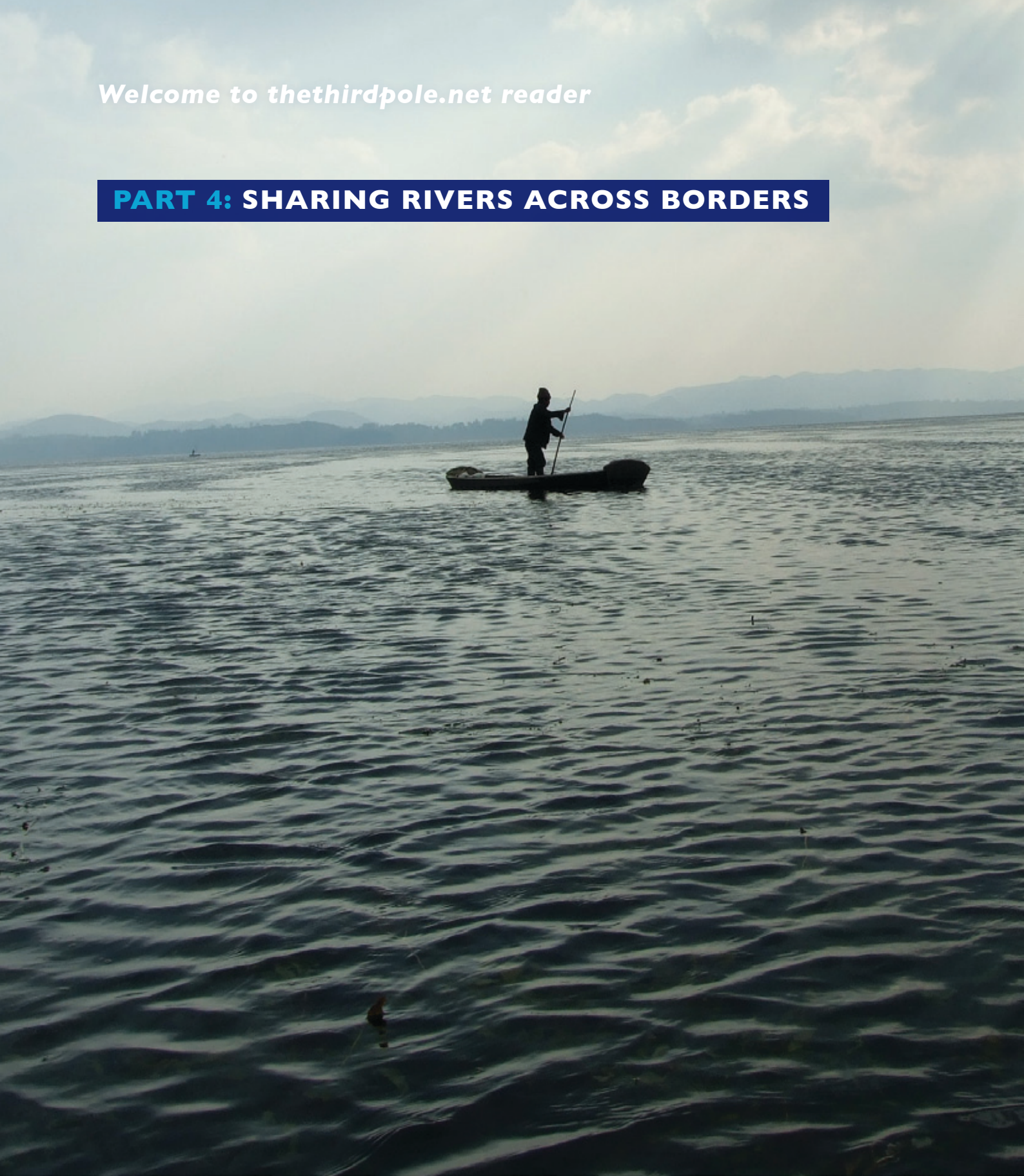


# Exploring the third pole



*Welcome to [thethirdpole.net](http://thethirdpole.net) reader*

## **PART 4: SHARING RIVERS ACROSS BORDERS**



# Exploring the third pole

## Editor's note

### ***Welcome to thethirdpole.net reader***

Since its launch in 2009, thethirdpole.net has provided a unique platform for information, reporting and discussion on the ecology, environment and climate of the Hindu Kush-Himalayas, the Qinghai-Tibet Plateau and the rivers that originate there. We aim to facilitate the free flow of accurate information and analysis and thereby support well informed policymaking in this region. Good governance is crucial to protecting ecosystems on which around 1.3 billion people depend directly or indirectly for their food, water and other vital services.

Using thethirdpole.net's unique reach across the region, we have been able to publish articles by journalists and experts from the various countries that share the benefits and risks of the world's highest mountain range and plateau, from Tibet to Bangladesh. Recognising the continued and pressing need for a regional perspective in a part of the world where access to accurate information is problematic, we are launching the first of a series of thethirdpole.net readers. These special publications will offer invaluable background material to policymakers, academics and other stakeholders.

Important articles are classified by theme and this reader is free to download. We hope that you find it useful and we encourage you to circulate the link. Please also help us to improve and develop this resource by sending your comments and feedback to [joydeep.gupta@thethirdpole.net](mailto:joydeep.gupta@thethirdpole.net) or [beth.walker@thethirdpole.net](mailto:beth.walker@thethirdpole.net).

***Isabel Hilton and thethirdpole.net editorial team***

June, 2012

# Part 4:

# Sharing rivers across borders

Historic tensions exist between neighbours who inhabit the Himalaya and share the major Asian rivers that drain it. But no regional institutions exist to deal with these tensions or facilitate water management between upper and lower riparians. And since mountains and rivers do not obey political boundaries, sustainable development in the Himalayas and all areas downstream is best promoted through a holistic river basin approach.

In this section, Isabel Hilton talks to Indian water expert BG Verghese about regional tensions and opportunity for cooperation. [thethirdpole.net](#) presents a series of articles that explore water-sharing issues in the Yarlung Zangbo-Brahmaputra and the Indus river basin. These articles aim to move beyond the half-truths, fear and suspicion that fuel the debate over south Asia's shared waters and encourage cross-boundary dialogue.

# Sharing rivers across borders

## Contents

---

5

### A mistrustful neighbourhood

Isabel Hilton (interview with BG Verghese)

8

### Nervous neighbours

Joydeep Gupta

11

### How not to discuss water with China

Rohan D'Souza

14

### Saving South Asia's water

Beth Walker

17

### Wanted: Bridges over troubled water

Joydeep Gupta

19

### Tackling old fears in Pakistan

Maaz Gardezi

## A mistrustful neighbourhood

*BG Verghese is an Indian water expert, political commentator and professor at New Delhi's Centre for Policy Research. Here, he talks to Isabel Hilton about the trans-boundary rivers of the Third Pole.*

**Isabel Hilton:** How would you assess the state of cooperation in the Himalayan watershed?

**BG Verghese:** It's very limited. There has been a lot of political mistrust; water arouses great emotion and is sometimes viewed in nationalist terms. There have been misunderstandings about the idea that countries "own" water, rather than it being a shared resource. There are different views about prior appropriation as against equitable apportionment, so problems between earlier developers and late starters are cropping up in various places.

**IH:** Could you expand on the early developer/late starter questions?

**BGV:** Take the Nile, for instance. Egypt, as a lower riparian, developed what was virtually a virgin, untapped river for its own purposes. That is prior appropriation. When other countries later wanted to develop hydropower, irrigation or flood control, Egypt said they couldn't pre-empt what Egypt had done. Pakistan has developed the Kabul River. Now Afghanistan is asking about its rights, since the river flows through Afghanistan, but Pakistan is arguing that its development can't be pre-empted.

We have similar problems on rivers in India, but the internationally accepted principle is equitable apportionment.

**IH:** What is the basis for assigning the shares?

**BGV:** There are various principles: The Helsinki Doctrine laid down certain guidelines, including the



contribution to the water flows made by various countries and populations. There is no hard water law as such, but it's a shared resource and everyone must get a fair deal. Upstream countries have no right to pollute the waters, even if they don't interfere with the flows. These problems take on different characters in different regions.

In this region, India and Pakistan have the Indus River agreement, which is not an optimal solution. With Bangladesh, India has the agreement on Ganges [water sharing] and is trying to reach understandings on the other 53 trans-boundary rivers on the principle of no harm to the lower riparian.

**IH:** But there are problems between India and Bangladesh?

**BGV:** There is political mistrust. I don't want to sound very Indian but Big Brother (India) tends to take the rap because of the psychology of small countries where there is mistrust. The classic example is the Farraka Barrage, which India built after independence to divert water into the dying Bhagirathi stream, on which the port of Calcutta stands. Bangladesh argues that the abstraction of the headwater flows by India is causing serious effects in Bangladesh – drying up of the mangroves, affecting drinking water, agriculture, salination, corrosion of industrial plant and so on.

But the reality is that there have been geomorphological changes in the river. It is moving eastwards and the delta is drying up on the western side and, as the river changes its mainstream course,

---

it deposits silt, which builds up into little silt dams. Bangladesh has the right to water but is unable to use it during the lean season because of the siltation of the Gorai Hump – a huge silt dam, about 18 feet high [5.5 metres] and 30 kilometres long. When the river starts dropping after the flood season, it cannot cross the Gorai Hump. The lean season is from January 1 to the end of May, and the historical records show that no water used to flow into the Gorai after November. So this is an old problem, but it remains an issue for a lot of people.

On the Barak River, which joins the Ganges and Brahmaputra, there's a storage project in India proposed at Tipaimukh, in Manipur, where various streams join. There's a narrow gorge and it's a good site for a dam. When the Indo-Bangladeshi treaty was signed in 1972, Bangladesh proposed that the Joint River Commission do something about the Barak flooding. After several joint surveys, India proposed Tipaimukh as a probable site [for a dam], but for various political reasons in India, the project did not move ahead.

Now it's being taken forward. It's a 1,500-megawatt installed-capacity dam with eight to nine million cubic metres of water storage, which will moderate flooding and improve navigation downriver. But now there's agitation in Bangladesh to the effect that it will leave the Meghna River high and dry and cause saline intrusion and summer flooding.

Any dam stores the peak monsoon flood and releases it year-round. It would reduce peak floods by 20% to 25%, benefitting both countries, and augment lean season flows by 30% to 40%, so in the summer there would be more water. But the issue is whipped up by the opposition parties in Bangladesh on the grounds that it is a sell-out to India.

I can understand Bangladeshi fears: about 95% of Bangladesh's waters enter the country from India, though they may originate in Bhutan or China. You could say that, for Bangladesh, India controls the

taps and can turn them off. But that is certainly not the intention.

Between Nepal and India, there are also problems of asymmetry: Nepal has no real water problem because it only has three to four million hectares [30,000 to 40,000 square kilometres] of arable land, of which the irrigable area is perhaps two million hectares [20,000 square kilometers] in the Terai, bordering India. India says that Nepal has the right to use as much water as it wants since there is a limit to how much it can use and much of it will regenerate in India, through underground flows, unless the water is polluted. For some time, however, Nepal has had the idea that it "owns" the water. One of their chief engineers wrote a book about how hydroelectric power in Nepal was really a by-product of selling water to India. But, in international law, flowing water is like the sun and the air: it belongs to everybody. You are entitled to use it, but not to pollute it. The only charge you can make is for any added value in flood prevention and drought alleviation through storage.

**IH:** Does that charge only apply to barrages, or does wetland restoration also count?

**BGV:** No, that is still a natural process. In the Columbia River for instance, in North America, the value of flood moderation is commuted, like a pension. The United States paid Canada around US\$50 million [341 million yuan] as the commuted value of flood moderation, though in today's terms that would be more like US\$500 million [3.4 billion yuan] or US\$1 billion [6.8 billion yuan].

In the pricing of hydroelectric power, if a dam is wholly in one country, the power is sold on a commercial basis. On the Mahakali, which is a boundary river between India and Nepal, the benefits of the dam are shared 50:50 between India and Nepal. If Nepal can't use its 50% share, it will flow to India. Since it is stored water, India paid a notional commuted value in a higher proportion of the capital costs of the dam.

---

**IH:** China has very large infrastructure projects and some people in India feel extremely nervous about China's intentions on the Brahmaputra. Do you share these concerns?

**BGV:** I think they are exaggerated and uninformed. First, the Brahmaputra doesn't exist north of the Himalayas. It comes into being in Assam [a northeastern state of India], where various rivers meet. The scare is that if the Chinese divert the Brahmaputra north, it will leave the Brahmaputra in south Asia high and dry. But more than 70% of the Zangbo, the main stem, is generated south of the Himalaya, so it would not greatly affect India.

Second, you can divert water, but how much? When we talk about the Tibetan plateau most people think we are talking about a billiard table, but the general topography is at 10,000 feet [around 3,000 metres] and the mountains rise to 16,000, 18,000, 20,000 feet. So you are talking about superimposing an Alpine situation onto the Tibetan plateau. If you imagine that you can pump the Rhone across the Alps into Hungary, you haven't understood geography or considered the hydrology, the cost effectiveness or the environmental impacts, which are horrendous at high altitudes. Secondly, the theory seems to be that, since the Chinese built the Grand Canal in the fifth century BC and have now built the Three Gorges dam and the Golmud-Lhasa railway, they can do anything. But if you want to transport this water uphill and down dale, you have to store a large quantum of water and be able to move it.

People say that the Chinese will use the power of the great bend of the Brahmaputra. The maximum drop would be from Tibet to India. Assuming that it could be done, you have to drop the water 2,500 feet to generate 40,000 megawatts. Then you have to lift it back again, 2,500 feet, to get it onto the Tibetan plateau, after which you have to lift it again, several times over, to get it to the Gobi Desert or Beijing. If you generate 40,000 megawatts of power then use it all to send the water back again, you are digging holes in the ground just to fill them up again.

The Chinese have said they intend to use the elevation further north, towards the head waters, where these gorges are already at 12,000 to 14,000 feet and where there is only a 500-metre hump to cross. But the further north you go, the less water there is because you are missing out on the tributary streams and the glacier melt. They are talking about linking the Yarlung-Zangbo River, the Mekong River and the upper Yangtze and moving the water north, which is a very different ballgame. They argue that this would help China to meet its needs and would provide a flood cushion for south Asia. In times of drought, as a good neighbour, they would open the gates and let the water flow. But this is not a very practical proposition either because there is less water if you go north – and if you go south, you have the energy costs.

There seems to be a debate in China about the south-north water transfer project: the water-resources ministry opposes it as utopian and cost ineffective. It is an order of magnitude and scale greater than anything that has been attempted.

In any case, let's assume some diversion on the Yarlung-Zangbo. Even if they divert up to 20%, so what? It won't affect India and south Asia. It is pointless to get everyone worked up over a non-starter. Nepal and Bangladesh are pleased about the controversy because they think that their local bully (India) is being hit by a bigger bully (China). There are uninformed people in the Indian parliament asking ignorant questions. I think it's a non-starter, bordering on nonsense, but I have no legal or moral quarrel with it. In fact, we could encourage them to get bogged down for 100 years in an unrealisable project.

*Isabel Hilton is editor of chinadialogue.*

*Image by xzly.org*

## Nervous neighbours

*Construction of a large-scale dam in Tibet is prompting familiar fears downstream on the Brahmaputra.*

*Joydeep Gupta reports on India's concerns.*



Only five rivers in the world carry more water than the Yarlung Zangbo, or Brahmaputra as it is known when it reaches India. Only one carries more silt. Rising at a height of 5,300 metres in the Kailash range of the Middle Himalayas – an area holy to both Hindus and Buddhists – the river flows east through Tibet for 1,625 kilometres before taking a horseshoe bend, changing its name and flowing as the Brahmaputra into north-eastern India.

There, for 918 kilometres, it is both a lifeline due to the water it carries and a scourge because of the floods it causes almost every year. It then takes a southward turn and flows into Bangladesh for 363 kilometres before it merges with the Ganges, together forming south Asia's largest river, the Meghna, and flowing into the Bay of Bengal. This huge river, with its 25 large tributaries in Tibet and 105 in India, drains much of the eastern Himalayas.

As the world's youngest mountain range, the Himalayas are particularly unstable – and so is the river. It has changed its course significantly at least once in the last 200 years, following a major earthquake. Smaller changes in course are common, wiping out farms and homes on one bank while depositing fertile silt on the other. Now humans are changing the course of this river: Chinese engineers have started to build the Zangmu hydroelectric power station in Lhoka prefecture, 325 kilometres from Lhasa, Tibet's capital. The development has led to serious expressions of concern, particularly in India but also in China.

Chinese plans on the Brahmaputra are nothing new. In June 1996, the Scientific American first reported China's intention to divert the river to its north-west territory, mostly covered by the Gobi desert. China's dam projects have long been a source of controversy. Critics say they cause huge environmental problems and do little to control floods, while millions of people are displaced. Earlier this year, Chinese dams were accused of channelling water away from the upper reaches of the Mekong River and contributing to the waterway's record low levels – a charge Beijing has dismissed.

The Tibet Online version of the People's Daily reported that construction of the Zangmu power station started on November 12. The appearance of the report led to immediate criticism from many experts in India and one in China. Though the Indian government has not made any official statement since building started, over the past three years it has repeatedly raised the issue with the Chinese government, expressing concern that the project could disrupt water supplies downstream in India and harm ecosystems.

Now China's foreign ministry spokesman Hong Lei has found it necessary to brief the media on the subject. "In the development of cross-border water resources, China has always had a responsible attitude and places equal emphasis on development and protection," he said, adding that China took "full consideration of the potential impact on the downstream area".



---

Chinese engineers are asking why India is so worried. Li Chaoyi, chief engineer at China Huaneng Group, the project's main contractor, told news agency Xinhua: "The river will not be stopped during construction... After the project becomes operational, the river water will flow downstream through water turbines and sluices. So the water volume downstream will not be cut."

But India is worried, particularly about one part of the Xinhua report, which said the project "can also be used for flood control and irrigation". This would require diversion and storage of water, experts have pointed out. There will be major impact downstream if any of the 79 billion cubic metres of water that flows down the Brahmaputra into India every year is diverted or reduced. "The diversified fauna and flora there have evolved over tens of millions of years and will be damaged," the Global Times quoted Wang Yongchen, the founder of Beijing-based Green Earth Volunteers, as saying.

Speaking on condition of anonymity, a senior official from India's Ministry of Water Resources said: "While power generation could either be a storage project or a run-of-the-river project, the flood control feature requires storage structures. And the irrigation feature would mean water would be diverted. These features are of concern to India."

The Zangmu scheme will be the first "mega hydroelectric power plant on the Tibetan plateau", according to the Chinese media. There will be six 85-megawatt power-generating units, the first of which is expected to start working in 2014 and to reduce the serious power shortages that now afflict Tibet. The project, which is expected to cost nearly 7.9 billion yuan (US\$1.2 billion) according to the Global Times, is a key project for Tibet in China's 11th Five-Year Plan. According to available preliminary information, the Chinese plan to have a series of five medium-sized dams along the river in this area of Tibet.

The issue has been raised in the Indian parliament more than once. On April 22, India's foreign minister SM Krishna told the upper house of parliament: "It is a fact that when I met my Chinese counterpart recently, the question of the hydel [hydroelectric] project over Brahmaputra river being built by it in Zangmu did come up. However, the Chinese foreign minister assured me that it is a small project which will not have any impact on the river's downstream flow into north-east India." Pressed further, he said: "With reference to trans-border rivers, we have an expert level mechanism to address the issue. A meeting of experts from both India and China is scheduled to take place April 26 to 29 in Delhi and the issue will be discussed in it."

The discussion evidently did not satisfy the Indian government, which appointed a group of its most senior bureaucrats – led by the cabinet secretary – to keep a watch on the project. Using data gathered by satellites, the officials alerted the Indian media about the construction in Zangmu almost as soon as it started.

One of the main reasons the Indian government is worried is that it has planned similar hydroelectric projects in its stretch of the river – plans that are under fire from environmentalists. If there is a change in the volume of water flowing into India, those plans will go awry. And the country further downstream, Bangladesh, will probably object to the Indian plans. Swelled by its tributaries while it flows through India, the Brahmaputra carries a huge 570 billion cubic metres past Guwahati, the capital of Assam province, shortly before it enters Bangladesh. It is the major source of water in northern Bangladesh, and any change in its volume is likely to affect the country adversely.

A pure run-of-the-river project may not affect the water volume, since it channels the water through the hydroelectric turbines and then releases it further down the river, but it does affect the amount of silt a river carries. Hydroelectric engineers do not want silt as it clogs up their turbines, and often find ways

---

to get rid of it before the water enters their channel. But the nutrient-rich sediment is vital for agriculture downstream, both in India and Bangladesh. The Brahmaputra has one of the largest catchment areas in the world – about 580,000 square kilometres – and most of the people within it are farmers.

The Brahmaputra leaves the Tibetan plateau in the eastern Himalayas, which is one of the richest areas in the world in terms of biodiversity. According to WWF, at least 353 new species were discovered in the eastern Himalayas between 1998 and 2008, an average of 35 new species finds every year. Located at the crossroads of two continental plates, the eastern Himalayas supports many of the threatened Bengal tigers and is the last bastion for the greater one-horned rhinoceros. But the biodiversity of the region is already under immense pressure due to deforestation, agriculture, unsustainable fuel wood collection, overgrazing by domestic livestock, illegal poaching, mining, pollution, hydropower development and poorly planned infrastructure.

The impact of these threats is exacerbated by the region's great vulnerability to climate change. There are 612 glaciers in the Brahmaputra basin. And these glaciers are receding due to global warming. Only 25% of the region's original habitats remain intact and 163 species that live in the eastern Himalayas are considered globally threatened, according to WWF. Experts say any change in the Brahmaputra's water and silt volume is likely to have a further adverse impact on this biodiversity.

Chinese officials have pointed out that the Zangmu project is similar to the Baglihar dam, built by India on the Chenab River before it flows into Pakistan. The difference is that India is bound by the Indus Water Treaty to ensure that the project does not reduce the volume of water flowing into Pakistan. India and China do not have such a treaty. Indian officials have said in the past that they have sought a similar agreement without success.

However, in 2006 the two countries agreed to establish an expert-level mechanism to discuss trans-border issues related to using the river as an economic resource and have since signed an agreement for sharing flood-related hydrological data for the Brahmaputra during monsoon season. During the period from June 1 to October 15 each year to 2012, China will provide hydrological data twice a day to India to help better manage floods. After 2012, a fresh implementation agreement will be needed.

Indian officials say their attempts to expand this cooperation beyond the peak flood season have so far not succeeded. Nervous governments and communities along the Brahmaputra will be waiting to see if their neighbourhood can find a way to work more closely together – or if the fears surrounding the Zangmu project will prove to be justified.

*Joydeep Gupta is project director (south Asia) of the third pole project.*

*Image by Boqiang Liao*

## How not to discuss water with China

*Debating the precise, quantifiable flows of the Brahmaputra will not foster regional cooperation. Water diplomats should discuss the river's environmental value instead, argues Rohan D'Souza.*



China has never been daunted by big engineering. The Great Wall, the Grand Canal and recently the Three Gorges Dam all testify to an almost habitual pursuit of projects involving enormous scale.

Small wonder that many people India see it is as inevitable that China will divert the Yarlung Zangbo for its thirst-ridden cities in the north. This idea is made even more spectacular, given that this siphoning will literally involve taking the waters in a hop-jump-skip equivalent over the upper reaches of three other mighty rivers: the Salween, the Mekong and the temperamental Yangtze.

And even when this unforgiving route is overcome, the flows of the Yarlung Zangbo that have not already evaporated will then still have to be pumped, dropped and shuffled across a whole set of connecting channels, tunnels and sprawling pipelines before finally gushing from turned taps in Beijing.

For many, understandably, this kind of engineering is between implausible and impossible. But can one confidently conclude that a desperately thirsty China is beyond such great, grand and gigantic imaginations about water?

Officially, the Chinese government intends to move 38 to 48 billion cubic metres of water annually from its southern rivers for populations in the north, through the unambiguously titled scheme, the South-North Water Transfer Project. But should these ambitious water diversions unequivocally hold for trans-boundary rivers as well?

One of China's major trans-boundary rivers is the Yarlung Zangbo, which after entering the Indian state of Arunachal Pradesh, opens up majestically within the Assam valley to become India's "moving ocean", the masculine Brahmaputra. Later on, these flows briefly meander as the Jamuna in Bangladesh before entirely folding into the Ganges River, near Goalundo Ghat.

**“** *Lazy arguments that continue to evoke nineteenth century quantitative hydrology and twentieth century large-dam monumentalism are most likely to fail.* **”**

One river stringing three nations is inescapably a natural geo-political muddle. Anyone, for example, pinching flows can send political ripples and cross-border anxieties. Added to this, the hydrological processes of this complicated fluvial regime – comprising innumerable tributaries, bifurcations and branches – remain little understood.

As yet, the vast mosaic of ecological niches and fluvial habitats of the Yarlung-Brahmaputra-Jamuna system has not been credibly studied in terms of its environmental webs and linkages. Ironically, the lack of knowledge on the river's flora, fauna and intricate ecological relationships has failed to humble those shaping a vibrant discourse over water security for the region. If anything, ignorance seems bliss in

---

this case; efforts have focused on ascertaining and intensely debating quantifiable flows.

In other words, the environmental qualities of the Yarlung-Brahmaputra-Jamuna have been conveniently ignored. Instead, it has become a river of volumes, compiled as numbers, as averages and as simple statistics.

And herein lies the Chinese water conundrum for Indian diplomacy and its non-traditional security strategists. If negotiations are reduced to ascertaining who is entitled to how much of the volume of water, the game might, in fact, be lost in a single move.

Thus far, the Indian side seems to be fashioning a two-point emphasis: constructing a dialogue for “sharing benefits” from probable hydro-electric projects on the Yarlung-Brahmaputra stretch; and developing a mutually agreeable format for exchanging hydraulic data.

The strategy, however, rests too much on hopes and expectations about reciprocal goodwill. Moreover, China’s imperatives or ability to realise kilowatts and cusecs (a measure of flow rate) do not, in any sense, provide compelling urgency for regional cooperation. Flow data, similarly, even when transparent and accessible, can only be read against the grain of several other imponderables.

And most critically, can such water arrangements, even if concluded as a treaty, be contained as a specific deal between India and China? That is, can India’s understandings with China be prevented from an interpretative spill over into existing water treaties, or significantly trouble other delicately poised discussions over trans-boundary rivers in the region? After all, India held the upper riparian position on previous major treaty negotiations: the Indus Water Treaty with Pakistan in the 1960s; and the Ganges Water Treaty with Bangladesh in the 1990s.

Upper riparians have an unstated advantage in the creation of hydraulic facts and can carry

their topographical strength into concluding any arrangement. But clearly, in the case of the Yarlung Zangbo, India is in the weaker position, and bargains with China over a likely water treaty will put Indian negotiators in a technical context that for the latter, at least, entirely lacks historical precedence.

Put differently, the Indian side will need to develop a new language game which, above all else, provides a novel architecture for discussions that are based on an entirely different set of hydraulic concepts and categories.

Interestingly, cutting such a fresh path will be a lot easier than pursuing an intense, dogged and grinding exchange over contested river flow data. Since the 1990s, a dramatic scholarly turn has occurred in several social science disciplines with the theme of water as a central narrative. A range of publications in anthropology, sociology and history, have decisively altered our understanding of river management and hydraulic control.

An issue of the journal *Nature* in 2010 highlighted the urgency for an “integrative water approach” to strike a balance between human resource use and ecosystem protection. In effect, hydraulic and riverine habitat diversity have to be sustained if human consumption requirements are to be met in the long term.

It is imperative that Indian water negotiators harness this fresh research. Lazy arguments that continue to evoke nineteenth century quantitative hydrology and twentieth century large-dam monumentalism are most likely to fail.

Indian negotiators can make a more meaningful case by discussing the strong interconnections between hydraulic diversity on the one hand and livelihoods and intricate social dependencies on the other – rather than emphasising statistical simplifications about river flows.

---

*Rohan D'Souza is assistant professor at the Centre for Studies in Science Policy, Jawaharlal Nehru University.*

*This article was first published on January 1, 2012, by Hindu Businessline. It is used here with permission.*

*Image by Rita Willaert*

## Saving south Asia's water

*Geologist, explorer and independent scientist Yang Yong tells [Beth Walker](#) what he has learned about sharing water resources from over 20 years spent rafting China's rivers.*



Yang Yong has spent over 20 years rafting on China's rivers, exploring the network that drains the Tibetan Plateau. Yang was one of first rafters to navigate the perilous upper reaches of the Yangtze and the Yarlung Zangbo to investigate the geological and hydrological conditions of the river basin. He has observed the impacts of climate change and development, and seen the snow and ice of the world's third pole disappear before his eyes. Speaking to Beth Walker on the sidelines of a third pole media workshop to discuss the impacts of climate change on the Yarlung Zangbo in Kathmandu this month, he discussed his work and the future of Asia's rivers.

**Beth Walker:** Can you explain the importance of the Yarlung Zangbo River [known as the Brahmaputra in India]?

**Yang Yong:** The Yarlung Zangbo is an important source of water for China, India and Bangladesh. The river provides important economic benefits and supports livelihoods, especially in Bangladesh where the river runs through densely populated areas. Where the river begins in Tibet, it represents the cradle of Tibetan culture. The river is sacred for local people who have built temples and carry out religious rituals along its banks. The source of the river is found on the slopes of Mount Kailas (the western section of the Himalayas), where Buddhist, Hindu and Bon gods are believed to reside.

**BW:** Why did you become interested in rivers? And why particularly the Yarlung Zangbo?

**YY:** I grew up in a small village up on the cliffs by the valley of Jinsha River (upper reaches of the Yangtze River), in Jinyang county in Sichuan, southwest China. When I was young, my mother told me not to play by the river, otherwise Shui Long Wang the river dragon that lived below would pull me into the river. Back then the river below in the deep valley remained a mystery to me. It marked the edge of my childhood world and drew me in. When I grew older I decided that I had to explore the river by rafting. At university in Chongqing [western China] I studied geology at the China Mining Industry University and this formed the foundation of my later research.

“ *In 1986, I rafted the Yangtze from source to mouth to collect hydro-geological and geological data. Fifty-five people took part in the expedition and 10 people died when our boats capsized.* ”

I began to explore all the rivers of the Tibetan Plateau in the 1980s. There had been very little research done and no data available for many parts of the rivers. In 1986, I rafted the Yangtze from source to mouth, through canyons that had never been passed through to collect hydrological and geological data, and to record information about the river valley and the landscape along it. Fifty-five people took part in the expedition and 10 people died when our boats capsized. Since then I have walked along and intensely examined the most important sections of the river.

---

I discovered there was less and less water on the upper tributaries of the Yangtze and intensifying soil erosion and geological disasters after the river and its tributaries have been developed since the 1980s. So I went in search of other water sources on the Tibetan Plateau. In 1998 I led a similar research adventure along the Yarlung Zangbo – the first descent of the river from the source to the Great Bend before the river flows into India. I wanted to understand how this river could pass through such a deep gorge, over 5,000 metres deep, the deepest gorge in the world. We travelled 1,800 metres by raft and 400 kilometres by foot over a period of over four months. Since 1998 and 2010, I have been back five times to research the river.

**BW:** What impacts of climate change have you observed over the 20 years you have carried out your research?

**YY:** Our 1998 trip along the Yarlung Zangbo took place just after major floods ravaged the Yarlung Zangbo River, the middle and lower streams of the Yangtze, the Song Hua and Nen River in northeast China. I believe these floods were a sign of climate change. I have seen an accelerated melting of glaciers on the Tibetan plateau, on average between 200 and 500 metres for the majority glaciers over 20 years.

Desertification of grassland has spread, in places across patches over 100 kilometres long and 10 kilometres wide in the upper stream of Yarlung Zangbo. In some places the different sand dunes patches have connected. This has been caused by climate change and convincingly as well by human activity. In Zhongba county in the Shigatse region of western Tibet, people have had to resettle two or three times because of the accelerating desertification process. If desertification continues, it will decrease the flow of water downstream and eventually this region could become a second Taklamakan desert. There have also been an increasing number of mudslides caused by glacier avalanches, and this increases the chance of geological disasters.

**BW:** How should the three countries through which the Yarlung Zangbo flows tackle these environmental issues?

**YY:** The three countries – China, India, and Bangladesh – should cooperate to utilise its water resources and design a comprehensive river basin plan. This must include measures to predict and control hazards, such as floods, landslides and other geological disasters, the impact of hydroelectric projects, changing river flow, and procedures to address and respect each country's water needs and rights. NGOs and media and scientists all play an important role in encouraging this collaboration.

**BW:** There has been a Chinese proposal to build the biggest dam in world at the great bend of the Yarlung Zangbo. What will the environmental impacts be?

**YY:** Since 2006, the government has planned to build nine dams in succession, with a capacity of over 40,000 megawatts at the 400-kilometre long “great bend” of the Yarlung Zangbo before the river flows into India. The basic technical idea is to divert the water directly before the bend, and the water will merge back with the mainstream afterwards. The dam will consist of nine tiers. At this point the water flow drops down a height of over 2,000 metres and therefore you don't need to build a big reservoir, or inundate a lot of land, to generate huge amounts of electricity.

Theoretically, the dam will not impact the water flow downstream. But the construction may cause environmental problems and geological risks that need more attention. The dam site lies within an immensely deep gorge that has rich biodiversity and complicated geological conditions. This makes construction and getting machinery to the site very challenging. The biggest concern is the geological risks. The project is at the convergence point of three gigantic mountain ranges and several very big rivers. Given the risk of earthquakes and mudslides, more research is needed before plans go ahead.

---

Construction of the Zangmu dam on the upper Yarlung Zangbo has already begun and is one of five relatively smaller dams planned in a much smaller gorge. But it only controls water flow of its upper stream, and this area is not so geologically sensitive.

**BW:** India and Bangladesh are very concerned that China's hydro dams and water projects will reduce downstream water flow. Are these concerns founded?

**YY:** There are two issues here. Firstly, India and Bangladesh's concerns over reduced water flow due to Chinese projects are not based on scientific evidence. The water flow of the Yarlung Zangbo at the point where the dam is under planning counts for only 50% of the total outflow of the river at the other side of the bend before the river enters India, and roughly eight times greater once it reaches the Bay of Bengal. Even if China went ahead with diversion plans on the river [the Chinese Water Ministry announced it will not in October], water flow downstream would not be affected. Myths about this have been fuelled by media hype.

Secondly, Chinese dams on the upper stream section could in fact provide benefits to Bangladesh by controlling the water flow and floods in summer if these dams store enough water. In any case, the planned dam at the Great Bend at Motuo will not happen for at least 10 years. It is still not clear how the power will be used. If it just goes to Tibet, which is not linked onto the electricity grid at present, the project will not be economically viable. More likely, electricity will be used to meet demand in south Asia. The three countries need to communicate with each other better and to collaborate particularly on issues of flood control.

**BW:** What are the biggest threats facing [dam projects] on the Yarlung Zangbo River basin?

**YY:** The biggest concern is the geological threats and impacts on biodiversity, in both China and India [where the authorities plan to build 70 large dams in an earthquake-prone region]. If an earthquake

occurs, dams will burst and cause destructive floods downstream, such as the massive flood on the Yigong River [a tributary of the Yarlung Zangbo], when a barrier lake breached, causing deaths and destruction in southern Tibet and India in 2000. There needs to more research carried out to increase the understanding of earthquake tendency as well as geological risks, stronger regulation of dam construction and trans-national coordination. All countries involved should work closely and strive to lay a good scientific foundation before any significant developments rush in.

*Beth Walker is a researcher for the third pole project.*

*Image by lacidelle*



## Wanted: bridges over troubled waters

*Getting India and Pakistan to communicate openly about river resources may seem an idealistic dream – but it's still the best bet for resolving conflict, writes Joydeep Gupta.*



**Editor's note:** *Water has always been a flash point between India and Pakistan. The two neighbours compete over use of the waters of the Indus River, the backbone of agriculture and industry in both states. As the Indian subcontinent was parted in 1947 to create the new state of Pakistan, the rivers were partitioned in 1960 through the Indus Waters Treaty (IWT). Five decades on, the radically altered landscape of Asia's water resources has put the agreement at risk.*

*Both India and Pakistan face a deepening water crisis, driven by population growth, industrial demand and gross mismanagement of water resources. Climate change has added fuel to the flames. Melting Himalayan glaciers are projected to reduce the flow of water in the Indus Basin, particularly for Pakistan, which is now calling for an urgent revision of the treaty. As national policymakers increasingly couch water resources in terms of national security, hard battle lines have been drawn.*

*In an attempt to bridge the polarised debate, third pole presents two more nuanced perspectives. Indian journalist Joydeep Gupta and Pakistani academic Maaz Gardezi each offer a tentative way forward towards a more constructive cross-boundary dialogue over water resources, one that looks beyond national security and takes a more holistic ecological perspective.*

As Pakistan went to the Court of Arbitration in The Hague once again in mid-August 2011, seeking an order for India to put on hold construction of the Kishanganga dam until the final decision of the court, the overwhelming response among Indian policymakers was: "Oh, not again."

The project on the Jhelum River, one of the main tributaries of the Indus, has been opposed by Pakistan since it got off the drawing board. But India has steadfastly maintained that the run-of-the-river project follows the 1960 Indus Waters Treaty between the two countries to the letter. Just about everybody in India feels that the treaty is the best basis for apportioning the waters of the giant Indus river basin, that India as the upper riparian country has stuck to the treaty through war and peace, and that Indians are unfairly blamed for Pakistan's water woes to cover up the inefficiency or worse of the water policymakers in Pakistan.

“ The trust deficit is so high – especially in India – that anybody advocating a dialogue would be lucky not to be dubbed a spy. ”

Given the near-unanimity of this view in India, and the near-constant rhetoric in Pakistan that "India is stealing our waters", there is very little space for any level-headed, rational and scientific conversation on the subject. The trust deficit is so high – especially in India since many of the country's terrorist attacks over the last three decades have been traced back to Pakistan – that anybody advocating a dialogue would be lucky not to be dubbed a spy. Anyway, Indian officials firmly hold, there is nothing to talk about: there is a treaty, India is sticking to it, that's the end of the matter. And if it is not, the officials in New Delhi add, both governments have a permanent

---

Indus Water Commission that is meant to sort out all issues, so why is there any need for anybody else to get involved?

Expectedly, this line of argument does not go down at all well in a water-stressed country like Pakistan, especially when the average Pakistani sees in the media that India is building structures upstream that can potentially choke off a part of the river flow. Knowing the extent to which it is under international scrutiny, India has not and is unlikely to build any structure that will reduce by even one cubic metre the volume of water it is supposed to supply to Pakistan under the treaty. But thanks to the trust deficit, few Pakistanis feel reassured.

Recent projects like the Kishanganga dam have no doubt added to the worry in Pakistan, though Indians are going blue in the face assuring the Pakistanis that the hydroelectricity project will not hold back any water at all, and that the project is being carried out as per the 1960 treaty. Indian planners point out that they cannot really go further and scrap the projects altogether – the parts of Indian-administered Kashmir through which the Indus and its western tributaries flow are chronically starved of electricity, and there are few economically viable options to meet the need other than hydropower.

It looks to be a situation where only open dialogue between India and Pakistan at every level – government, media, civil society – can clear the air. The chances of such a dialogue do not seem high at the moment, but it is nonetheless vital to keep striving for this. It is vital not only to build trust, but also because now there are two factors in the water-sharing puzzle that were not taken into account by the Indus Waters Treaty: deforestation and climate change.

The Indus and its main tributaries rise in the Tibet Autonomous Region (TAR) of China, and flow through India on their way to Pakistan and then the Arabian Sea. When the Indus Waters Treaty was signed in 1960, the volume of water was apportioned between

India and Pakistan on the basis of the assumption that the flow of the water in the rivers would remain constant. This assumption is now in question due to these two factors.

While there are few official reports about the extent of deforestation in western TAR through which these rivers flow, there is plenty of anecdotal evidence that the already-sparse tree cover of the Tibetan Plateau is being rapidly denuded. Indian hydrologists have reported an increase in the silt load in the rivers as a result. They are expecting an effect on the water flow, but are uncertain of what the effect would be. The same goes for the effects of climate change. While some of the large glaciers of the Karakoram Range that feed these rivers are expanding, most of the glaciers in the western Himalayas – including the Karakoram Range – are receding due to global warming. The net effect on water flow is unpredictable, but likely to be negative, the hydrologists say.

So there is a treaty that apportions a certain amount of water between India and Pakistan. What happens to the treaty if that amount is no longer certain? How will the two countries amend the treaty – for which it does have a provision – for a fair water-sharing arrangement in the future? It requires a cool-headed, civilised dialogue to even start to answer this question. Then it requires a lot of scientific research in both countries to reduce uncertainties in the water flow projections. And it definitely requires close cooperation from the authorities in China, where the rivers originate.

Anybody advocating these steps would be considered dangerously naïve by most people in India and Pakistan today. But not to take these steps may prove even more naïve in the long run.

*Joydeep Gupta is project director (south Asia) of the third pole project.*

*Image by International Rivers*

## Tackling old fears in Pakistan

*The 50-year-old treaty governing water-sharing in the Indus basin has failed to fix the culture of recrimination. It's time for broader collaboration, says [Maaz Gardezi](#), from Pakistan.*



A typical Pakistani newspaper article on the Indus Waters Treaty begins by explaining the essential elements of the 1960 agreement with India – allocation of western rivers to Pakistan and the eastern rivers to India, restrictions on building water storage infrastructure, and the underlying dispute resolution mechanism – before citing a few examples of finger-pointing across the border, and concluding in the classically paranoid tones of a lower riparian.

Cases such as the Baglihar Dam, the Kishenganga Dam and the Wullar Barrage, where Pakistan claims violations of the Indus treaty terms, are brought up time and time again, and their outcomes are monotonous: the two nations are unable to reach an agreement, and the case is taken to a neutral expert for mediation, or to the International Court of Arbitration. Although these issues may be important for Pakistan's sustainability, it seems the resulting discourse has left little, if any, space for cooperation.

The Indus Basin was developed by the British to function as a single system; but the enormous water works built to control and to use the river's water for certain limited ends, has since been split in two. The boundary that now separates Pakistan and India – the Radcliffe Line – was crudely drawn up in 1947 to divide an area shared by competing nation states. It was not chosen with the impacts it would have on the river basin in mind.

For 13 years after the division, the two countries maintained the system. This was a period of inefficient water management, continued hostilities and a wider

anticipation of a final settlement. The Radcliffe Line, that not only divided the land but also the water of Punjab, received condemnation from both countries. Finally, in 1960, the two nations signed a water treaty under the auspices of the World Bank.

“ *The treaty promotes a passive aggressive stance between the two nations, which is precisely what the establishment requires to maintain its status quo.* ”

Some might argue that the Indus Waters Treaty has performed very well for the past 50 years. After all, it has survived three wars. But there is an underlying reason why this treaty has been so popular on both sides: it promotes a passive aggressive stance between the two nations, which is precisely what the establishment requires to maintain its status quo. It creates fear among the Pakistani population, based on the idea that India is “stealing our water”. The rhetoric becomes uncontrollable when it gets into the hands of non-state actors, right-wing religious hardliners whose purpose is to depict an India driven by cruel intentions.

When it comes to managing trans-boundary waters, change is the only constant. Change management requires a shift in the paradigm: the way we understand the river basin, its people and their livelihoods. Water is a finite, freely flowing resource that should not be divided by geopolitical boundaries.

---

Environmental and ecological concerns are extremely important. A regional approach is required to maintain the prosperity and dominance of the mighty Indus.

Article seven of the Indus Waters Treaty mentions “future cooperation”, which points to future efforts to jointly optimise the potential of the Indus River system. But very little attention has been paid to cooperative projects: the joint observation of discharge which enables correct measurement of water entering into Pakistan along with the environmental flows and earthquake risks; and the potential of joint engineering works to augment storage, produce power and better moderate floods.

Certainly, a trust deficit exists between the two countries. Experts suggest that advance information to the lower riparian – Pakistan – about planned interventions such as dams and barrages, and when reservoirs will be filled, can bridge these issues. However, this seems hopelessly unlikely given cases such as Wullar Barrage, a stalemate case, which has been in its negotiation stage for 26 years.

We cannot depend on a few state-actors to determine the fate of relations between the two countries, and instead should work towards a more informal diplomacy that involves non-officials in transboundary water management. By bringing together state and non-state actors, such diplomacy also provides a way for poor and marginalised communities to voice their concerns, which should be reflected in national and sub-national decisions on water management projects in the region.

One area where collaborative work should be urgently undertaken is on ground-water aquifers, especially near the border areas of Pakistan and India. The Indus Waters Treaty only considers sharing of surface water discharge from the rivers and overlooks groundwater abstraction. A study conducted by the International Union for Conservation of Nature (IUCN), using analysis from NASA’s Gravity Recovery and Climate Experiment, found that the aquifers of

Pakistan will be affected by the disproportionate abstraction of groundwater in India. It concludes that “the issue of transboundary groundwater with India has to be addressed and an addendum has to be negotiated between basin states for inclusion in the Indus Waters Treaty.”

The 1994 Jordan-Israel Treaty can help us learn manageable ways of dealing with both ground and surface transboundary water. Moreover, there are global laws governing transboundary aquifers, such as Article 42 of International Water Law. Any effective water-sharing agreement must be extended to include groundwater.

First it was the territorial dispute over Kashmir, now it is water: tension in this part of the world is nothing new. The difference between these conflicts is that the latter is an existential issue. Pakistan has survived without Kashmir for 60 years; it will not survive without water for even 60 days. Bringing water to the forefront of Indo-Pakistani relations could have a devastating effect on regional security and prosperity.

It is pertinent to Pakistan’s growth that we form our water policy based on a holistic approach. We need to work closely with our neighbours in order to share this resource, rather than divide it. I find it necessary to cite the views of Indian water policy expert Ramaswamy Iyer, who has called for a new approach to national water policy: “The best way of avoiding conflicts is for the upper riparian (India) to adopt a cautious and minimalist approach to such interventions; undertake them where absolutely necessary with due regard to the interests of the lower riparians (Pakistan); provide advance information to the latter about plans for intervention; consult them at all stages on possible impacts; and take care to avoid significant harm or injury to them.”

Other Indian policymakers are also becoming more sensitive to the anxieties of Pakistan. In order to improve water cooperation, concerns of the

---

downstream country need to be addressed through initiatives that build trust and share knowledge across borders.

*Maaz Gardezi is a research associate at Lahore University of Management Sciences' Development Policy Research Centre.*

*Image by International Rivers*