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Often Parched, India Struggles to Tap the Monsoon

By SOMINI SENGUPTA

SURAT, India — Early on a Monday morning during the August monsoon, after several days of torrential rains, the engineers in charge of a massive dam about 50 miles upstream from this diamond-polishing hub faced a harrowing crisis.

With water brimming well past the permitted levels at the 350-foot Ukai Dam, according to official records, and the skies showing no sign of relief, the engineers apparently threw open the reservoir's 21 sluice gates. Water then did what water does. It surged downriver, swallowing this city of three million people like a hungry beast. The diamond lanes of India became a warren of muck and ruin.

In less than three days, at least 120 people died. More than 4,000 animal carcasses were later hauled out of the mud. Two weeks after the floods, Surat's diamond-polishing factories were practically empty of workers, who had fled fearing disease. An industry group estimated the losses at $60 million.

Exactly what happened in Surat is still under investigation. But the deluge has drawn new attention to a puzzle that is crucial to securing India's future: how to harness and hold on to its rich but capricious rains.

The problem is a matter of bitter and enduring debate in this country — and the answer may hold a key to India's prosperity. Every year, India is crippled by floods in some areas, even as it is parched in blighted corners elsewhere.

India's average annual rainfall rate hovers at an abundant 46 inches, as much as Ireland's. Yet growing water scarcity threatens both farms and cities. With the population hitting 1.1 billion, the amount of water available to each Indian is roughly the same as the amount available to the average Sudanese, according to the Food and Agriculture Organization.

India's rains tend to come in short, furious bursts, meaning that much of that water escapes as untapped potential, washing into the sea and wreaking havoc on the fragile villages and flourishing cities that stand in its way.

India is likely to become even more vulnerable, environmentalists warn. Global climate change threatens to make weather patterns even more erratic. Steadily shrinking Himalayan glaciers will inexorably melt and rush down the flood plains.

Floods in India are already a perennial and costly affair, especially in human terms. The southwest monsoon killed 2,545 people in less than four months this year, according to the Ministry of Home Affairs.

Part of the problem lies in India's rapid and unruly development. As water demand has soared, the natural

sponges of Indian cities — lakes, ponds, marshes, mangroves — have been lost to construction. Only a handful of city and state governments have lately begun to mandate rainwater harvesting to slowly replenish groundwater.

Moreover, the country faces a water storage crunch. Traditional small-scale Indian storage systems, from temple tanks to elaborate step-wells, have fallen into disrepair. China, a country with similar development issues, manages to store five times the water that India does per person, the World Bank estimates. But the Chinese government, with scant public debate, has moved thousands of people to make way for colossal water projects.

India, too, has tried. But here, in the world's largest democracy, the big-money water solution — the big dam — has been the subject of rancorous disputes. Some projects have met resistance for decades.

Proponents say India must build many more reservoirs to meet its growing water and energy needs. India's founding prime minister, Jawaharlal Nehru, under whose watch the Ukai Dam was built, called them "modern temples" of his newly sovereign nation. India has roughly 4,300 large dams, like the one east of Surat, and an additional 475 under construction.

Critics say that big dams have already proved too costly and too destructive, submerging villages and displacing people without adequate compensation.

They also argue that dams and irrigation canals, like so much Indian infrastructure, are so poorly maintained and managed that already they cannot hold all they are supposed to. According to government estimates, silt deposits make up 10 percent of total capacity. Because of declining rains, India today fills up its reservoirs two out of every three years.

When the Tapi River burst upon Surat on Aug. 7, its swollen waters broke through an already fragile concrete embankment near Abdul Bhai Patel's apartment.

Eventually, the rising waters reduced Mr. Patel's building to a pile of rubble and brick. His wife, Zulekha, was among nearly 40 people who were killed when the building collapsed.

"I screamed," Mr. Patel recalled several days later, as he picked solemnly through the rubble in search of his passport. "No one heard me. There was water all around." The river took away his only source of income, too — the auto-rickshaw that he plied on the streets of Surat.

Downstream, at the industrial park called Hazira, one of the country's largest natural gas plants was forced to shut down. Several petrochemical plants shut down as well. The floodwaters reached as high as 18 feet at Hazira.

Government engineers who manage dams, including the Ukai, have the unenviable task of balancing the competing Indian curses of drought and deluge.

In dry years, they must take measures to store as much water as possible in the reservoir. In wet years, they must guard against drowning those who live downstream.

Whether state officials at Ukai could have taken any steps to forestall the flooding remains uncertain. The

officials plead silence, citing a judicial inquiry under way.

Their critics are not silent. They argue that it was reckless to wait so long to discharge so much water, knowing it could submerge the city in a matter of hours, and they have pounced on the drowning of Surat as a model of all that is wrong with the way India uses its reservoirs.

“I call it a management failure,” said M. D. Desai, a retired state engineer who once worked at Ukai.

The reservoir was already well over 20 percent full by the time the rains began in July, critics note. Meteorological data forecasted heavy rains in early August. And dam officials should have known that a full moon, on Aug. 9, would bring high tides and further pinch the river’s ability to drain into the sea. The Hazira industrial complex, built on the estuary, also compromises the river’s ability to drain out.

Often, the wasted water is a double hit to development: Not only does it go unused, it destroys everything in its path, setting back both industry and infrastructure. In Surat, the outpouring of the Ukai Dam snapped electricity and phone lines, and suspended train service and commerce.

The Business Standard, an English-language daily, fumed in an editorial, under the headline “Man-Made Floods,” a few days after the deluge.

“Releasing the water in a rush at the monsoon time means that the stored water has gone completely waste, as runoff,” it read. “This is criminal profligacy with a scarce and precious resource.”

Modern India, urban and rural, continues to live at the whim of the monsoon.

For two-thirds of India’s farmers, who have no access to irrigation, a good monsoon is the difference between survival and penury. For fast-growing cities like this one, the monsoon lays bare the frailties of urban infrastructure.

This year, in the perennially drought-stricken agricultural region of Vidarbha, in central India, the monsoon was first tardy and then, unexpectedly furious. Those who had low-lying lands lost their crops entirely. In the western state of Rajasthan, a fluke downpour turned desert to lake.

In the cities, troubles like those in Surat are spread all around, at accumulating costs. Last year, one day’s unusually heavy rains brought Mumbai, formerly Bombay and the country’s financial capital, to a standstill.

Trains stopped in their tracks. Cars were submerged, sometimes with people inside. Shanties were washed away. All told, 400 people died in the flooding, and then, 60 more, as cholera and dengue fever festered in its waterlogged streets.

Civic scrutiny fell on years of neglect and bad planning: the narrow storm drains bursting with the city’s waste; the slums sitting on the city’s floodplains; and the sprawling complex of financial services buildings that has eaten up mangroves.

In Surat, prosperity and population growth brought a surge of new development on the river’s edge. A city official acknowledged that expanding construction along the riverbank had made it impossible to put up flood walls in some places.

Any lessons will come too late for Tulsi Mistry, 14, and her family. Before dawn, on that fateful Monday in early August, when news of flooding first reached the Rivera Row Houses, they scrambled to higher ground.

From her perch on the roof, Tulsi watched as the river rose and devoured her city. A refrigerator and washing machine coursed down her street. A body floated in the park up the road.

Tulsi and her family ended up virtually stranded on their rooftop terrace for a week. They ate whatever was left in the pantry and shared with neighbors. They drank what was stored in the rooftop tank, forgoing a bath for seven days.