by the poor. Indeed, just like the *diara*s and the *char*lands of the Gangetic plains, a large number of indigenous communities lived in and around the Indus river bed - in the *Kachha* (or the fragile or wet land), the *Baet* (the *doab* or the mound between two permanent river branches) and the *Pakka* lands (or the firmer ground). Some of these communities are unrecognised and have no proof or identity card as legal citizens of Pakistan. Over years of living with the river, these communities had finely-tuned understanding of how the river behaves, how the floodwaters rise and fall, and which wrinkles on the land they flow through. With their lives at stake, over many generations of living and coping with the changing moods of the river, they had developed a close knowledge of the river's rise and fall and are always at high level of alertness. But, the extraordinary downpours, the sudden rise of the waters, the lack of warning

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and the unpredictable movements of rushing floodwaters through the breaches in the embankments have made all that irrelevant this year. In deep frustration, Imdad Khan, an old farmer of Baet Morjhangi, commented that, 'the Sindhu broke its old agreements with us' (as quoted by Ahsan Wagha). The catastrophic inundations, however, were not only partially caused by human folly, which was not committed by the *biraderi* (clan/community) to which Imdad belongs, but of people who had never lived in the Indus valley. These are the water engineers and development planners who based a series of structures on the Indus river system over the years, interventions that hugely exacerbated this year's flood. They enhanced the misery by creating a false sense of security amongst the rural peasants whose lives and livelihoods were washed away in the floods. In other words, the 'aftermath' of the floods, which is currently under intense discussion, could have been far less severe. Although in numbers of dead the disaster that has hit the nation is smaller than the Asian Tsunami, the scale of human suffering, particularly during the post-flood times, and the magnitude of the nearly impossible task of rebuilding innumerable livelihoods is far greater than the Tsunami. If something good can come out of the enormous human tragedy that Pakistan has been confronted with, it should be a rethinking of river development and planning, not only in Pakistan, but in the entire South Asian region.

Coming back to the questions posed early in this essay, no one could possibly predict and prevent the floods. It was by all measures an unusual natural event exacerbated by human folly in terms of water resource planning and development. One could, however, certainly ensure that the magnitude of its after-effects was within human ability to deal with. The Pakistani government is poorly equipped to deal with the human aftermath. This is where all of us as individuals can play a role. We still have the time to help the flood-affected people, and assist them to rebuild their lives.

Tags:climate change, floods, irrigation, Jet Stream, Pakistan

Comments»

1. Indus floods, 2010: why did the Sindhu break its agreement? | Climate Himalaya Initiative – September 1, 2010

[...] Source>> [...]

2. ss – September 1, 2010

well written. helps understand. thanks

3. Rohan D'Souza – September 2, 2010

Brilliant. This is the most credible explanation I have seen on the Indus 'floods'. Erudite scholarship with extraordinary prose. This is exemplary literature.

4. Rajesh – September 2, 2010

Well described. I think this article supports the importances of interdisciplinary approach in water resources planning and development. I specially request hard core water engineers and bureaucrats to go through this article.

5. A Ercelan – September 2, 2010

well put, indeed. thanks Prof Kuntala.

the tragedy is that pakistan's dependence on international donors will mean that the Indus will be chained again, for possibly worse floods and damage when the river breaks free again. Public works programs for increased employment will mean that the poor are lured into building infrastructure for their own destruction.

a couple of points bear mention. one, the agriculture drainage system has intensified damaging impacts for years to come – an example of which is manchar lake near sehwan (sindh), now flooded with chemical-laden, extremely saline wastewater. thousands of fisherfolk that live on and around the lake face displacement today with no hope of regaining livelihoods in the near future. ,

Official relief camps in urban areas ease service delivery but are also a source of grave sanitation and hence disease problems in the absence of emergency toilets, burdening the already inadequate water supply. As can be imagined, women are suffering the most.

Many of the landless evacuees are unlikely to return, unless they have credible hopes for better livelihoods. But land reform will be thwarted by donors, and pressure reduced as urban poor increase.

Near Thatta, a small town in the Indus delta, Sujawal is completely under water. Its history is insightful. Starved of water by upstream agriculture, the delta allowed Sujawal to expand recklessly. Now flood, but really natural flow is a check on such mindless urbanisation.

My work supports the Pakistan Fisherfolk Forum in Sindh. They are doing a tremendous job for rescue and relief with contributions from Trocaire & Oxfam-Novib. http://www.pff.org.pk/

We will hope for your personal support.

A Ercelan
Pakistan Labour Trust
Pakistan Institute of Labour Education & Research (piler@cyber.net.pk)

6. jim masselos – September 3, 2010

and my thanks too for an important presentation – and significant comments

7. Salam Dharejo – September 5, 2010

We should not forget the role of forest in managing the floods and embankments of indus river. Unfortunately, along the banks of Indus River forests have been erased and land is cultivated. If we really want to control the risk of future floods, we would have to protect and promote the forests.

8. Javed Iqbal Bhatti – September 5, 2010

we are working for flood victoms in Golarchi town of district Badin sindh our organization is JAAGO FOUNDATION is working with support of South Asia Partnership Pakistan SAP-PK.
http://www.jaago.weebly.com our email is infojds@yahoo.com
Javed Iqbal Bhatti

9. A Ercelan – September 7, 2010

need to read Rohan D'Souza more fully – Drowned and Dammed (Oxford) of the 'spectacular soaking of the entire (orissa) delta' could well be the equally ferocious Indus delta. Wish it could be made

required reading, alongwith Kuntala's book (Water First, Sage) for all concerned with 'taming nature,' specially for the 'development professionals' on the payroll of Washington, Manila, Tokyo, and now Beijing.

10. Nazrul Islam – September 9, 2010

Excellent brief presentation of causes of flooding in Indus in particular, and in all other places in South Asia! Exactly this argument was presented by the report of the World Commission on Dams in 2000 which was overlooked (ignored) by many governments as well as donor agencies. Again we have to wait for the recommendations of WCD + 10 conference! Recently I had a lengthy discussion with one 'Institutional Expert' on water resources development and planning who has been working in the rural areas of Bangladesh for last 30 years on the issues of 'Engineering solutions' to the water problems in Bangladesh. He told me that the ordinary people like 'Imdad Khan' understand the issue clearly than the engineers and planners of water resources. But unfortunately their suggestions and perspective are not taken into consideration when constructing embankments on the rivers. Here comes the question of 'world views' of the people in policy makers. Let's see whether 'Adaptive water management' could guide us to take prudent decisions on river basin managment nationally and regionally. Thanks Kuntala didi for this brilliant essay!

11. Deane Rimerman – September 11, 2010

How can you spend so much time writing such an in-depth article and not once consider the role that timber smugglers and the recent decades of rapid escalations of deforestation?

Seems like the only commenter who is aware of this is Salam Dharejo for which I'm grateful... As for the rest of you that have no awareness of the world's forests as a moderator of every type of extreme weather... May god have mercy on your soul....

12. Kuntala – September 12, 2010

Dear Deane,
Thank you for drawing my attention to this important aspect which I had missed. And Salam, thanks to you too for earlier mentioning this. I guess I avoided entering the 'highland-lowland' interaction debate which has now been debunked as more of a myth than reality. At least one can safely say that upland deforestation is not entirely responsible for lowland floods. Perhaps I was thinking about the flood from a political ecology perspective – and trying to point out that those who have been so terribly affected by the floods, whose livelihoods were washed away, were not the ones who benefitted from the irrigation projects. On this, I have just come across a terrific interview:
http://www.bbc.co.uk/worldservice/news/2010/08/100818_mustafa_wt_sl.shtml
It is important for us to look at rivers and their behaviour from an interdisiplinary lens. Otherwise, we will continue to receive the kind of wisdom that the World Bank offers on water management. This view is expressed in the following Press Release which, instead of introspecting on the flood & its causes, continues to give lectures abiut financial reforms and governance.
See below:
Islamabad, Thursday September 09, 2010 – Isabel Guerrero, World Bank Vice President for South Asia, today relterated the Bank's commitment to support Pakistan in recovery and reconstruction from the devastation