

The Dams of the Himalayas

Strategic Challenges in a Rapidly Changing Region

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IN BRIEF

- The Environment of the Himalaya Mountains and Tibetan Plateau is changing rapidly, which will substantively impact future river flows.
- China, which controls the headwaters to all of the region's major rivers aside from the Ganges, has engaged in a 30 year boom in building dams.
- Downstream neighbors have rights to upstream water resources, but, in practice, imbalances in power mean that the stronger nation asserts its will.
- The Brahmaputra River is the only major shared river between China and India. India fears that China is seeking to slow or divert the river's flow, while China refuses to share data. Basin management of the Brahmaputra will test the China-India bilateral relationship – and give the U.S. an opportunity to offer best practices from around the world.



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Introduction

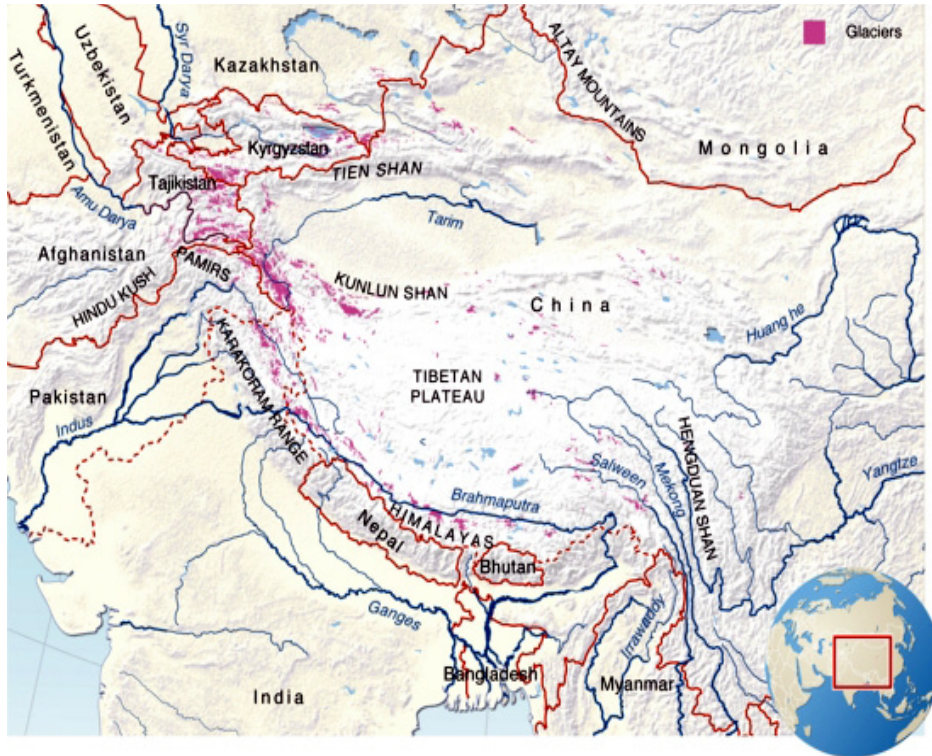
More than one in five people in the world depend on the great rivers that emanate from the Himalayas. Across Asia, from Shanghai to Hanoi, Delhi to Dhaka the rivers that start in the high Himalayas provide drinking water, agricultural irrigation, industrial use, electricity generation, and spiritual sustenance to over one billion people.

The Indus, Mekong, Salween, Yangtze, Ganges, Yellow, and Brahmaputra all begin in the Himalayas. Their waters are composed of meltwater from glaciers and snowpack and the seasonal monsoon rains.

Aside from the Ganges (which begins in India), all of these rivers begin in Chinese-controlled Tibet. The Himalayan region, along with the Arctic, is the world's fastest warming region, due to global climate change and local pollution.¹ Temperatures have warmed by 1.5 degrees Celsius since 1982, a rate more than three times as fast as the global average.² In the eastern part of the region, especially, glacier mass is falling quickly, though how quickly is uncertain.³

The effects of these changes on the rivers that emanate from the Himalayas could be drastic. Reduced flows, especially in the dry season, could reduce downstream agricultural yields, clean water availability, energy production, and industrial use. Water and energy insecurity can act as an accelerant of unrest and local conflict. How countries and societies respond to these changed flows will determine the impacts on internal security and regional stability.

One of the most common responses to uncertain river flow is to build dams. Not only do dams provide hydroelectric power, they can give a measure of certainty to river flows.



Already, China has dammed significant portions of the Mekong, Yangtze, and Yellow Rivers for electricity, flood control, and agriculture. The Three Gorges Dam on the Yangtze is only the largest and most ambitious of the extensive array of hydroelectric dams that China has built in the last two decades.

Unlike the Yangtze or Yellow Rivers, which exist solely within China's borders, damming cross-border rivers like the Mekong, Salween, or Brahmaputra creates a series of international problems for downstream

neighbors. The UN recognizes in its Convention on the Protection and Use of Transboundary Watercourses and International Lakes that there is a duty by states that share water resources to cooperate and inform each other on the uses of the water. This means that, just because China sits upstream, it does not have the right to unlimited use of the river's flow.

However, even with such international rules, international relations over water rights usually follow traditional balance of power relationships. Often called "basin hegemony," the result in most regions where states of different levels of national power share a water supply is that the larger, more powerful country dominates the use of the water.

The Himalayas: Where India and China Meet at the Roof of the World

Of the transboundary rivers that start in the Himalayas, the Brahmaputra deserves special attention because it is the only cross border river that includes substantial stretches in both India and China during its passage to the sea. It is also (for now) the longest undammed river in Asia.

India and China are the two most populous countries in the Himalayan watershed (and indeed the world). They are two of the world's fastest growing countries over the last decade, with India's GDP growth averaging about 8% per year from 2006-2011, while China's GDP growth has averaged about 11% per year over that same period. Their military and strategic power is rapidly growing as well.

The two countries' growth is placing a growing demand on their rivers. Their vast populations require water for agriculture, while their growing economies demand more electricity. Both are struggling to build enough power generation to meet ever-growing demand from businesses and to electrify rural regions. In addition, recent initiatives to reduce the growth of greenhouse gas emissions mean that there is a great pent-up demand for emissions-free hydropower. The Brahmaputra river presents the greatest untapped source of hydropower in the world.

China and India have a history of conflict over their borders. They share a 2,175 mile-long border that runs through some of the most inhospitable terrain on the planet. Along the Tibet-Arunchal Pradesh 'Line of Actual Control' – a border officially disputed by China – India and China have fought a series of border conflicts, including a short-lived war in 1962. It is notable that this is not only a 50 year-old conflict; there are ongoing disputes between China and India over this border region. In November of 2012, China issued a new passport that showed borders extending into territory that India claims as its own.

The United States is interested in the region due to the ongoing "pivot to Asia." The growing military power of China is seen as threatening by many of its neighbors, including India. The U.S. has an interest in stability in the region, and the relationship between China and India is a central part of this.

Because of this strategic backdrop, any changes to the Brahmaputra River basin could have significant impacts on the bilateral relationship of these countries and the stability of the region.

Background: the Brahmaputra – India and China’s Shared River

The Brahmaputra River, which passes through this border, is the largest and most powerful undammed river in Asia. In Tibet, it is called the Yarlung Tsangpo for its 1,100 mile stretch as the highest major river in the world, at about 13,000 feet. Before flowing into India, it reaches a stretch called the ‘Great Bend’ where the river turns south and flows through a dramatic series of rapids, canyons and cascades. Through this stretch, it falls nearly 8,200 feet, and goes through the deepest gorge in the world.

Once the river crosses the disputed border, into India’s Anrunchal Pradesh region, it rapidly falls down through the foothills until it reaches the lowlands in Assam, where it spreads into a massive river that can reach more than five miles wide during the annual monsoon rains. As it meets the border with Bangladesh, it turns south, where it merges with the Ganges before emptying into the Bay of Bengal. As it reaches the sea in the Bengal Delta, the Ganges-Brahmaputra system has the third largest discharge rate in the world, after only the Amazon and the Congo.



China’s Unclear Plans for the Brahmaputra

Although the Brahmaputra’s flow is currently unimpeded by dams, that is changing. Its large flow and long fall speaks to the untapped potential for that it presents for hydropower. For over a decade, Chinese government officials denied any intentions to build any along their stretch of the river, even as recently as an October, 2009 they assured Indian Prime Minister Singh that there were no plans to dam the river. However, in April of 2010, Chinese officials informed then Indian Foreign Minister Krishna that China had begun building a 510 Megawatt (MW) dam at Zangmu along the Yarlung Tsangpo, and that there will be a total of five along this stretch of the river, upriver from the Tsangpo Gorge. The Chinese have stressed that these dam will be ‘run of the river’ dams and will not impede the flow. A Foreign Ministry spokesman, Ma Zhaoxu, said “China is a responsible country and will not do anything to damage the interests of others.”⁴

Independent reporting is difficult to find in Chinese controlled Tibet, but some credible sources say that China has more ambitious plans than that. There is circumstantial evidence of plans for a massive hydroelectric facility on the Great Bend of the Yarlung Tsangpo near Motuo. As evidence, they point to a new 950 million yuan (\$139 million) highway being built through the surrounding mountains and plans for high-capacity power lines into the region.⁵ Preliminary studies in China’s most recent five year plan show a massive dam in this region.⁶ The Chinese hydropower industry has actively advocated for such a dam to be built.⁷

One concern is that dam building along the Brahmaputra will follow the model of what Chinese dam building is doing to the Mekong. Over the last decade, China’s ambitious building program along the Mekong River in Yunnan Province has captured the fall of that great river out of the Himalayas. When completed, a cascade of 15 dams capable of generating 25,000 MW of power all together – more than the 22,500 MW capacity of the recently completed Three Gorges Dam. Laos, Cambodia, Thailand, and Vietnam – all downstream neighbors along the Mekong have complained about lower than usual water levels during dry seasons.

China's South-North Water Diversion Project

Of even greater concern for India than simply losing unimpeded flow of the river is that China would divert the some or all of the flow from the Yarlung Tsangpo north to its drought-prone north-eastern provinces.

China's distribution of water is very unequal – so much so that Mao said in 1952 The North and North-West of China have about 380 million people, and about 50% of its arable land. However, the region has only 7% of China's surface water. In 2002, China began work on the South-North Water Diversion Project, which is bringing water from the Yangtze River north to the Yellow River and reservoirs serving northern cities like Beijing and Tianjin.⁸ Portions of the massive project have been completed, and canals are already supplying Beijing with water from the south. However, Chinese officials have long stressed that water used in this project would be diverted only from Chinese sources – no transboundary rivers would be diverted.

Nevertheless, revelations about China's plans to build any dams upstream from India's Brahmaputra brought strong denunciations, as "unacceptable" from Indian politicians and media.⁹ Some Indian media have even claimed that a dam in the Tsangpo Gorge could be used as a weapon against India in the case of a future conflict – or even that building a dam would be an act of war.

The diversion of the river would be one of the greatest feats of engineering in history. It would take place over or around the highest mountain range on earth, and it would use massive amounts of power just to pump the river up and over the mountains.



Currently, China values energy more than it values water, so a water diversion project on this scale would fail the test of economics. However, if water becomes more valuable, the cost-benefit of such a diversion plan would change.

India's Response

One result of China's activity is that it has galvanized Indian officials to move forward long-delayed plans to put in place dams along their stretch of the river in Arunachal Pradesh. They have moved forward planning and construction of two dams, about 60 km from the Chinese border that would serve as containment areas – should China cut water supplies. In addition, the dams will generate 10,000-12,000MW power.¹⁰

It is just as likely that the threat of Chinese action is being used to push forward the notoriously sclerotic planning infrastructure building process: these dams had been held-up out of concerns about submerging a village. These dam building projects are controversial, however. Local organizations and governments have protested the spate of dam building in the region.

To Avoid a Water War

It is not preordained that India and China will come into conflict over the Brahmaputra. Throughout history, there is little evidence that shared rivers cause interstate wars. The need to share a border and the water from the transboundary river usually leads to negotiations and cooperation.

The phenomenon of a “basin hegemon” ensures that, in some cases, the more powerful states exert their will over weaker neighbors, leading to an unequal sharing of water. In the case of the Brahmaputra, there are two major powers that see each other as strategic peers.

More communication is needed. Rumors and conspiracy theories from India, combined with silence and denials from China, show the need for greater dialogue between the two neighbors.

One option is for India and China to negotiate a water-sharing agreement along the Brahmaputra, similar to the Indus Water Treaty which governs the use of the Indus River and its 5 major tributaries (for which India controls the headwaters to). Such an agreement could be useful, and negotiations would be an important way to begin a deeper discussion into the disputed border in that region, and the worrying build-up of military personal and infrastructure by both sides.



Conclusion – Worthwhile Adaptation Projects, but more Communication is Needed

Major infrastructure like dams are built as if climate and river flow are constants. With the threat of climate change, it is no longer clear that this should be the case.

Environmental and strategic concerns must be taken into account should not preempt all dam building: a dam in the Tsangpo Gorge that supports a 38,000 MW dam would save about 200 million tonnes of carbon emissions by preventing the building of coal power plants.¹¹ Also, in the face of such uncertainty about future water flows, it surely does make sense to have dams act as water supplies, in order to smooth out seasonal changes.

Prudent infrastructure investments can significantly help energy production, and increase resilience to climate change. However, the extreme and unique environment at the roof of the world will present challenges to Chinese and Indian engineers. They should be careful that bilateral communication in the region expands, in order to ensure that geopolitical conflicts are not added to environmental challenges.

The United States should encourage both sides to share information. Furthermore, American scholars and engineers can share best practices in water management from around the world to help both countries make better use of their water – so that there is no demand for major projects in the high Himalayas.

Climate change is altering the environment of the Himalayas.

The glaciers will retreat, and the rivers will slow. How that impacts the security of the region will be determined by the actions of countries and societies in the river basins.

Smart infrastructure planning, open diplomacy, and foresighted adaptation measures can ensure that the region works together to meet this challenge. On the other hand, if nations only look to a narrow interpretation of their national interest, they will inevitably push towards conflict over increasingly scarce water resources.



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Endnotes

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