Opinion

The race to dam the Himalayas

Hundreds of big projects are planned for the rivers that plunge from the roof of the world.

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ADAM DEAN FOR THE NEW YORK TIMES

Bhutan's largest river, the Dangme, winds through a valley in the eastern part of the Himalayan nation.

Along the banks of the Godavari River, near the city of Rajahmundry in the eastern India state of Andhra Pradesh, stands a museum built in the memory of Sir Arthur Thomas Cotton. As commissioner for irrigation there in the 1840s, Cotton brought water to Andhra's parched lands, turning them into India's rice bowl.

An engineer in the East India Company's army, he did this by restoring and expanding an ancient network of dams and canals along India's great southern rivers: the Kaveri, the Krishna and the Godavari. Motivated by a belief that science would pave the way for rural capitalism, he envisaged a landscape transformed.

And so it was.

But his dreams didn't stop with those projects. In the 1870s, Cotton proposed building a series of canals to connect Himalayan rivers to the southern tip of India and another to connect the Brahmaputra with the Yangtze through Assam and Yunnan. A stingy British colonial government dismissed his plans as unrealistic. Nearly 150 years later, the dream persists. It is like a ghost behind contemporary India's plan to link some of its biggest rivers, at an estimated cost of nearly $90 billion.

India is not alone in its ambitions. Hungry for energy and threatened by an acute shortage of fresh water, other Asian nations are competing to harness the power of the Himalayan rivers, on which more than half a billion people depend directly for sustenance.

More than 400 dams are under construction, or planned for the coming decades, in Bhutan, India, Nepal and Pakistan; at least 100 more have been proposed across the Chinese border in Tibet. If the plans come to fruition, this will be one of the world's most heavily dammed regions. But these projects will aggravate international tensions. They carry grave ecological risks. To understand why their backers cast caution aside, it helps to look to history.

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adequately into account in their calculations of river flow, silt loads and energy potential. Dams also threaten to intensify flooding downstream during intense downpours when reservoirs overflow.

At stake is not just the siting or approval of this or that dam — it is a whole worldview. Ramaswamy Iyer, India's water resources secretary in the 1980s, was once a big supporter of dams, but toward the end of his life he turned skeptical. The fundamental problem he identified was the persistence of a "colonial" approach to water engineering, going back to the legacy of Arthur

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When India became independent in 1947, large dams promised to even out the vagaries of a monsoon climate that provides more than two-thirds of the country's annual rainfall. These projects held out the prospect of increasing food production in a part of the world where the memory of famine still stung and where the partition of India from Pakistan left both countries feeling they had lost valuable agricultural land. For new Asian nations, these bold engineering projects symbolized their attainment of political freedom and embrace of modernity. When he surveyed the Bhakra Nangal Dam in 1956, India's first prime minister, Jawaharlal Nehru, declared that "these are the new temples of India, where I worship."

Dam building was a global obsession. In the 1950s, the World Bank began financing multipurpose water projects in the developing world that combined irrigation, power generation and flood control; by the end of the 20th century, the bank had lent billions of dollars to dam projects.

American engineers roved the world selling their hydraulic expertise. So did their Soviet counterparts, who advised the enormous program of dam construction in Mao's China. In that era, India and China sought to learn from each other. In 1954, two of India's leading engineers embarked on a two-month tour of China's water projects and found that the Chinese were working at a pace, and on a scale, that dwarfed India's ambitions.

India's dam fever reached a peak in the 1970s and '80s. Roughly half of the more than 3,500 large dams built in India from 1947 to 2000 were constructed between 1970 and 1989. The total number of large dams built in China after 1949 is estimated at more than 20,000.

But the 1970s were also when the benefits of dams began to be questioned. In a landmark 1982 report, the pioneering environmentalist Anil Agarwal and his colleagues at New Delhi's Center for Science and Environment highlighted the huge numbers of people displaced by water projects. It became a rallying cry for India's environmental movement. And despite the sums spent on large dams, they contributed ever less to India's irrigation as millions of farmers turned, instead, to exploiting groundwater through electrified pumps. This was a more readily accessible source of irrigation water at the command of individual farmers — at least those who could afford the pumps.

Estimates for the number of people displaced by dams in India since 1947 vary from 16 million to 40 million. If these projects were inspired by dreams of equality, India's large dams have instead entrenched some of the most

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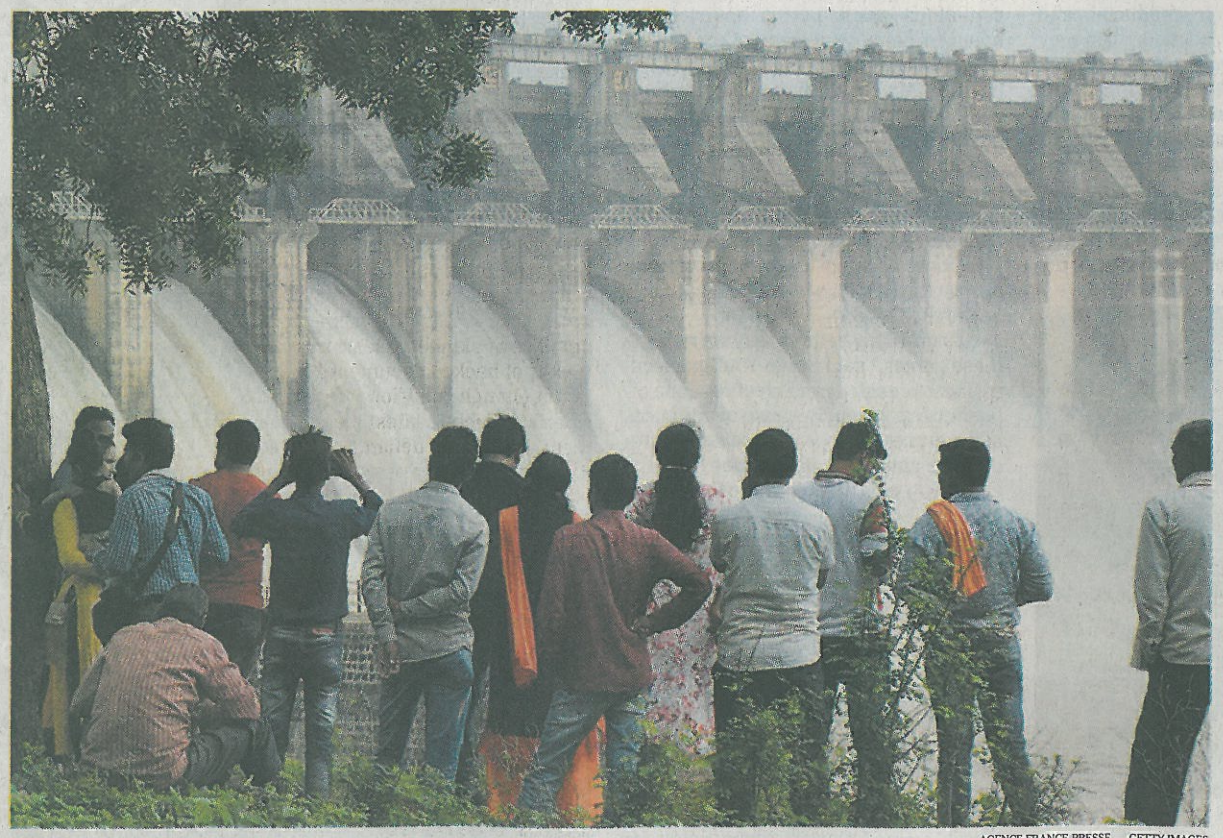
most likely to be uprooted, and least likely to be compensated for their loss of land and livelihood and the rupture of their bonds of community, are marginalized indigenous communities.

Even so, government leaders, engineers and private contractors remain wedded to the promise of large dams. The Himalayas are the next frontier. Until the 1980s, the upper reaches of the great Asian rivers appeared too remote and too expensive to engineer. New demands for water and electricity changed the calculus of costs and benefits. So did new infrastructure. From 1960 to 1980, the Himalayan nations built 6,200 miles of road in the region, making it more accessible for dam builders. The steep drops as the rivers descend from the mountains augment their hydropower potential. But the Himalayan projects are especially risky, for three reasons.

The first is geopolitical. Taken together, the Himalayan rivers flow through at least 16 countries. In the absence of coordinated planning, dam building becomes a zero-sum game in which downstream users lose out. India fears the construction of a large dam on the Chinese side of the border would affect the flow of the Brahmaputra; Bangladesh, in turn, would bear the consequences of Indian dams on the same river. The potential for conflict looms.

The second reason is ecological. The Himalayan region contains an extraordinary concentration of biodiversity. An estimated 660 square miles of forest will be submerged or damaged by the planned dam projects. The snow leopard, the brown bear, the snow trout and the golden mahseer fish are among the threatened mountain species endangered by these plans. And the third relates to natural hazards. The dam projects are at risk of collapse from earthquakes in this seismically active region and of breach from flood bursts from glacial lakes upstream.

The risks are likely to intensify with climate change as areas of the Himalayas warm faster than many other parts of the world. As the glaciers melt more quickly, the Himalayan rivers are projected initially to swell and then, by midcentury, to experience diminished flow. Ecologists and environmental campaigners charge that the new dam projects have not taken climate change



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Are there viable alternatives? On a local level, there are. The journalist Meera Subramanian has reported on the restoration of arid Rajasthan's water supply through an ecologically sensitive series of small dams. But is an agglomeration of small projects enough? Dam supporters invoke the scale of Asia's energy needs, population and threatened water shortages to argue that only colossal solutions can work. Yet in India, as elsewhere in the region, the problems of both water and power are problems of their unequal distribution as much as of aggregate availability.

There doesn't need to be a binary choice between local solutions and coordination on a larger scale, especially if that coordination reaches beyond national borders. A spirit of caution, wedded to environmental impact assessments with more teeth, better coordinated between the federal and state levels, would help to avert the most flagrant environmental risks. A more open and democratic discussion of resettlement and compensation is needed to reckon honestly with who bears the costs of these schemes. Even minimal attention to the repair and restoration of existing dams, canals, pipes and power lines will lessen the number of dams needed, because large amounts of generated power, as well as irrigation water, are lost to leakage. Better regulation of groundwater use and a concerted policy of recharging depleted aquifers will do more for water security than large reservoirs.

There are few reasons for optimism about international solutions to shared water problems in a region that is heavily militarized, and where many borders are contested. But countries in the region have much to gain in committing to transboundary water management. Support and pressure from civil society organizations can help. One area where they can be effective is in pushing for greater transparency of information in a context where data on river flow, for example, is guarded as a state secret. The Third Pole, a London- and New Delhi-based nonprofit focused on environmental threats in the Himalayas, has embarked on an ambitious project to make such data open source. These initiatives can build on foundations that already exist between scientists and activists who work across borders to address shared threats.

Faced with the prospect of catastrophic climate change, we need to better understand the benefits and dangers of 20th-century ideas about harnessing great rivers before damming even more of them.

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eastern part of the Himalayan nation.