

How to clean up the Ganges?

For millennia, the Ganges River, holy to Hindus, has provided livelihoods, food, and water for Nepal, India, and Bangladesh. Last month, one of India's leading environmental activists died after a 111-day hunger strike, failing to evoke changes to save India's most revered river (known as Ganga).

After years of unrelenting abuse, Ganga is now one of the world's worst polluted rivers. India's Prime Minister Narendra Modi vowed in 2014 to clean Ganga by 2019, but despite increased funding and much lip service, the river is more polluted than before. Mr. Modi needs a new strategy.

Pressure on Ganga has been building for decades. With a tripling of human population since 1950 and rapid urbanization, 50 cities along Ganga daily release 6 billion liters of untreated sewage into the river, by far the largest source of pollution. Untreated industrial effluents compound the problem, together with run-off of chemical fertilizers and pesticides. Unfettered disposal of human and animal corpses into Ganga makes it unfit even for ritual bathing. Barrages and hydroelectric projects on the main stem of Ganga and its tributaries divert 60% of their waters, leaving little mainstream flow, which further concentrates pollutants in the river.

Earlier governments tried cleaning Ganga, investing some U.S.\$14 billion, mostly in plants that treat sewage to an acceptable level of pollutants before discharge into waterways. Mr. Modi brought a new sense of urgency to the task, allocating U.S.\$27 billion up to 2019. But money alone will not clean the river. Complex long-standing issues must be addressed, including increasing involvement of stakeholders, reducing corruption in pollution control agencies, increasing accountability and rule enforcement, and inciting behavioral change among citizens. This requires tackling three interrelated challenges, each involving different stakeholders. Municipalities must curtail discharge of untreated sewage and rapidly build sewerage infrastructures. Pollution control authorities must ensure treatment of municipal and in-

dustrial effluents to the needed standards. And water managers must enhance river flow so that secondary treated waste can be safely discharged into Ganga.

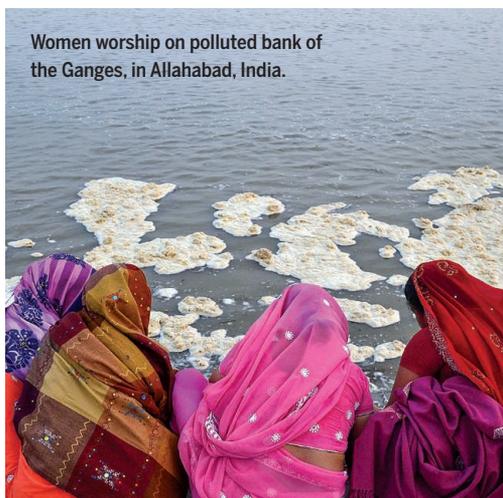
Since 1855, a profusion of barrages and dams has diverted water from Ganga and its tributaries for hydropower and canal irrigation. But over the past five decades, farmers have increasingly turned away from canal irrigation to shallow tube wells. Herein lies a big opportunity for cleaning Ganga. During the 1970s, modelers recommended cranking up the "Ganges water machine" to relieve flooding in the eastern parts of the river

basin by promoting intensive groundwater-based irrigation during winter and summer months. The strategy was to draw down basin water tables in the copious alluvial aquifers. Shallow aquifers would then absorb monsoon floods and snowmelt, and protect Bihar, North Bengal, and Bangladesh from annual floods. Monsoons would replenish aquifers that shallow tube wells could then tap into for irrigation. This concept did not catch on back then, but today, the water machine is alive and kicking thanks to easy access to credit and cheaper drilling technology. With over 6.5 million shallow tube wells in Nepal, India, and Bangladesh, the Ganga basin is one of the most densely plumbed aquifer systems in the world. More than 80% of

farmers depend on these wells. The water machine would be revved up even more but for the high cost of diesel that farmers must use to pump groundwater. But affordable electricity or solar pumps could wean farmers from canal irrigation, leaving more water to flow in Ganga and its tributaries, without adversely affecting hydropower.

The quickest, cheapest, and most effective way for Mr. Modi to show a less polluted Ganga by 2019 would be operating dams and barrages in the Ganga basin with the sole objective of augmenting river flows. This would be a start to controlling discharge of untreated sewage and industrial waste, which will take a long time.

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