theirview

Floodplains and flash floods

Indian cities need much improved drainage to deal with the challenge faced by urban centres on the floodplains

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PTI

My first exposure to "the field" as a budding administrator was during a "village attachment" in central Uttar Pradesh in northern India. The year was 1983. I still remember the name of the village, Chaturabehar, in Sitapur district. Every villager we met, owner cultivator to landless labourer, had the same woeful tale of collapsed houses and submerged crops to narrate.

Floods have long been a regular feature of life on the Indo-Gangetic plains. The administrative records of British India, however, indicate that the chief threat in these parts before the advent of canal irrigation was not floods but monsoon failure. Successive failures caused famine, disease and epidemics. Excessive rainfall caused short-term havoc with positive spin-offs.

My own research on the eastern reaches of the same vast floodplain on which Chaturabehar was located is illustrative. The rains in south Bihar were excessive in 1867, about 50% above the long-term average. Both the Ganga and Sone rivers were in spate, destroying the standing *bhadoi* crop. H.W. Alexander, collector of (erstwhile) Gaya district, noted that "the lands near the river sown with this crop are always liable to be flooded and are moreover sown with the full knowledge of this risk; should they escape a flood in any year, a full harvest is reaped; should they be destroyed, the land is rendered by the flooding more rich and fertile for the ensuing *rubee* (winter) crop. No crops could look finer than do the *rubee* crops now on the very lands which a few months ago were under water... thus the gains on the *rubee* almost compensate for the loss to the *bhadoi*." The 60-day *bhadoi* was a bonus crop, grown in just 10% of the area, and when it was lost a better rice harvest ensued.

Two years later the Sone flooded again on 18 July, 1869, but receded within a few days, doing little damage to the *bhadoi* on the ground and improving "the land considerably by leaving behind it a mouldy deposit".

Medieval Europe followed an extensive protocol of cyclical fallowing, the "three-field system", under which only one-third of the cultivable area was actually available each year. The densely populated floodplains of northern India, on the other hand, were cultivated without fallowing and fertilizers year after year. Cow dung was mostly used as household fuel. Would this have been possible without these periodic mouldy river-borne deposits? The Indo-Gangetic plains are one of the most naturally fertile regions in the world, home to some of the oldest and densest human habitations.

The floods in Chaturabehar were however not caused by discharge from rivers swollen with bountiful monsoon precipitation. They were man-made. The flood waters could not recede because of water logging and seepage from the Sharda Canal which, along with the new all-weather road and rail embankments, now blocked the natural lines of drainage.

Commenting on the flood prone nature of the river Sone over a century earlier, J. McNamara, district engineer of the erstwhile Shahabad district (adjoining Gaya), felt that the construction of the East India Railway mainline had increased the frequency and intensity of floods. The track embankments tampered with the natural drainage of the country. The construction of the Shahabad canal created new obstructions. A new kind of fever which district officials called the "Shahabad Fever", soon became endemic in the area.

Something similar had happened in village Chaturabehar. British India civil servants had pointed to potential drainage problems while opposing the Sharda Canal scheme. Work on the canal began only after being shelved for half a century. Sub-soil saturation along the canal was more acute than in the western reaches of the Indo-Gangetic plain, where modern canals were first built in India. Chaturabehar was in the Awadh region, so plentifully supplied with water that the British called it the "Garden of India".

What had once been a purely temporary flooding phenomenon of several hours, with beneficial spin-offs, now became a pervasive problem of water logging, breeding despair and disease. This also discouraged the kind of risk-taking and entrepreneurship in evidence in the Green Revolution western reaches of the Indo-Gangetic plain.

It is no coincidence that the oldest and most dense civilizations were all located on alluvial flood plains in Mesopotamia (Tigris-Euphrates), Egypt (Nile), China (Yellow River) and India (Indus-Ganga-Brahmaputra). Alluvium is a natural freshwater sink. Floods are the flip side of nature's abundant bounty. Good drainage was always an issue. Before the emergence of big cities and modern development works, the flood waters were unimpeded, followed natural lines of drainage and receded seamlessly back into the river while recharging sub-surface aquifers and restoring soil fertility.

The drainage challenge in dense urban centres on the floodplains is more acute. Indian cities consequently need better drainage than their European counterparts. They need to evacuate large quantities of silt-laden flood waters, in addition to human sewage. The earliest urban centres in India, in the Indus Valley about five millennia ago, were global pioneers in constructing drainage and sewage systems. Mega European cities like Paris and London from early on built huge underground tunnels to evacuate large quantities of sewage generated by urban sprawls. Their Indian counterparts like Delhi and Kolkata do not have comparable underground sewage or drainage systems on this scale. Worse, extant water bodies and lines of drainage have been built over with concrete and asphalt. Delhi and Gurgaon now need just three hours of heavy rainfall to be flooded. The same narrative is repeated in Mumbai, Chennai and several other Indian cities.

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drawbridge

By Jayachandran