

Chatham House Report

Gareth Price et al.

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# Attitudes to Water in South Asia



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The Royal Institute of  
International Affairs

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June 2014

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# Acronyms and Abbreviations

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## Afghanistan

|       |  |
|-------|--|
| CDC   | Community Development Council                |
| NEPA  | National Environmental Protection Agency     |
| NPP   | National Priority Programme                  |
| NSP   | National Solidarity Programme                |
| SCWAM | Supreme Council for Water Affairs Management |
| WASH  | Water, sanitation and hygiene                |

## Bangladesh

|         |  |
|---------|--|
| BIWTA   | Bangladesh Inland Water Transport Authority                  |
| BUET    | Bangladesh University of Engineering and Technology          |
| BWDB    | Bangladesh Water Development Board                           |
| CEGIS   | Center for Environmental and Geographic Information Services |
| (D)WASA | Dhaka Water Supply and Sewerage Authority                    |
| E-flow  | environmental flow   |
| GBM     | Ganges-Brahmaputra-Meghna                                    |
| IUCN    | International Union for Conservation of Nature               |
| IWFM    | Institute of Water and Flood Management                      |
| JRC     | Joint Rivers Commission                                      |
| NRLP    | [India's] National River Linking Project                     |
| NWMP    | National Water Management Plan                               |
| NWP     | National Water Policy  |

## India

|      |                                |
|------|--------------------------------|
| IWT  | Indus Waters Treaty            |
| NRLP | National River Linking Project |

## Nepal

|       |   |
|-------|---|
| DWIDP | Department of Water Induced Disaster Prevention |
| LDC   | Least developed country                         |
| MoWR  | Ministry of Water Resources                     |

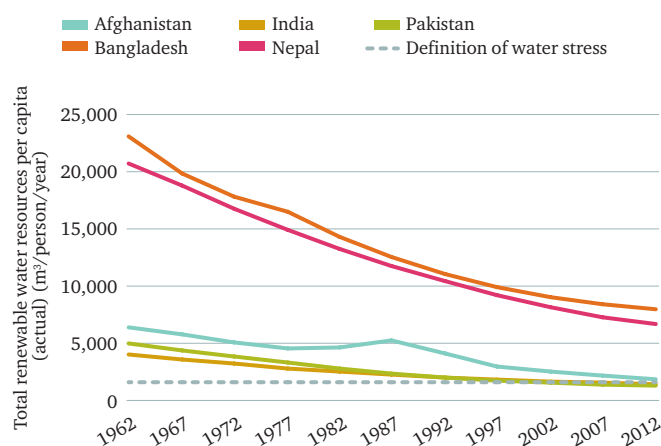
## Pakistan

|       |  |
|-------|--|
| DDMA  | District Disaster Management Authority |
| IRSA  | Indus River System Authority           |
| IWT   | Indus Waters Treaty                    |
| KWSB  | Karachi Water and Sewerage Board       |
| NDMA  | National Disaster Management Authority |
| WAPDA | Water and Power Development Authority  |
| WASA  | Water and Sanitation Agency            |

# Executive Summary and Recommendations

Discussion about water in South Asia – in particular the shared rivers of the region – is vociferous, antagonistic and increasingly associated with national security. Renewable water resources in the region have fallen dramatically on a per capita basis since the 1960s. India hit the ‘water stress’ mark around a decade ago, Pakistan slightly earlier. Groundwater is fast depleting in India, Pakistan and Bangladesh, and there are few feasible options for increasing supply. Management and governance of water have not adapted to the escalating pressures of demography. With the population of South Asia projected to rise by 32 per cent in three decades – from 1.68 billion in 2010 to 2.22 billion in 2040 – the outlook under current trends is for greater competition over water between agriculture, urban centres and industry, and between countries which share rivers.

**Figure A: Falling per capita water availability**



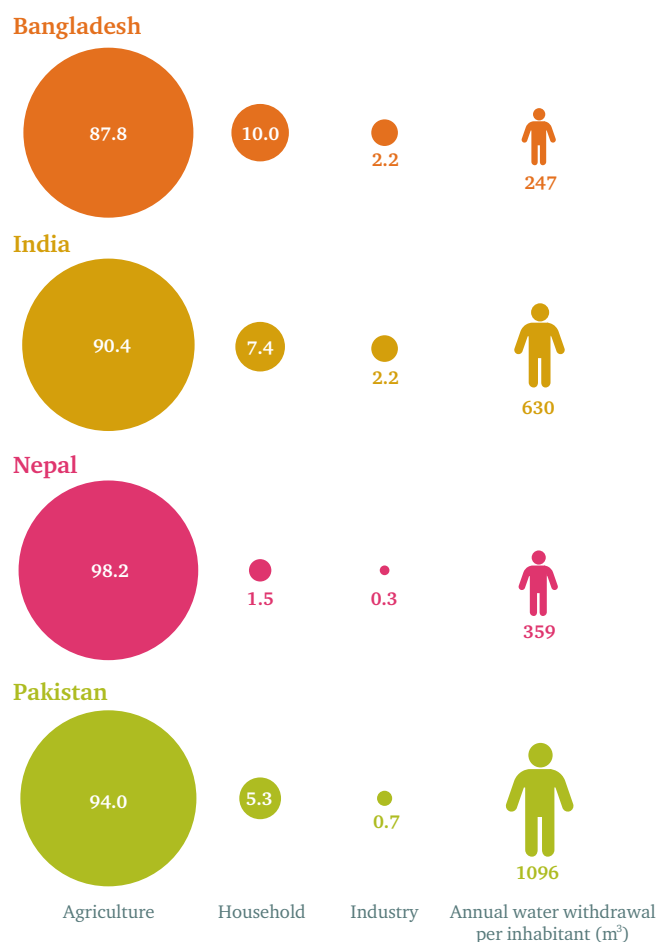
Source FAO, Aquastat.

This report explores attitudes in five South Asian countries: Afghanistan, Bangladesh, India, Nepal and Pakistan. It lays out the evidence based on almost 500 interviews conducted in 2013 as part of a Chatham House project by five local institutes with a range of water experts, policy-makers and decision-makers from NGOs and the private sector. It focuses on two river systems: the Ganges-Brahmaputra-Meghna and the Indus-Kabul basins. All the countries face similar challenges relating to these rivers. For instance, both basins are reliant on the summer monsoon as well as some upstream mountain snowmelt, leading to concerns about seasonal supply, flooding and water storage.

However, different narratives prevail across the region. With around 90 per cent of water used in agriculture, the relationship between food and water is seen as paramount in all countries. The linkages between water, energy and food are most clearly identified in India, where the provision of subsidized or free electricity to farmers to pump

groundwater for irrigation is seen as unsustainable. In Nepal and Pakistan, the relationship between water and energy is seen through the prism of unfulfilled hydro-power potential, while in Bangladesh the focus is on infrastructure in India – the Farraka barrage in particular – and the consequent reduction in water flows to its downstream neighbour.

**Figure B: Water usage by sector (%)**



Source: UN Food and Agriculture Organization (FAO), Aquastat.

Note: Figures for consumption data vary widely. Data on extraction from groundwater are scant. The comparative figures for Bangladesh, India, Nepal and Pakistan are sourced from the FAO for 2008. According to the Indian Ministry of Water Resources, agriculture accounts for roughly 80% of overall water consumption with domestic consumption using 13% and industry just 7%. The FAO does not publish comparative figures for Afghanistan, but its figures for 1998 suggest that more than 98% of water is used in agriculture.

The balance of blame between local mismanagement and the actions of upstream or downstream riparians in affecting access to water varies between countries. In two upstream riparians – Afghanistan and Nepal – there is a widespread view that downstream riparians undermine their ability to store water.

Water has differing impacts on regional relations. Between India and Pakistan, and Pakistan and Afghanistan, water



disputes exacerbate already strained bilateral relations. For Bangladesh and Nepal, Indian approaches to water are a primary source of distrust. Conspiracy theories and blame are prevalent throughout South Asia – Afghanistan blames Pakistan and Iran for its water problems, while Nepal, Bangladesh and Pakistan blame India. Within India and Pakistan, water shortages are also blamed on the actions taken by upstream provinces or federal states. This culture of blame reflects the absence of trust that plagues interregional relationships and makes river-sharing arrangements particularly difficult to negotiate.

In spite of the shared river systems and interdependencies, South Asian governments have signed few bilateral water agreements and no regional ones. Those transboundary water treaties that do exist face criticism on a number of grounds: for time periods too short or too long; for the absence of dispute resolution mechanisms; and for their lack of provision for environmental factors or new challenges such as climate change.

Of the agreements currently in place, aside from the Ganges Treaty between India and Bangladesh and the Mahakali Treaty between India and Nepal, the rest were signed in the 1950s and 1960s before terms such as water stress had been formally coined. The Indus Water Treaty, for example, took seven years of negotiations and was signed in 1960 when the population of India and Pakistan combined was just a third of today’s 1.4 billion. Despite these criticisms, respondents generally rate existing water treaties between countries more positively than their respective overarching bilateral relationships, suggesting that even a sub-optimal treaty is better than none.

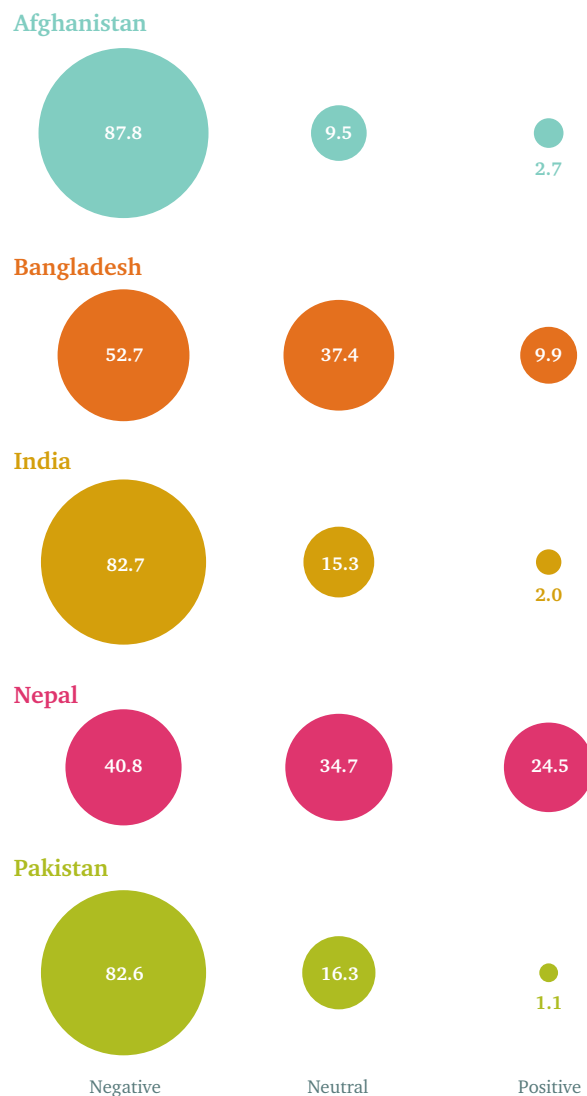
Part of the problem is the zero-sum way in which water relations are viewed throughout the region. Agreements imply the division of a volume of water between two countries or the provision of a minimum flow at certain times of year. This, in turn, implies that one party will be worse off than in a pre-agreement status quo. Water is highly politicized in the region, with strong links to food security and the livelihoods of the large proportion of the populations dependent on agriculture. This plays out through the various systems of democracy across South Asia, meaning that transboundary water issues are increasingly dealt with in the domain of national security.

There is little perception of water as a ‘shared challenge’. Rather, sentiments towards other riparians are coloured by nationalist standpoints, focusing on past injustice or perceived hostile intentions. These factors mean that negotiations as they are currently configured stand little chance of success, enhancing distrust if they fail.

The Indus Waters Treaty is generally seen as one of the most positive aspects of the relationship between India and

Pakistan, garnering support for its proven ability to resolve disputes and for its 50-year survival through political tension and war. Suggestions for its improvement chime with wider recommendations for future agreements in the region. They include revision to take into account new challenges such as the impact of climate change as well as falling groundwater levels, and to provide for engagement with stakeholders such as the river communities themselves.

Figure C: How do you rate the current water management? (%)



Although most South Asians continue to live in rural areas, urbanization is an emerging cross-regional challenge. The urban population of South Asia is expected to double over the next two decades. The existing focus on water as a source of irrigation means that water management systems

are ill-placed to adapt to the changing demand patterns. The share of water consumption will shift to cities in the coming decades, sharpening the imperative of improving already inadequate urban water management.

This is not a simple story of upstream riparian hegemony versus downstream complainants. Even the most water-secure country, Nepal, suffers severe water shortages during the dry season owing to insufficient storage capacity, resulting in most water flowing to downstream countries. Midstream Afghanistan suffers from the same problem, which is blamed on conflict and deforestation. Downstream Bangladesh has more available water per person than India, Pakistan or Afghanistan but cannot store and redistribute its flood rains.

Across the region, there was near unanimous agreement among those interviewed that the current state of water management is poor. This is a serious threat because of rising demand (from both population growth and socio-economic changes) and creeping supply-side infrastructure and quality degradation as a result of pollution, under-investment and the unpredictable effects of climate change.

Price reform or privatization of water supplies elicited mixed responses. Throughout the region, the notion of water as a scarce resource – and therefore one whose use should be priced or regulated – is continually challenged by notions that water is a ‘human right’ or an infinite gift from God. Scaling up awareness campaigns on water usage has proved difficult across the region and in all sectors. Many civil society respondents felt that water should be conceived as a ‘common resource’ rather than as a commodity or economic good. In India, there is a widespread sense that the ‘Western model’ of water provision has failed, and support for greater community self-reliance. Nevertheless, private-sector delivery was widely welcomed, especially in India, as long as it worked – although some considered the idea that water could be supplied 24/7 as far-fetched.

Domestic water-sharing remains contentious, particularly in India and Pakistan where there are long-standing internal disputes between states and provinces. And if domestic allocations and management are so difficult, how can countries expect to resolve disputes with their neighbours? In Afghanistan, for example, many respondents questioned whether the government should be entering into negotiations on transboundary water before it has met its own water needs.

Numerous interlocutors across the region criticized their country’s lack of domestic ‘vision’ for water. The approaches of different ministries frequently conflict – for instance, while water ministries may devise good water conservation policies, other ministries may have contradictory priorities for water use and incentives that exacerbate inefficiency.

Crucially, while existing water policies are often considered good, implementation is seen as poor. These problems have been complicated by a decentralization of power. The power of regional parties has increased in India since independence, and in Pakistan too power has shifted towards the provinces. Nepal is also discussing implementing a federal system.

This lack of vision and coordination affects transboundary water relations. For example, the state government of West Bengal was able to scupper an agreement between India and Bangladesh over the Teesta river. Moreover, in the absence of any sense of how countries aim to utilize their water, international negotiations are framed in abstract terms without a sense of why each country requires a particular volume of water.

Data challenges affect domestic water management and exacerbate transboundary water concerns. Across South Asia, concerns were expressed about poor-quality, unreliable data and declining standards of data collection. Data are often not shared between ministries, while government officials are often unaware of those collected by non-government sources. Accuracy of data, and the extent to which they are usefully interpreted and disseminated, are frequently questioned. For example, India’s classification of a range of data as secret – notably information pertaining to rivers that flow into downstream neighbours – does little to build trust. Rather, it allows critics, particularly in Pakistan, to apportion blame to the Indian government for shortages or floods downstream.

If South Asia’s worsening water conditions are to be addressed through cooperation rather than competition, its countries will need to adopt a new approach. The outlook on current trends suggests that local grievances over water availability and quality will spread and intensify. Unless water governance is improved with far greater coordination of relevant policies in agriculture, energy and environment, localized conflicts over water usage are as likely as transboundary disputes to undermine stability.

Since the interviews were conducted, India has elected its first majority government for 30 years. The difficulty of decision-making within coalition governments was identified as an important impediment both to better local management and to transboundary water relations. In India this impediment has now been removed, presenting a window of opportunity for a new approach.

For some bilateral relationships, cooperation on water could become a source of mutual benefit and improved security. There are numerous examples of cooperation between upstream and downstream communities to create win-win solutions. In South Asia, one clear example – although not without criticism – is the arrangement

between Bhutan and India whereby India pays for hydroelectricity generated in Bhutan.

Domestic water management and transboundary water relations are inseparable parts of the same problem. In this respect, the evidence from interviews presents several potential possibilities for changing the transboundary water narrative.

Data improvement, comprehensibility and dissemination are one vital supportive endeavour. The research and interviews indicated that greater awareness within and between countries of available information would serve to ease transboundary water tensions and could facilitate improved domestic water management.

There is strong regional support for learning from best practice and for improvement and development of rainwater harvesting in both rural and urban areas. The desire for greater community participation is widespread, particularly in relation to micro-conservation techniques.

The concept of local watershed or basin-wide management, linked to issues such as conservation and environmental protection, also provides scope for cross-regional dialogue and knowledge-sharing.

In addition, cases of successful domestic water management reviewed in the report indicate that the most effective collaborative approaches focus on water usage rather than simply water supply. What are the energy service, food production, health, livelihood and socio-cultural needs and development expectations involving water in each area or country? What changes are desired or anticipated over the next 30 years that could impact on water? This thinking at the domestic level could help transform a stagnant dialogue framed in terms of insurmountable conflicts of interest into regional dialogue and cooperation initiatives based around shared challenges or even shared threats.

## Recommendations

### 1. Improve domestic water management.

- Poor access to water within countries raises regional tensions. Improving water management is imperative both in itself and as a means of easing these tensions.
- Enhance coordination between relevant ministries connected to water, such as those for agriculture or mining, and ensure that policy on water is coordinated with agriculture and energy policies.
- Create domestic 'visions' for water usage to enable transboundary negotiations to be driven by demand as well as supply.

- Enhance understanding of the nexus between food, energy and water to enable pricing of electricity, and ideally water, to better reflect social and environmental costs.
- Disseminate examples of best practice to facilitate broader understanding of what can be achieved and, importantly, *how* it was achieved.
- Shift management of water at the local level to the communities themselves. Current top-down approaches frequently fail to meet communities' actual needs. This approach would enable a more holistic understanding of cross-regional commonalities, encouraging a focus on sustainability, as well as shared cultural and social approaches towards water.
- Ensure that water-related policy documents, examples of best practice and so forth, are translated into local languages.

### 2. Enhance data collection and expand data-sharing.

- Establish nationally accepted standards of data measurement and, in time, regionally accepted standards.
- Improve the availability of consumption data to help guide policy-making.
- Enhance data-sharing, in particular in relation to floods and droughts. Streamline processes by which flood and drought data are cascaded to relevant local agencies.
- Publicize existing data-sharing agreements.

### 3. Ease demand for water.

- Incentivize the cultivation of less water-intensive crops.
- Encourage less water-intensive methods of irrigation through pricing and/or through the promotion of cost-efficient technologies.

### 4. Boost supply of water.

- Where appropriate, focus on local rainwater-harvesting projects.

### 5. Connect cross-country discussions about water to the uses of water, rather than to its abstract supply.

- To build understanding of shared challenges, as well as opportunities, connect debates about water to issues such as climate change; disasters (and disaster warning and preparedness); energy; environment and ecology; fisheries; food, agriculture and livelihoods; groundwater management; health,

- sanitation and water-borne diseases; navigation; tourism; urbanization.
- Enhance and expand existing cross-regional dialogues both on local approaches (such as watershed management) and on macro-level basin-wide management.
  - Expand dialogues beyond technical experts. At present technical dialogues fail to garner political buy-in. Media, civil society, government and politicians need to be engaged in water challenges.
6. Revisit existing treaties and agreements or focus parallel discussions on emerging issues.
    - Ensure treaties address technological advances, environmental factors and climate change.
    - Ensure new treaties have built-in third party or mutually agreed arbitration clauses.
  7. Enhance engagement between decision-makers at state/provincial level in India and Pakistan with their counterparts in neighbouring riparian states.
  8. Build the capacity of water policy-makers and international negotiators in Afghanistan, Nepal and, to a lesser extent, Bangladesh, and at state/provincial level in India and Pakistan.



# 1. Introduction

---

Discussion about water in South Asia – in particular the shared rivers of the region – is increasingly vociferous and antagonistic. Tension over access to water within and between countries in the region is growing as water scarcity increases, and the discourse is increasingly securitized. However, it is also fragmented and incoherent, varying within and between countries. There is little sense that challenges are shared. The zero-sum framework through which they are approached promotes division rather than cooperation.

In some bilateral relationships tension over water exacerbates existing tension. In others, water is one of the leading causes of tension. This situation seems set to worsen. Continued population growth will reduce per capita water availability – both India and Pakistan are already defined as ‘water-stressed’ – and changing precipitation patterns provide a foretaste of the possible impact of climate change.

Out of almost 500 interviews conducted in Afghanistan, Bangladesh, India, Nepal and Pakistan as part of the survey on which this report is based (see Appendix 1 for methodology), it would be difficult to find one in which views about water, and particularly domestic water management, were upbeat. Across the region, there is near unanimous agreement that the current state of water management is poor. This is considered a serious threat because of rising demand (resulting both from population growth and social and economic changes) and supply-side challenges, stemming from issues such as pollution, under-investment and potential future threats from climate change.

Transboundary water relations (i.e. those referring to international borders rather than state/provincial boundaries) are also viewed in negative terms. While there are variations in perception between countries, the challenges of domestic water management often provide the context for transboundary water issues. If domestic water management is so difficult, how can countries expect to resolve international water disputes? This sense is heightened in India and Pakistan by their failure to resolve long-standing internal disputes between states or provinces.

## Domestic water management

In relation to domestic water management, the question of inter-ministerial coordination, or more commonly the lack of it, is a universal concern. The approaches of different ministries frequently conflict. For instance, while water ministries may devise good water conservation policies, other ministries may have contradictory priorities for water usage. Problems are exacerbated by the need to

manage coalition governments and, in several countries, by a decentralization of power away from central government. Coupled with this is a gap between policy and implementation in each of the countries surveyed. Simply implementing existing policies would significantly improve domestic water management.

Prioritizing water as an issue would necessitate greater coordination between relevant ministries, such as those for agriculture or mining. Coordinating water policy with agriculture and energy policies is a prerequisite for better water usage. Support for ‘integrated water management’ or better understanding of the nexus between food, energy and water varied between countries, but given that the challenge of coordination is region-wide, adopting or promoting such thinking could provide an opportunity to formulate a region-wide approach to water management.

This lack of coherence on water led numerous interlocutors across the region to criticize their country’s lack of domestic ‘vision’ for water. This also affects transboundary water relations. In the absence of any sense of how countries aim to utilize their water, international negotiations are framed in abstract terms without a sense of ‘why’ each country requires a particular volume of water. Such a vision would involve a greater focus on the relationship between water and a range of issues such as energy needs, irrigation potential, health and livelihoods.

Water management throughout South Asia is seen through the prism of agriculture and the needs of farmers. The vast majority of water across the region is used for irrigation. This reflects a quest for food security as well as the machinations of vote-bank politics, particularly in India. The threat caused by overuse of groundwater is well recognized but, given the nature of democracy and the short-term benefits that can accrue from growing water-intensive crops, few ‘solutions’ to unsustainable water usage present themselves. Throughout the region the notion of water as a scarce resource – and therefore one whose use should be priced or regulated – is continually challenged by notions that water is a ‘human right’ or, indeed, an infinite gift from God. Up-scaling awareness campaigns on water usage, whether in agriculture, industrial or domestic consumption, has proved difficult across the region.

In the longer term, it is clear that current trends for water usage are unsustainable. Incentivizing less water-intensive crops such as barley, shifting to seeds that require less water and using agricultural practices that require less water (such as the System of Rice Intensification) will become imperative, certainly in India. The allocation of water to those with political power is equally seen in instances of water scarcity across South Asia. Unless water is managed in a more holistic manner, taking into account

social and environmental, as well as economic and political factors, localized conflicts over water usage are as likely to undermine stability as transboundary disputes.

Although most South Asians continue to live in rural areas, urbanization is an emerging cross-regional challenge. In the coming decades urban water consumption will take up a greater share of water consumption and improving urban water management will become imperative. According to a UN report (the 2011 Revision of the World Urbanization Prospects), the largest increase in urban population over the next four decades – involving 497 million people – will take place in India. (China follows in second place, with 341 million more urban dwellers.) Mega-cities such as Karachi and Dhaka will also grow rapidly. The existing focus on water as a source of irrigation means that water management systems are ill-placed to adapt to changing demand patterns, and competition between municipalities, industrial and agricultural users of water will intensify.

Attitudes towards methods of water delivery reflect prevalent discourses in each country. Across the region there is support for service delivery methods that work, although in some cases the notion that water could actually be delivered 24/7 seemed far-fetched. Attitudes towards privatization were generally sanguine, provided that private players provided a reliable service and did not monopolize the sector. Across the region, there was a broad correlation between those who felt that government service delivery was flawed and amenability towards private service delivery. Concurrently, however, the fear that privatization would lead to monopolies, and result in rising prices over time, was also notable, particularly in Bangladesh.

Lack of water data affects domestic water management and exacerbates transboundary water concerns. Across South Asia concerns were expressed about poor-quality, unreliable data and declining standards in data collection. Data are often not shared between ministries, while government officials are often unaware of data collection by non-government sources. Where data are collected, there are questions over their accuracy, over the extent to which they are usefully intermediated or interpreted and over their subsequent dissemination. India's classification of a range of data as secret does little to build trust and allows critics, particularly in Pakistan, to apportion blame for water shortages or floods onto India.

There are calls throughout the region for greater data-sharing, in particular in relation to warnings of floods and droughts. There is also a need to improve micro-level data consumption to help guide policy planning. But there is also a lack of awareness of existing data-sharing. Greater awareness within and between countries of information that is already available would serve to

ease transboundary water tensions, and could facilitate improved domestic water management.

There is a strong willingness across the region to learn about best practice both in relation to domestic water management and in dealing with transboundary water flows. This may reflect a lack of awareness of a number of current initiatives, and highlights the need for broader regional sharing of knowledge. Rather than establishing new institutions, there is potential to consolidate existing networks for dialogue. Some governments, and particularly the Indian government, view water data through a securitized prism. At the same time, government officials across the region were frequently unaware of work undertaken by a number of non-governmental organizations working on issues such as water extraction.

### **Greater awareness within and between countries of information that is already available would serve to ease transboundary water tensions, and could facilitate improved domestic water management.**

Water storage is a shared challenge across the region. India's downstream neighbours focus on its construction of large dams upstream. In India, in contrast, the sense that the 'Western model' of water provision has failed is widespread. This in turn has led to a shift in support towards the need for community self-reliance and localized, off-grid, water storage to supplement existing services. The idea that water management should be decentralized is prevalent throughout the region. The concept of local watershed or basin-wide management, linked to issues such as conservation and environmental protection, provides scope for a cross-regional dialogue and knowledge-sharing. There is also strong regional support to improve and develop rainwater harvesting both in rural areas and as a means of augmenting urban water supply.

The desire for greater community participation is also widespread, particularly in relation to micro-conservation techniques that have proved effective but not scalable. Their implementation requires community initiatives to supplement mainstream government efforts. For India, decentralizing the water sector and strengthening the decision-making power of *panchayat* (local councils) in rural areas are crucial to address the gap between the centre and the periphery. Questions of access to water in rural areas can only be resolved – and delivery ensured – at the local level.

There is a widespread feeling that women are under-consulted both at the community level and at higher levels of policy planning with regard to water. Actions

that may be taken to help women are rarely designed by women. Strategies designed ostensibly to help women can actually serve to disempower them. Greater understanding of the needs of women, and of local communities in general, would help ensure that policies are both better designed and more effectively implemented. Filling cross-regional knowledge gaps, for instance in relation to gender, could also assist both in policy-making, and in creating a sense that water presents shared challenges and opportunities.

The issue of political will was frequently cited as a problem both in domestic water management and in transboundary water relations. A lack of political commitment was held responsible for stalled cross-border projects, such as those between India and Nepal. A potential subject for further research is the clear gap between politicians (and their electorates) and experts regarding best practice. Politicians often promise access to water through the provision of free electricity (to run pumps). This short-term solution is clearly unsustainable (both in terms of the cost of electricity and as regards its impact on groundwater levels). This speaks to the concerns raised by many water experts that water is frequently, and unhelpfully, seen as an infinite resource.

Debates surrounding water are framed differently across the region. For instance, while the relationship between food and water is seen as paramount in all countries (given the amount of water used for food production), understanding of the water-energy-food nexus is most clearly seen in India, where some farmers receive free power. Elsewhere the relationship between water and energy is frequently seen through the prism of hydro-power, and is thus regarded as more relevant in Pakistan and Nepal than in Bangladesh. In addition, the relative importance of water as a challenge varies between countries. Facilitating multi-layered cross-country dialogues would provide opportunities to promote understanding and to learn from best practice.

## Transboundary water

Water is clearly considered to be a potential source of tension between countries. In most cases water was seen as an additional strain on already turbulent bilateral relationships. This is less the case in Bangladesh where water stands as one of the primary causes of tension with India. Greater confidence in Bangladesh regarding river flows from India would significantly improve the broader political relationship with India. Because of the zero-sum nature of transboundary water arrangements, bilateral relationships focus primarily on actions taken by upstream riparians to increase their water storage capacity.

(Upstream) Afghanistan exhibits the greatest disconnect between central government policy and local water management. The difficulties Afghanistan faces in increasing its water storage capacity are well known, and while many Afghans expressed support for large-scale water storage projects, most also felt that these are politically unfeasible. Conflict and deforestation – an indirect result of conflict – were blamed equally for Afghanistan’s inability to store water. This clearly affected attitudes towards trans-boundary water. Most are sceptical about the prospects for agreements, in particular with Iran and Pakistan. And many respondents question whether Afghanistan should consider negotiating over water, asking how the country could be expected to discuss water before it has met its own water needs.

Discussions in (downstream) Bangladesh highlighted the widespread sense of vulnerability stemming from the country’s dependence on India. Indian upstream projects currently under consideration were seen through the prism of the Farakka Barrage (which reduced water flow into Bangladesh). While there was widespread pride in Bangladesh’s policy towards water, domestic water issues were seen to be most entwined with transboundary issues. The need to treat water in a ‘holistic’ manner, relating it to issues such as the environment and socio-economic factors, was frequently articulated in Bangladesh, though equally prevalent was the notion of water as Bangladesh’s ‘natural right’.

In contrast, in India (both upstream and downstream), awareness or consideration of transboundary water issues is most concentrated among certain communities. Numerous water experts see water solely in domestic terms and do not hold opinions on India’s relations with upstream or downstream neighbours. In terms of domestic water management, the sense that India should shift away from large-scale projects towards smaller, off-grid water storage solutions is widespread, as is a surprising absence of opposition to private-sector water provision (as long as that provision actually works). That said, many civil society respondents felt that water should be conceived of as a common resource rather than as a commodity or economic good.

Non-government respondents in India were more willing to revisit existing treaties than those from government, and there is a widespread sense that there is more scope to reframe water relations on the Ganges and Brahmaputra (with Nepal and Bangladesh) than with Pakistan; many respondents felt that the securitization of India’s relations with Pakistan, and the equation of water with the Kashmir dispute, were more problematic.

Given its greater water security, the idea of water as a threat was least prevalent in (upstream) Nepal. That said, many respondents recognized the opportunity cost stemming



from its inability to utilize the potential of its rivers, notably for hydro-power. At the same time, many felt that Nepal should meet its own needs first before considering selling power to India.

An energy crisis prevalent when the interviews were being conducted permeated discussions in (downstream) Pakistan; widespread concern was expressed about domestic mismanagement, under-investment and lack of water storage. Water storage was frequently described through reference to the Kalabagh dam, highlighting inter-provincial water disputes. Many in Pakistan felt that there was scope to forge agreement with Afghanistan, a hope not reciprocated in Afghanistan.

### **Improving transboundary water relations in the absence of domestic water security will be challenging, particularly given that the current approach treats water as a zero-sum resource.**

The idea that water presents a threat rather than an opportunity permeated discussions about both domestic water management and transboundary water. Conspiracy theories and blame are prevalent throughout South Asia – Afghanistan blames Pakistan and Iran for its water problems while Nepal, Bangladesh and Pakistan blame India. Within India and Pakistan water shortages are also blamed on actions taken by upstream states/provinces. This reflects the absence of trust that plagues interregional relationships.

Improving transboundary water relations in the absence of domestic water security will be challenging, particularly given that the current approach treats water as a zero-sum resource. Agreements imply the division of a volume of water between two countries or the provision of a minimum flow at certain times of year. This in turn implies that one party will be worse off than in the pre-agreement status quo.

Consequently there have been few agreements in South Asia. Those transboundary water treaties that do exist in South Asia faced criticism on a number of grounds – notably for time periods that were either too short or too long, and for the absence of dispute resolution mechanisms. Others suggest that treaties do not take account of environmental factors, or new challenges such as climate change. The Indus Waters Treaty<sup>1</sup> (IWT) – generally seen as one of the most positive aspects of the bilateral relationship between India and Pakistan – garnered the most support, for its proven ability to resolve disputes and for the fact that it has lasted despite political tension and war.

Despite these criticisms, most interlocutors rated existing treaties more positively than the bilateral relationship. This implies that a guarantee of water, even with a sub-optimal treaty, is preferable to no guarantee.

Having survived 50 years, the IWT is rightly seen as a success. But there is scope for it to be improved in the light of increased understanding of water issues over the past half-century and the emergence of new challenges such as the impact of climate change and more variable rainfall patterns which were unforeseen when the treaty was signed. In addition, the treaty does not cover other shared water challenges, such as falling groundwater levels.

At present, variable river flows exacerbate tension. Enhancing the IWT's ability to cope with climate change would involve a more holistic approach – beyond the current technical focus – which would take account of social and environmental issues and involve dialogues among other, non-technical, stakeholders such as river communities. Furthermore, the treaty could encompass provisions regarding environmental flows while provisions regarding information exchange and water measurements could be strengthened.

If water is to become a source of mutual benefit rather than competition for India and Pakistan, the prism through which both countries approach it needs to be expanded beyond the IWT. A range of shared challenges – such as falling groundwater levels in both Indian and Pakistani Punjab – are not covered by this treaty, and require a new framework for understanding and cooperation. Understanding that problems are shared will help de-secure the water discourse.

Of agreements currently in place, aside from the Ganges Treaty (between India and Bangladesh) and the Mahakali Treaty (between India and Nepal), the rest were signed in the 1950s and 1960s before terms such as water scarcity had been coined. The Indus Waters Treaty, signed in 1960, took seven years of negotiations. In the early 1960s the population of India and Pakistan combined was around 480 million. Now the population of the two countries stands at around 1.4 billion, an almost threefold increase. Consequently, water availability per capita has declined substantially, even though total water storage capacity has increased. Given the politicization of water in the region, the reliance of a large proportion of the population on agriculture for livelihoods and the nature of democracy throughout South Asia, transboundary water negotiations as currently configured stand little chance of success – and, if they fail, enhance distrust.

In the cases of India–Pakistan and Pakistan–Afghanistan, water disputes exacerbate already strained bilateral

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<sup>1</sup> The IWT does not divide water flows in the six rivers it covers; rather it allocates three rivers to India and three to Pakistan.

relationships. Yet many Indians see greater opportunity for positive outcomes in transboundary water relations than in domestic water management. Many Pakistanis expressed a willingness to engage with Afghanistan, although this was not reciprocated in Afghanistan, where domestic challenges were seen as more pressing. And in Bangladesh there is a clear desire to engage with India, admittedly driven by perceptions of threat rather than opportunity. Opportunities to adopt a more holistic approach towards water issues seem most feasible in relation to India–Nepal and India–Bangladesh, or between all three countries. In Bangladesh, in particular, concerns over water serve as one of the main factors fuelling political distrust. Resolving water disputes could help to recalibrate the broader relationship. While Pakistan and India have stated their willingness for deeper engagement, greater political distrust makes cooperation more challenging on the Indus and its tributaries.

A further challenge is that an increasing number of power centres are involved in water negotiations. Water is the responsibility of state (rather than central) governments in India, and of provincial governments in Pakistan. Both countries are witnessing a shift in power towards states or provinces. Coalition governments in India have increased the power of regional parties in India, while in Pakistan the 18th Amendment to the constitution has shifted power towards the provinces. Nepal, too, is discussing implementing a federal system. These shifts are already affecting transboundary water agreements, as seen in the decision by the government of West Bengal to scupper an agreement between India and Bangladesh over the Teesta River. Yet these new power centres may present opportunities for new approaches.

### De-securitizing transboundary water

Poor domestic water management affects transboundary water relationships. When water is not available in a locality, the easiest option is frequently to blame the actions taken by upstream riparian states rather than to demand better water management. Were water plentiful, it is easier to envisage a situation in which countries would be more amenable to transboundary agreements, ensuring water reached downstream riparians.

One solution therefore, would be to reduce pressure on national water resources, either through increasing the supply of water or by reducing demand. There is significant potential for better water management on both the demand and supply sides. For instance, a shift towards the cultivation of less water-intensive crops or using less water-

intensive methods of irrigation could be encouraged while also improving water harvesting or tackling pollution.

Even so, with the population of South Asia projected to rise by 32 per cent from 1.68 billion in 2010 to 2.22 billion in 2040,<sup>2</sup> per capita water availability is likely to remain under stress in the absence of a major technological breakthrough such as, for instance, low-cost desalination. Better water management is imperative but, alone, is unlikely to prevent water being a source of tension.

The second, or ideally *additional*, approach would be to rethink the framework in which transboundary water issues are seen, placing the basin, rather than the state, at the centre of water negotiations. While this may sound more utopian, ideas raised during interviews across the region, as well as through a parallel study examining successful examples of domestic water management (see Appendix 3), suggest that there is potential for a new approach based on what tends to work, rather than what tends not to work. However, the study also found that public scepticism about new approaches towards water management is widespread. Garnering support for change frequently requires some form of demonstration effect from an initial project, and frequently also a committed individual who sways public opinion in favour of change.

There are numerous examples of situations in individual countries where, with some lateral thinking, upstream and downstream communities work together to create win-win solutions. In South Asia the most clear-cut international example of this would be the relationship between Bhutan and India, whereby India pays for hydro-electricity generated in Bhutan. However, in many of India's other neighbours this was seen as a demonstration of its hegemonic relationship with Bhutan and not necessarily a replicable model. Some form of non-financial benefit-sharing model would be preferable.

Rather than focusing purely on the provision of water, successful water management projects frequently approach water not in the abstract but as a resource intimately connected to other issues such as health, livelihoods or the environment. Furthermore, better water management frequently involves an assessment of how water is used rather than simply ensuring a supply of water. Those projects that focus solely on delivering water without considering how it is subsequently used often end up over-consuming water.

There is a common tendency to view domestic water projects as successful as of the date of their completion. However, in common with transboundary water agreements, a judgment of success is only relevant

<sup>2</sup> Medium-variant projection of the Population Division of the United Nations Department of Economic and Social Affairs, *World Population Prospects: The 2011 Revision*, [esa.un.org/unpd/wpp/index.htm](http://esa.un.org/unpd/wpp/index.htm).

if positive outcomes outweigh negative ones over a considerable period of time. This resonates with attitudes towards existing water agreements in South Asia.

The longevity of the Indus Waters Treaty is of itself a major strength, notwithstanding a widely held opinion in both India and Pakistan that it should be updated or reviewed because of factors such as new technology, climate change and environmental issues. In Nepal concern was expressed that some agreements were too long. In Bangladesh, by contrast, there was concern that the time-period of the Ganges Water Treaty was too short. While this may reflect the different concerns of upstream and downstream riparians, it is imperative to ensure that agreements can

be reviewed in the light of unforeseen developments. This will almost certainly involve the provision for some form of third-party or mutually agreed adjudication process.

India is widely seen as the 'problem' by its smaller neighbours in terms of transboundary water. Criticism of India in both Bangladesh and Pakistan focuses on its construction of large-scale infrastructure. Yet in India there is growing support for a shift away from large projects towards smaller 'off-grid' rainwater harvesting projects. This shift could reduce threat perceptions of India in its downstream neighbours and provide a further opportunity to build trust.

## 2. Background

The project on which this report is based explored attitudes towards water along two river systems: the **Ganges-Brahmaputra-Meghna** (GBM) and the **Indus-Kabul**, which together flow through or are fed by waters from seven countries (although the project focused on just five, excluding China and Bhutan). The Brahmaputra begins in Tibet – where it is called the Yarlung Tsangpo – before flowing through northeast India, fed by rivers from Bhutan, and into Bangladesh. The Ganges (or Ganga) originates in the foothills of the Himalayas, and is fed by the flow of around 6,000 rivers in Nepal before merging with the Meghna and Brahmaputra rivers in Bangladesh. The merged river is known as the Meghna. Both basins are reliant on the monsoon, meaning that precipitation is concentrated between July and October each year (although snowfall in Nepal in winter contributes to the flow of the Ganges).

The GBM basin is one of the world’s largest in terms of the size of the drainage area and length of the river. It is one of the most complex river systems in the world, linking and entangling diverse biodiversity and ecosystems, cultures, politics and economies of India, Nepal and Bangladesh. The river drains an area of around 1.7 million sq km and is home to around 630 million people.<sup>3</sup> The basin is also characterized by religious significance, varying levels of industrial development and a number of interstate and transboundary disputes.

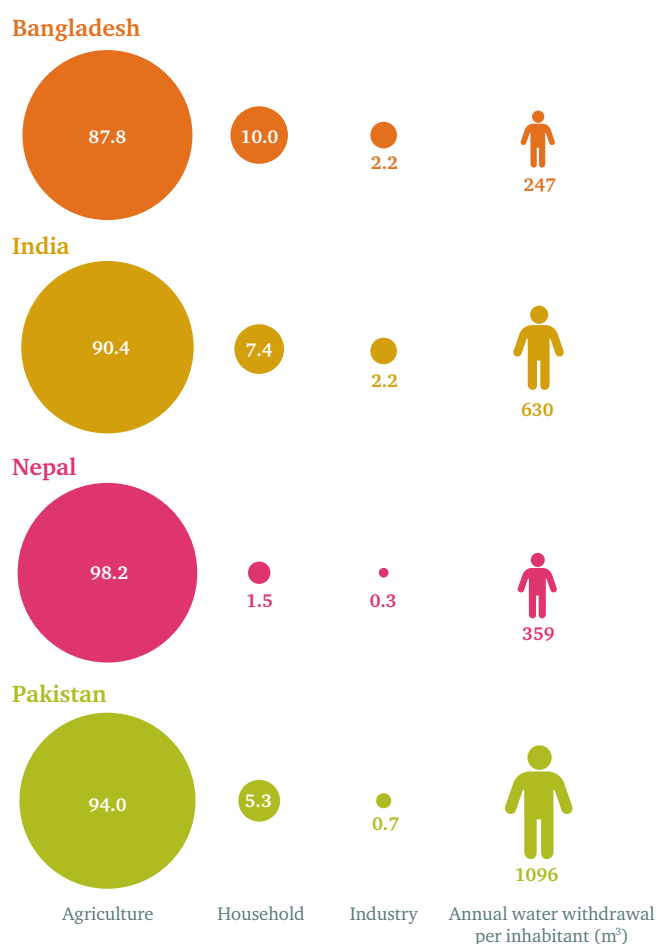
The Indus river originates in the Tibetan Plateau in China, and runs for 3,200 km across northern India and through Pakistan before flowing into the Arabian Sea near Karachi. The Indus system has 27 major tributaries; the six most significant branches – the Chenab, the Ravi, the Sutlej, the Jhelum, the Beas and the Indus itself – flow west through India before crossing into Pakistan. A seventh major tributary, the Kabul river, rises in Afghanistan and flows east into Pakistan.

The Indus river basin, in which some 300 million people live, drains an area of around 1.1 million sq km. India and Pakistan represent almost all of the demand on the river’s resources, with Pakistan accounting for 63 per cent of total water used in the basin and India 36 per cent. Pakistan is critically dependent on the Indus: the country’s other rivers are seasonal and their total flow is less than 2 per cent of the annual inflow that enters Pakistan through the Indus system.

Agriculture dominates water use patterns in both basins (although figures given by different agencies vary). Historically, annual flooding of the Indus and its tributaries contributed to the development of agriculture in the region. A series of engineering feats in the colonial period and following independence led to a shift in practices related to water use in the basin. The so-called Green Revolution in the 1960s boosted agricultural growth in the Indian states

of Punjab and Haryana, and led to the Indus basin becoming the breadbasket of India. However, the repercussions of the Green Revolution and over-exploitation are now being felt with regard to the Indus waters (and in particular in relation to groundwater resources) in terms of both water quality and quantity.

Figure 2.1: Water usage by sector (%)



Source: FAO, Aquastat.

Note: Figures for consumption data vary widely. Data on extraction from groundwater are scant. The comparative figures for Bangladesh, India, Nepal and Pakistan are sourced from the FAO for 2008. According to the Indian Ministry of Water Resources, agriculture accounts for roughly 80% of overall water consumption with domestic consumption using 13% and industry just 7%. The FAO does not publish comparative figures for Afghanistan, but its figures for 1998 suggest that more than 98% of water is used in agriculture.

Around 57 per cent of India’s net irrigated area is fed by the Ganges, but irrigation efficiency is low. As well as supporting agriculture in both India and Bangladesh, the Ganges is significant for its hydropower potential and fisheries. The hydroelectric potential of the basin has been assessed as 10,715 MW. Of 142 schemes identified in the basin, 22 – with total installed capacity of 2,437 MW –

<sup>3</sup> Data from UN Food and Agriculture Organization (FAO), Aquastat.

are in operation, and 12 – with an installed capacity of about 2,716 MW – are at various stages of construction. However, the development of hydroelectricity in upstream riparians causes concern downstream. At the extreme end of the spectrum, workers constructing or renovating infrastructure in Afghanistan have been killed in attacks that many Afghans blame on downstream riparians. Elsewhere, in Nepal, there is a widespread belief that attempts to develop hydropower projects stall because of stiff resistance and lobbying from India.

Pollution poses a serious challenge to the Ganges. Millions of litres of industrial waste water from industries including tanneries, textile mills and chemical plants pass into the river, as does run-off from chemical fertilizers. Pesticides also seep into groundwater, degrading the environment and affecting water availability. India first launched a Ganga Action Plan to reduce pollution in 1986, but population growth undermined many of the initial gains. A current clean-up campaign marks the third incarnation of this plan.

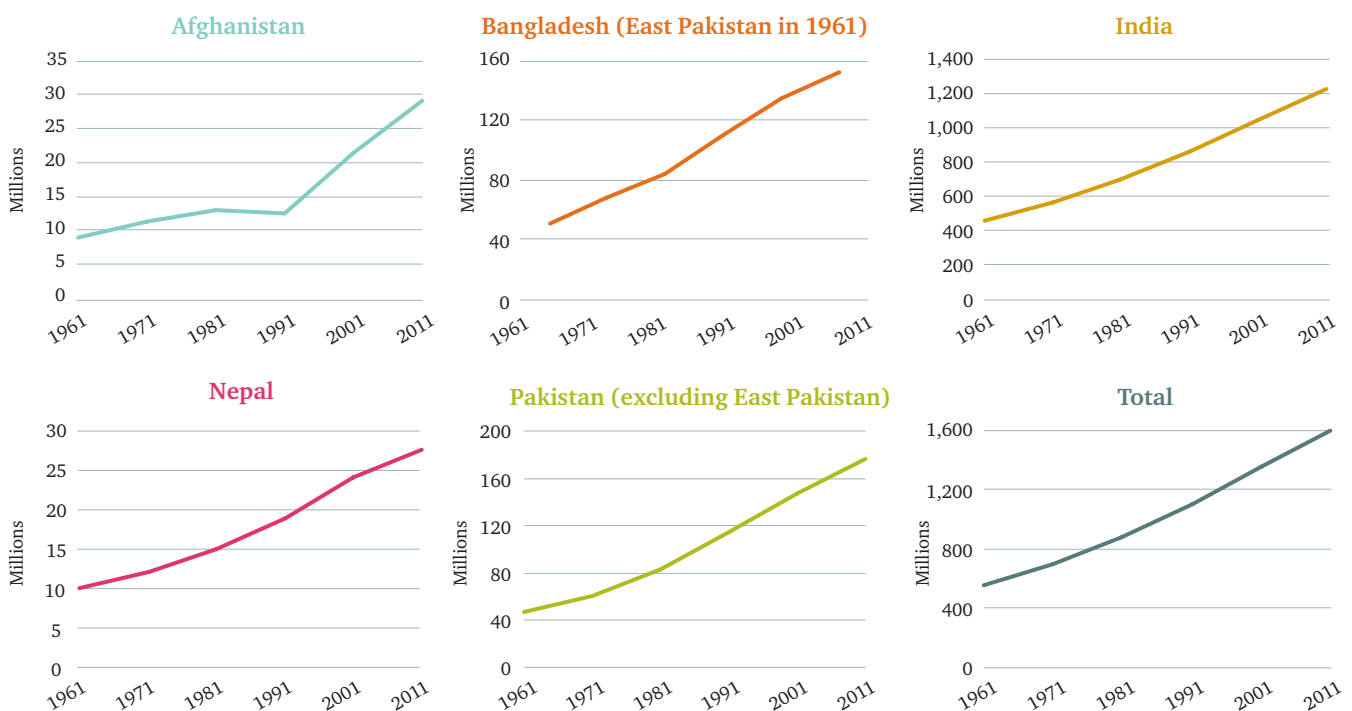
The river is also faced with threats from over-extraction and over-exploitation of both surface and groundwater. Almost all of the tributaries of the Ganges have been diverted or controlled by barrages, disrupting the natural flow and affecting the ecosystem. This has increased vulnerability among communities dependent on the river. The decline in the water table is having huge environmental, social and economic costs.

The Ganges holds religious significance in Hindu culture. In recent years religious leaders have helped lead attempts to mobilize communities to protect holy rivers. While there has been a reinvigorated drive to safeguard and conserve this river, government plans to construct dams and storage structures on ‘sacred’ rivers work against such efforts.

### Water management

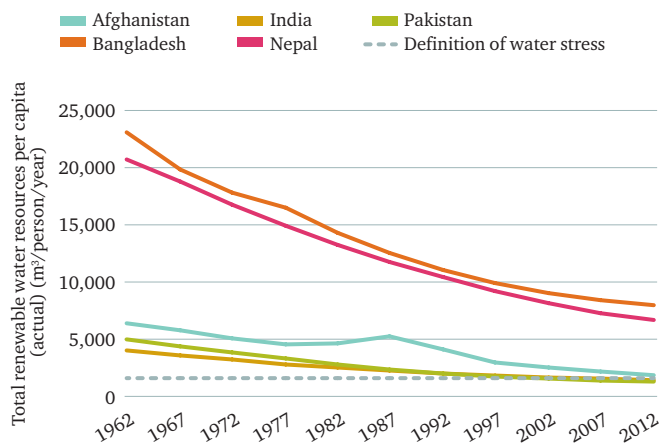
While the challenge varies across the countries, population growth is the biggest challenge for water management, and the factor that has most clearly caused water to be seen as a threat (although industrialization and urbanization are also changing water usage patterns). While India and Pakistan have increased their water storage capacity, this has not kept pace with the growth of the population, which has tripled in both countries over the past 50 years. Consequently, both India and Pakistan are now water-stressed (i.e. having less than 1,700 cu m per capita per year). Nepal, on the other hand, suffers from temporal allocations of water and has been unable to build on its water storage capacity because of financial limitations, resulting in most water flowing to downstream riparians. This often leads to Nepal suffering from severe water shortages during dry seasons, despite being the most water-secure of the five countries studied. Bangladesh, too, suffers from the temporal distribution of precipitation and a geographical inability to store water. Water storage capacity in Afghanistan has declined, particularly in the 1980s, as a consequence of conflict.

Figure 2.2: Population growth



This has led to an increased politicization of water. Most people in South Asia remain dependent on agriculture, and thus on water, for their livelihoods. Promises of free electricity – and in turn water – have proved popular among (farming) voters in many parts of India. Shortages of water in Pakistan are frequently blamed on India. And across the region, overall figures for annual water resources mask the temporal distribution of water: as noted, even Bangladesh and Nepal are faced with water shortages in the dry season.

Figure 2.3: Falling per capita water availability



Source: FAO, Aquastat.

Meanwhile, a shift towards coalition governments, as well as transfer of power to states or provinces, has become a theme of many countries in South Asia. This has implications both for transboundary water and for domestic water management. Coalition governments have resulted in an increase in the number of ministries and departments responsible for issues such as water and energy. This in turn has made it more difficult to create a coherent strategy to address a host of challenges that fall under the remit of different ministries.

In Afghanistan the question of effective water management exercises officials and traditional representatives at many levels. Central government policy-makers – particularly in the Ministries of Energy and Water (MEW), of Agriculture, Irrigation and Livestock (MAIL), and of Rural Rehabilitation and Development (MRRD) – concentrate on national issues, while their local officials interlink with the responsibilities of these government departments through the National Solidarity Programme (NSP) and their local representatives through the Community Development Councils (CDCs). Separately, Provincial Councils may also work on water-related issues, although there is often some overlap in representation between these councils and the CDCs. The extent to which water distribution and management constitute a critical priority varies across the country.

Different approaches towards water management are taken across Afghanistan, largely dependent on the focus of the implementing organization. Many NGO projects concentrate on meeting basic needs by digging wells or installing hand pumps to enable access to low-level groundwater. Others emphasize the reconstruction or reconstitution of traditional supply and sewerage systems. Most of these humanitarian organizations coordinate with one another, with UN agencies and with the relevant government departments through the water, sanitation and hygiene (WASH) cluster, which meets regularly at national, regional and provincial level.

Both NGOs and government departments in Afghanistan are involved in efforts to reconstruct and improve traditional water management systems, including the *karez* system of traditional community irrigation and water supply. Other schemes have tried to improve water supply and extend the sewerage system. These efforts include the establishment of the Afghanistan Urban Water Supply and Sewerage Corporation (AUWSSC), which aims to rectify supply problems in urban areas through privatization and institutional development of this sector. Separated from the former Kabul office of the government department of the Central Authority for Water Supply and Sewerage, and with funding from USAID, the new corporation was the first state-owned enterprise to be restructured as a private corporation.

Of the five countries examined for this project, Bangladesh has the most centralized system of government. Its water policies are widely praised, although the gap between policy and implementation is frequently noted. Water insecurity affects both rural and urban areas, and the situation is complicated by different water problems in different ecological zones of the country. As an agrarian and riverine country, Bangladesh is highly dependent on natural water sources for consumption, food security, transportation, conservation of nature and biodiversity. Rapid industrialization and population growth in Bangladesh and co-riparian countries means that the need for water has increased many-fold in the last few decades in South Asia.

Agrarian demand competes with hydropower and industrial demand, and holistic water management is seen as imperative for food security, health, development and overall economic growth. Problems in the water sector are exacerbated by water pollution, environmental degradation, poor sanitation and climate change.

The question of internal water management in Bangladesh is rarely seen in isolation from the reality that this country, as the lower riparian in the GBM basin, is highly dependent on the waters from upper riparian countries. Despite the fact that almost 80 per cent of its territory lies within the flood plains of the GBM basin, it accounts for only 7–8 per cent of the total basin area. More than 90 per cent of Bangladesh's surface water comes from other countries.

Under India's constitution, water is a state subject. Each state manages water separately, with different bodies dealing with specific aspects of water management through various departments and ministries including agriculture, irrigation, hydropower, fisheries, rural development, flood control, supply and sanitation. However, national boards such as the National Water Development Agency and the Central Water Commission provide overall guidance and technical support to the states. In addition, the Ganges basin has its own regulatory authority to supervise, plan and monitor conservation and development in the basin.

### **The management of water resources presents a huge problem that is not helped by the lack of coordination between the different government departments focusing on different issues.**

The multiplicity of organizations and lack of synchronization among the different agencies within India have been seen as problems in water planning and management. The various Indian states have not been able to create effective interstate organizations. The failure to create a river board organization to resolve interstate disputes has been legally challenged by civil society and environmental groups, but this has failed to change the governance regime of interstate rivers.

To bridge the widening gap between power demand and supply, India has focused on exploiting the hydropower potential of its rivers: according to the country's Ministry of Power, only 26 per cent is currently exploited. However, concerns are growing with regard to the drawbacks of hydroelectric power plants, such as displaced populations, damage to aquatic life, methane emissions from reservoirs resulting from anaerobic decay of the plant material, and geological risks. Whether the advantages of hydropower outweigh the disadvantages has been a matter of intense debate and conflict between the government and numerous NGOs.

The revised (2012) version of India's National Water Policy emphasized the need to recognize 'environmental flows' as necessary to maintain the ecological health of the river, improve water infrastructure for water security, and ensure clean and safe water supply for all. However, it can be inferred from the socio-economic indicators and the growing number of social protests against water development projects that the water sector has not yet met its objective of inclusive and sustainable development. A startling gap between policy and practice is said to be responsible for the ineffectiveness of policies and, more importantly, that of the process of policy-making.

In an attempt to fill this gap, multiple NGOs have been working to promote community-based water management programmes in India. Local-level institutions, democratic arrangements and allocation mechanisms have proved to be very successful in conservation of water, with schemes dating back to the 1970s in some cases. While these innovative models have been gaining credence, the recognition of local rights, entitlements and privileges is yet to be seen in the legal and regulatory framework of water. Community-based water management is assigned further importance because of the cultural and religious connotations of Indian rivers.

In Nepal the dissolution of the Ministry of Water Resources (MoWR) is widely seen as a key factor in poor water management. Following the dissolution of the MoWR, the Ministry of Energy (MoEN) and the Ministry of Irrigation (MoIR) took over its responsibilities. While the MoEN is responsible for the utilization and management of water resources, the Department of Electricity Development (DOED), which falls under the MoEN, develops and promotes the electricity sector and is responsible for the implementation of overall government policies related to power generation. The MoIR includes the Department of Irrigation and the Department of Water Induced Disaster Prevention (DWIDP). The Department of Irrigation plans, develops, maintains, operates, manages and monitors different modes of environmentally sustainable and socially acceptable irrigation and drainage systems. These range from small- to large-scale surface systems, and from individual to community groundwater schemes. The DWIDP works to prevent and mitigate water-induced disasters such as soil erosion, landslides, debris flow, and flood and bank erosions.

Current water management is supply-driven and does not focus on managing demand. The management of water resources presents a huge problem that is not helped by the lack of coordination between the different government departments focusing on different issues. The Water and Energy Commission Secretariat (WECS) was formed in 1975, with the objective of developing water and energy resources in an integrated and accelerated manner. Its primary responsibility is to assist the government of Nepal in the formulation of policies and planning of projects in the water and energy resources sector.

Population growth, along with poor management of water infrastructure, has accounted for a substantial drop in per capita water availability. In 1947 Pakistan's water resources stood at more than 5,000 cubic metres (cu m) per person per year. By 2011 resources per capita had fallen to 1,394 cu m, placing Pakistan in the 'water-scarce' category. In the years to come, the equivalent figure is expected to drop below 1,000 cu m per person per year.

Reduced access to water, and in particular to clean drinking water, is a major health issue for Pakistan. A significant proportion of hospital admissions in Pakistan are due to water-related ailments, of which cholera, typhoid and diarrhoea are the most prominent. Some estimates suggest that 40 per cent of child deaths stem from water-borne diseases. Other studies suggest that the economic cost to Pakistan of impure drinking water and poor sanitation equates to around 4 per cent of annual GDP.

According to Pakistan's constitution, water is a provincial subject, meaning that it falls within the competence of the provincial legislatures. However, the federal government has some authority to ensure access and equity among provinces. The Council of Common Interests and the Parliamentary Committee on Water Resources are, respectively, the constitutional and main parliamentary bodies overseeing the inter-provincial regulation of water. Under the 1958 Water and Power Development Authority Act, the Water and Power Development Authority (WAPDA) has legal power to carry out development schemes in the water sector. The Indus River System Authority (IRSA) is a statutory authority mandated to regulate inter-provincial water-sharing under the terms of the 1991 Water Apportionment Accord. Although it is a federal government institution, it is comprised of one representative from each of the provinces, as well as a federal member, and so reflects thinking in provincial governments.

### A significant proportion of hospital admissions in Pakistan are due to water-related ailments, of which cholera, typhoid and diarrhoea are the most prominent.

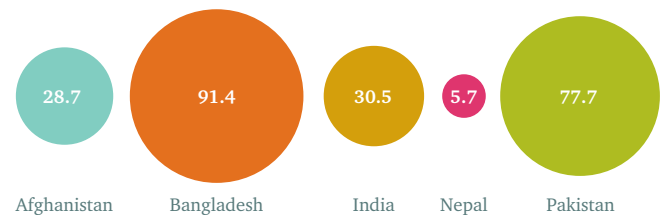
At the provincial level in Pakistan, the main regulatory framework is provided by the provincial irrigation departments and provincial Irrigation and Drainage Authorities, and by the provincial Environment Protection Agencies. At the local level, local government and, in urban areas, Water and Sanitation Agencies (WASAs) regulate the supply of drinking water and sewage disposal.

### Transboundary disputes

Both the GBM and Indus basins cross borders, and downstream riparians are dependent on the actions of their upstream neighbours. The dependency ratio – i.e. the proportion of water resources in each country that comes from other countries – varies from 0 per cent in Bhutan to more than 90 per cent in Bangladesh. While internal water management in India is frequently regarded as being

separate from transboundary issues, in Bangladesh the two are seen as deeply entwined because of the high level of dependency. Almost 80 per cent of water in Pakistan comes from other countries, primarily India.

Figure 2.4: Dependency ratios (%)\*



\*Defined as the percentage of total renewable water resources originating outside the country.  
Source: FAO, 2014.

While India and Nepal have a history of cooperation in relation to water, with a series of agreements signed from the 1950s – the Koshi Agreement (1954), the Gandak Agreement (1959) and the Mahakali Treaty (1996) – many Nepalis believe that the treaties are unequal and biased towards India. Three tributaries in particular, the Ghagra, the Koshi and the Gandak, all play a role in transboundary tensions between India and Nepal. Nepal's relative political weakness and inability to utilize its water resources – widely regarded as a result of Indian interference – has created a trust deficit that has caused many potentially beneficial projects to stall.

The Brahmaputra river remains a source of tension between China and India, and between India and Bangladesh. While the intensity of the Brahmaputra's recurring flood cycles in both India and Bangladesh could be mitigated by a united disaster response, the lack of bilateral agreement on hydropower projects and water transfer schemes has led to sub-optimal outcomes. India's proposal for inter-basin water transfer – i.e. diverting water from the Brahmaputra to augment water flow and resolve water problems in both the Ganges and Brahmaputra basins – has met with resistance from Bangladesh. But Bangladesh's dependence places it in a weak position in negotiations with its neighbour.

China's decision to begin construction of a series of dams on the Yarlung Tsangpo in early 2013 raised concerns in India (similar to those in Bangladesh) that China intends to divert water from the river. There are no bilateral agreements or treaties concerning water management between India and China. Ironically, this may lead to an opportunity for greater regional engagement: numerous water experts in India suggested in the survey that India was rapidly developing a greater sense of empathy with other downstream riparians in the neighbourhood.



The 1960 Indus Waters Treaty (IWT) between India and Pakistan is not a conventional water-sharing treaty, instead dividing the rivers of the Indus basin. The eastern rivers – the Ravi, the Beas and the Sutlej – were allocated for exclusive use by India before flowing into Pakistan. Pakistan has exclusive use of the western rivers – the Jhelum, the Chenab and the Indus – subject to India's limited domestic consumption and hydropower generation. Unlike other agreements in South Asia, the IWT does have a provision for external arbitration.

Afghanistan has no agreements in force with any of its neighbours. Aside from some tributaries of the Kabul that flow from Pakistan's Chitral district into Kunar province in Afghanistan, Afghanistan is the upstream riparian on its five major river basins. Iran, Pakistan and the adjacent Central Asian states rely on water supplies flowing across the boundary (and water flows downstream have increased as upstream infrastructure has deteriorated during three decades of conflict). This is a major source of contention, and one that is only mitigated by Afghanistan's relative political weakness – as well as its inability to capture and utilize its own water supplies effectively, and its lack of both policy and technical capacity in water management.

While the Kabul river is a major cause of tension between Afghanistan and Pakistan, it also presents an opportunity for mutually beneficial cooperation. The river flows from the Hindu Kush through Kabul and Nangarhar, and over the border with Pakistan, ending when it joins the Indus in Pakistan. The Amu Darya river, with the largest basin in Afghanistan in terms of water volume discharge, flows from Badakhshan's Wakhan corridor in the northeast of Afghanistan and forms the country's northern border, separating Afghanistan from Tajikistan, Uzbekistan and Turkmenistan as it runs west towards the Aral Sea.

The countries bordering these rivers all require reliable irrigation, flood control and hydropower, as well as safe supplies for drinking and domestic use, and conditions are apposite for a comprehensive regional agreement. However, a lack of trust between neighbouring states and the instability within Afghanistan mean that the political will to reach agreement has fallen short. During the time of the Soviet Union the Central Asian states brokered a number of agreements between themselves to share water and exchange it for other resources such as energy, but Afghanistan was not included.

The Helmand river, the country's third largest in terms of volume discharged, also starts in the Hindu Kush and ends in the saline Sistan basin of southwest Afghanistan and Iran. Unlike many rivers with no sea outlet, the Helmand is relatively free of salt and has for centuries been crucial to traditional irrigation in Kandahar and Helmand provinces. The two smallest river basin systems in Afghanistan are the Northern basin, in the central northern provinces of the country, and the Hari Rod–Murghab, which flows to Iran through Herat province in the west.

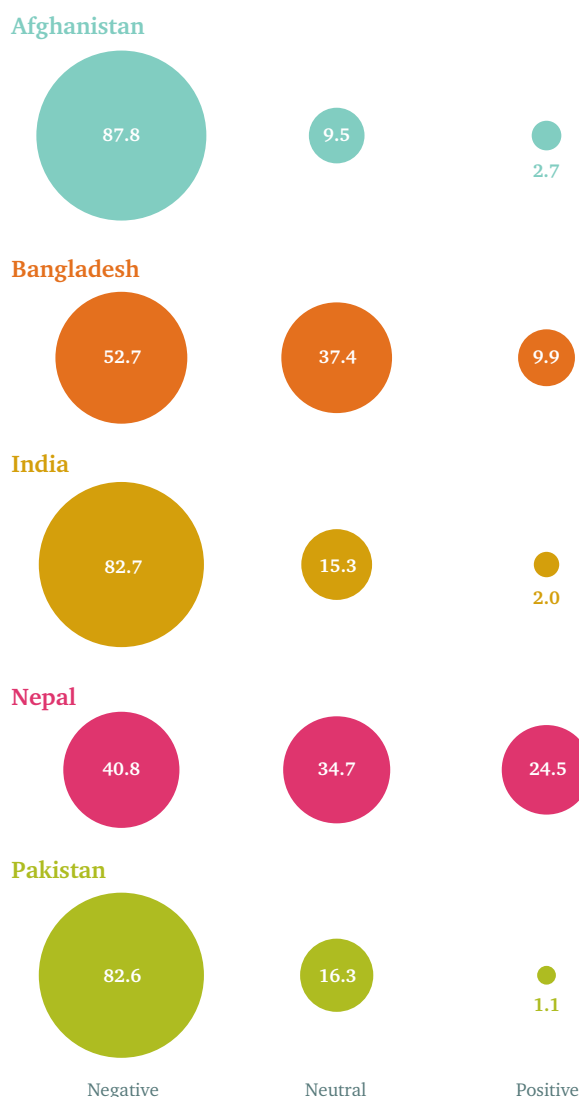
As well as transboundary disputes, both river systems are subject to internal disputes between states and provinces. In India, Delhi, Haryana, Himachal Pradesh, Punjab and Rajasthan all dispute the sharing of water from the Sutlej and Yamuna rivers and the associated link canal. Madhya Pradesh and Bihar dispute rights to the Son river, while Madhya Pradesh and Uttar Pradesh argue over the construction of the Rajghat dam on the Betwa river. In Pakistan the proposed Kalabagh dam has divided opinions between Punjab, which is perceived to be the beneficiary of the project, and Khyber Pakhtunkhwa and Sindh.

### 3. Attitudes Towards Water Management

Across the region, water management was largely assessed as being poor. Declining water quality and domestic mismanagement, together with rising population, were cited as the main challenges in the water sector.

Concern was expressed in many countries at the gap between (often) good policies and their implementation. This was particularly marked in Bangladesh, where the 1999 Water Law was highly praised. In several countries respondents contrasted failing national strategies with more effective locally managed systems. The question of coordination both between central governments and local officials, and between different ministries with responsibility for one or more aspects of water management, was also widely raised in the context of overall water governance.

**Figure 3.1: How do you rate the current water management? (%)**



Respondents in Afghanistan pointed out that the local situation plays a key role in the success or failure of localized water supplies. Different natural risks and political environments, as well as (in Afghanistan) conflict and tribal dynamics, provide the context in which water is distributed within the community. In Pakistan, similarly, variations between water management in Punjab and Khyber Pakhtunkhwa were attributed to different landholding systems – and hence to different power structures. Access to water was more egalitarian in Khyber Pakhtunkhwa, where landholdings were deemed more equal. In most other countries there was a broader division between water management in urban and in rural areas.

Lack of coordination between government ministries was cited as a problem throughout the region, as was the lack of coordination between central government and local level. In Afghanistan, for instance, high levels of donor funding meant that there was considerable expertise at the national level, but the capacity of officials declined markedly at lower levels. This theme was replicated across the countries in terms of the lack of capacity of local officials – and frequent complaints about corruption (particularly in Afghanistan, Bangladesh, India and Nepal, though less so in Pakistan), which was seen as an impediment to effective water management. In turn, community-led projects were frequently regarded as more effective than government initiatives. In India, for example, many water experts were critical of the National River Linking Project (NRLP) on a variety of counts, including the fact that the scheme was too centralized.

Afghanistan’s approach to water management appeared to be stuck in a particular vicious circle. Because government systems are widely seen as ineffective and corrupt, donors channel funds through international NGOs, bypassing government systems and keeping Afghan capacity low.

In India the lack of a coherent water management strategy was seen as one of the most pressing problems facing the country. Many respondents, as in Bangladesh and Pakistan, linked the challenge to population growth. The ad hoc approach to water management adopted in India was seen as unrelated to any clear overarching objectives or sense of optimum water efficiency. But while Bangladeshi respondents highlighted India’s actions as being detrimental to the downstream riparian, Indian respondents felt that their failure to harness water was one of the key challenges (in the context of reliance on the monsoon, and with precipitation concentrated in a small time-frame).

Indian respondents were the most vocal in expressing the need to move the agricultural sector away from water dependence. Urbanization and industrialization were frequently cited as shifts that required a new approach

towards water management. Incentivizing the cultivation of less water-intensive crops was regarded as one approach that could serve to encourage more effective water usage. Water scarcity in urban areas was seen to be a function of poor water management – rather than a natural shortage – because of over-consumption by the agrarian sector. In turn, this was seen as a result of an unclear division of responsibility between central and state governments, and local bodies. As many as eight central government ministries in India had responsibility for some aspect of water management under the previous government.

In Nepal – the most water-secure of the countries surveyed – the key water management challenge was regarded as being poor water-related physical infrastructure, as the country suffers from seasonality of water availability. As noted, while traditional systems of water management were previously sufficient, rapid urbanization and increased population levels have put a strain on the country's water resources, particularly during the dry seasons.

### **Numerous respondents in India, Pakistan and Bangladesh noted that slum dwellers in cities frequently paid more, either in cash or in time and effort, than those in more affluent districts.**

Additionally, various approaches to water management – rainwater harvesting, recycling water, monitoring groundwater – are still in their initial stages in Nepal and need to be developed. Increased awareness of these issues, as well as education on water conservation, for instance, received widespread support as a means of encouraging more effective water usage. With the country suffering an intense energy crisis, water was also clearly seen in the context of potential hydroelectricity, necessitating a more integrated approach towards water management.

The need for enhanced water storage – linked to the temporal distribution of precipitation – was common across each country. In Afghanistan, Pakistan and Nepal most respondents tended to focus on large-scale infrastructure (dams and reservoirs), and in the case of both Pakistan and Nepal this was closely linked to the potential for greater electricity generation. Energy shortages in both these countries have major economic impacts. In India, by contrast, such approaches were considered by many (non-government) respondents to have failed. Here, the preference was more for localized and 'off-grid' water storage options (despite the concerns expressed in downstream countries with regard to India's plans for large-scale infrastructure).

Across the region, those with economic – and thus political – power appear to find it easier to secure access to water. Numerous respondents in India, Pakistan and Bangladesh noted that slum dwellers in cities frequently paid more, either in cash or in time and effort, than those in more affluent districts. But understanding this political economy, particularly in rural areas, is difficult if water is relatively plentiful. Only when a commodity becomes scarce can these dynamics be grasped. This point was highlighted more in relatively water-scarce Pakistan and Afghanistan – as well as in urban areas across South Asia – than in those rural areas in which water is more plentiful.

In Pakistan both local and provincial dynamics are in play. Some respondents argued that feudal landowners in Punjab consumed water with little regard for the consequences for smaller farmers downstream. As noted, this was not felt to be the case in Khyber Pakhtunkhwa, where landholdings (and thus political power) were distributed more equitably. Similar dynamics were noted in Afghanistan. Even where the traditional community *mirab* remains important in water distribution, many respondents suggested that these come under pressure from powerful local figures, enabling those with political influence to use resources for more water-intensive crops.

The politics of inter-provincial water-sharing in Pakistan has focused on the mooted construction of the Kalabagh dam, frequently considered to benefit Punjab at the expense of downstream Sindh (which fears reduced water flow) and Khyber Pakhtunkhwa (parts of which would be flooded). These interstate differences were reflected in attitudes towards IRSA, with many Punjabi respondents critical of the fact that the current chairman is from Sindh.

Respondents from Sindh suggested that the divisive ethnic politics of Karachi had enabled the growth of 'tanker mafias', able to steal water and then sell it on for three times the standard amount. In India, similarly, some respondents from Delhi expressed fears that criminal gangs were stealing water to sell on to water-scarce communities in the city.

In India a recurring concern was the over-extraction of groundwater, which had led to a rapid decline in the water table in many parts of the country. In part, this would seem to explain the preference among experts for locally managed institutions, away from both national organizations and local politics. Some respondents criticized the manner in which politicians promised free electricity to farmers, in turn allowing them to run pumps and thus overuse groundwater to cultivate more water-intensive crops. Rather than the focus being on the political economy of water usage, instead the issue was seen through the lens of vote-bank politics, with concerns for water efficiency overshadowed by a political system predicated on garnering rural votes.

Support for ‘traditional’ systems of water management was most marked in Afghanistan and India. In the case of India, this reflected a shift – particularly within civil society – away from ‘Western’ models of water provision. In Afghanistan it was more reflective of day-to-day realities. Successful water management there reflected good traditional practice rather than state-delivered water. In India it reflected the apparent failure or unsuitability of Western models. In Nepal growing population pressure was cited by a minority of respondents as a reason to revisit traditional systems. Elsewhere (and among government respondents in Afghanistan and India), there was greater support for engineering-centred water provision.

Across the region there was widespread concern about declining water quality. Respondents in Bangladesh were most concerned about pollution, in part because of widespread awareness of arsenic contamination, as well as rising salinity. In India, too, concerns about industrial pollution, as well as poor sewage disposal, were widespread, as was criticism of expensive government schemes to clean up rivers. In Bangladesh, India and Nepal concerns about pollution were often linked to disease. Declining water quality in Nepal was blamed on unplanned urbanization and population pressure, particularly in the Kathmandu valley, as well as on under-investment in infrastructure. The need to prioritize sewage disposal was particularly noted in Nepal, but was common region-wide. In Pakistan, too, degraded water quality was cited as a major threat to the availability of water.

In India and Pakistan regional differences in water management were noted. Varying road connectivity in rural India was seen to result in inequitable access to a range of resources including food and water. Lack of water access in more poorly connected states such as northeast India, Rajasthan and Bihar contrasted with states such as Madhya Pradesh and Kashmir where, for industrial or strategic reasons, road networks were better developed. Poor sanitation coverage was also seen as linked to literacy levels: hence states such as Tamil Nadu and Karnataka were thought to have the best coverage while Uttar Pradesh, Chhattisgarh and Bihar were among those with the worst.

In urban India, several respondents cited a north–south divide in relation to urban service delivery and water access, with the south performing better. Respondents most commonly attributed this to a positive correlation between water adequacy and social indicators such as education, life expectancy and income. Many also felt that Urban Local Bodies (ULBs) did not take sufficient account of either the safety or the convenience of women. Many said that these regional differences reflected political will, with one respondent suggesting that a vicious circle had developed,

whereby those states with greater economic potential had better access to water, while less developed states suffered.

While proponents of privatization hailed Karnataka as an example of continuous water supply and efficient management, Tamil Nadu came a close second for making use of traditional methods such as tanks and rainwater harvesting on a large scale. Many respondents felt that the interstate water disputes in the north and all-round poor management created more pressure on transboundary water issues.

Almost all respondents agreed that Pakistan was in need of additional water storage capacity, and that this was best addressed through the construction of dams and water reservoirs. The construction of the Kalabagh dam was often cited as the best means to improve capacity, although several experts questioned the rationale for its construction. Nevertheless, increasing water storage capacity was perceived as the best means of addressing water and food security issues. A large number of respondents also agreed that water conservation strategies were needed in Pakistan, where they do not otherwise exist. Additional water storage and water conservation were seen as two sides of the same argument. It was pointed out that, to date, there is no legislation or policy on the latter in Pakistan. The perceived importance of water conservation was thus belied by lack of action taken to promote or enforce it.

While there was broad agreement in Pakistan that among the provinces Punjab maintained the best water practices, there were two very strong voices in support of others. Experts and respondents from other provinces also highlighted how existing water management practices particularly affected local communities in their jurisdictions. One water expert spoke highly of conservation practices in Balochistan, referring to its groundwater conservation legislation as a model for the country.

## Community participation

Respondents across the region expressed strong support for greater ‘community participation’. Centralized systems of governance were frequently criticized on the grounds that officials at the centre had little awareness of the needs of local people. While many central government strategies frequently refer to decentralization, there was widespread criticism of the extent to which this occurred in practice. Support for community participation, and by implication a bottom-up approach to water management, also appeared to reflect the perceived failure of past top-down approaches. Indian respondents in particular made reference to failed ‘Western’ approaches to water management. This was less the case in Bangladesh, where many respondents supported any approach ‘that worked’.

In India many respondents felt that empowering communities through a rights- or entitlement-based approach, rather than the decentralization of water management, would prove to be the most effective means of improving access to water. A significant number of interviewees floated the idea that the right to water should be constitutionally guaranteed, although some of these noted that such a move would require the politically difficult step of changing the status of water from being a state responsibility and placing it on the Concurrent List (concerning relations between the central and state governments).

Afghanistan is the most extreme example of the lack of government capacity making most of the rural population self-reliant for their water needs. Water is community-managed, although a number of interviewees in Afghanistan (as well as in Pakistan) pointed out that women – who were disproportionately affected by decisions made – were often excluded from the decision-making process. In general, localized, community-based projects were regarded more positively than government-initiated ‘national’ schemes, which seemed disconnected from realities on the ground.

In Nepal water management in communities has seen an improvement, with growing levels of local participation, education and awareness with regard to issues such as sanitation, health and water as a finite resource. Most districts in Nepal now have a district water committee that oversees the water needs of its respective area.

While the government in Nepal has been unable effectively to manage water in these areas, various communities have taken matters into their own hands and have developed effective community-managed systems to meet the needs and requirements of their own villages. These systems are often based on the ideas of reuse and recycling of water.

In Pakistan most respondents felt that the needs of local communities were insufficiently taken into account. Many noted that the government focused primarily on large-scale engineering schemes, which often led to the displacement of local communities. Very few respondents felt that gender issues were sufficiently taken into account in water management programmes.

## Floods and droughts

Closely related to matters of local community engagement in water issues is the question of disaster response. Effective disaster response requires community engagement and empowerment. Despite significant investment across the region in disaster management and response in recent years, a significant proportion of respondents in the countries surveyed felt that their government’s ability to

deal with floods and droughts (where applicable) had either declined or stayed the same over the previous decade. While many noted that government capacity had improved, this appeared to be counterbalanced by the sense that countries were experiencing a greater frequency of disasters – notably floods – in recent years. The gap between policy and implementation was noted region-wide, as was the impact of financial constraints.

Respondents in Bangladesh were most convinced that their country’s capacity to deal with floods had improved because of better early warning systems, disaster response and mitigation. The Center for Environmental and Geographic Information Services (CEGIS) was widely praised for improving community-level flood forecasting. The move away from ‘flood control’ and towards ‘flood management’ was cited as evidence of a better understanding of floods. Many respondents in Bangladesh linked flooding with upstream (i.e. India’s) actions.

**Despite significant investment across the region in disaster management and response in recent years, a significant proportion of respondents in the countries surveyed felt that their government’s ability to deal with floods and droughts had either declined or stayed the same over the previous decade.**

Responses in India were more mixed. Broadly speaking, perceptions of an improved approach to dealing with disasters were offset by the sense that the frequency of floods and droughts was increasing, and that flawed urban planning heightened the impact of disasters. India’s performance was perceived as having improved on the reactive side, but not in terms of proactive measures, and questions were raised about the last-mile connectivity to disseminate warnings regarding disasters.

In Nepal respondents were very positive about the introduction of a new Department of Water Induced Disaster Prevention, although many noted that its effectiveness remains largely untested. Nepal appears to lag behind India and Bangladesh in terms of disaster response. Many respondents suggested that it should focus more on preparedness and mitigation than on response. In both Nepal and Bangladesh many respondents were critical of a lax government approach towards encroachment – i.e. the construction of shelters or houses in flood-prone areas.

Views in Pakistan understandably focused on the series of devastating floods that had hit the country in recent years. While many interviewees suggested that the response to the 2013 floods demonstrated that institutional capacity to deal with flooding had not improved markedly, others

argued that the establishment of disaster management authorities at national, provincial and district level pointed to greater government attention to disasters. Respondents also linked flooding to the need for increased storage capacity.

## Data collection

While data collection is important for transboundary water relations, the level of data gathering for domestic water management came under criticism – on varying grounds – in each country.

In Afghanistan insecurity and low capacity meant that data collection was poor. In the absence of data, the ability of communities to negotiate with on another over water consumption was limited. Many respondents mentioned specific monitoring or data-collection efforts for which a large number of measurement stations were not operational.

Similar concerns were raised in Bangladesh, where many experts felt that the standards of data collection were lower than in the past. Many blamed the resource constraints (in terms of both manpower and funding) facing the Bangladesh Water Development Board. Similar criticisms emerged from Nepal. There, a reliance on out-of-date data stemmed from a failure to collect more recent statistics. The dissolution of Nepal's Ministry of Water Resources was frequently cited as a move that had diminished the country's research capacity. Another, linked, complaint that surfaced across the region (although less so in Afghanistan, given the widespread absence of data) was the misuse or circular repetition of incorrect data. Examples given included underestimates for the amount of water consumed by the agricultural sector compared with household and industrial consumers. In Bangladesh, unlike in other countries, many respondents argued that water data should be 'holistic', encompassing social science as well as raw technical data.

Downstream and upstream riparians were critical of India's failure to share data; and, clearly, the climate within which transboundary water relations are conducted would be eased if it were to do so. Indian respondents were more sanguine, being critical of the lack of coordination of data – rather than the lack of data *per se*, or secrecy pertaining to water data. While there were calls for the Indian government to make water data more accessible, an array of other institutions provided many broad data-sets. In addition to criticism of India, respondents in Pakistan also focused on the lack of agreement on data-collection methodology within Pakistan itself, although many respondents noted that Punjab does maintain an online resource of canal water management.

## Pricing and privatization

Attitudes to payment for water varied between the countries studied, depending on the water distribution currently in place. Some ideas did permeate the whole region: the idea that the poor should pay less than the rich for their water was commonplace, along with the observation that frequently the reverse occurred. Similarly, the notion that pricing should be 'fair' was widespread. Attitudes towards privatization were more mixed. While there was widespread scepticism, there was general agreement (with exceptions) that if consumers received an uninterrupted supply of clean water, they would be happy to pay more.

At the same time, in some countries – notably India and Nepal – there was support for private companies provided that they ensured a continuous supply at a reasonable price and did not monopolize the sector. The opposition to privatization, particularly strong in Bangladesh and among non-government respondents elsewhere, stemmed from fears that governments would be unable to enforce regulations on pricing or water quality standards, for instance.

Many responses suggest that an apparently contradictory position is widespread. While many people believe that water is currently underpriced – either in general or for specific sectors – at the same time they believe that current prices are too low for the service actually provided. The disconnect between theory and practice permeated attitudes towards water management in South Asia. For instance, in those countries where water metering is relatively commonplace, many critiqued not the policy itself but its implementation, noting that overcharging or demands for additional payments were commonplace. Given community management of water in most of Afghanistan, these issues are irrelevant for most water users there. In Kabul, where water is semi-privatized, the same willingness to pay, provided that the service was delivered, was apparent. In Nepal, similarly, the willingness of households to pay far more to private tankers, and in communities where water supply was uninterrupted, was held up as evidence that people were prepared (or at least able) to pay provided the service – i.e. water – was actually delivered.

A significant number of interviewees across most countries expressed the view that water was a 'fundamental right' or a 'basic necessity'. While not all of those who held this position felt that water should therefore be free (although many Pakistanis considered that this should be the case for drinking water), an underlying attitude, particularly from civil society, was that water should not be 'marketized' or commodified.

In every country (apart from less-industrialized Afghanistan) it was widely thought that industry should pay more for its water consumption. In India and Pakistan most

respondents felt that agricultural users should pay more. While this was less the case in Bangladesh, government officials there noted that the current prices of water for irrigation were far lower than the cost of its delivery, while farmers reliant on groundwater had demonstrated a willingness to pay private operators of tube wells.

Again (apart from in Afghanistan), the idea of progressive pricing of water was widely recommended, whereby the poor would get access while more judicious use of water by the more affluent would be encouraged. Another similar issue raised repeatedly was that slum dwellers frequently pay far more for their water than do those with access to piped water.

Water experts in India were largely supportive of pricing, often demonstrating the widespread awareness of overuse or wastage of water in the agricultural sector. However, many NGO and civil society respondents held a counter view and were wary of treating water as an economic good. Many took the position that water should be seen as a 'common pool resource', rather than as a commodity to be marketized. This perhaps reflects the growing importance of water not in abstract terms, but as part of a vital nexus linked to food, energy and social equality.

## Water conservation

Water conservation was largely viewed by respondents in terms of enhancing water storage, rather than reducing demand-side usage. Throughout the region, furthermore, there was a general sense that water management has focused insufficiently on conservation, thus defined.

In Afghanistan and Pakistan issues of water conservation were seen to be the key challenge, and there was strong support for water conservation. While some respondents supported small-scale storage and harvesting solutions for water, the majority view in both countries was in support of large-scale dam construction as well as the better maintenance of existing infrastructure. Across the region there was support for more education on water conservation, which many thought could be a key policy tool in areas of water scarcity.

In Bangladesh questions on water conservation elicited a range of opinions. Many experts noted the topographical restrictions limiting Bangladesh's ability to store water. Others talked of the need to focus greater attention on preserving natural water bodies; several respondents raised concerns about ecological problems arising from a failure to preserve such bodies. Some argued that domestic water wastage could be tackled through the imposition of some form of cap on usage and raised the issue of underpricing of water by the Dhaka Water Supply and Sewerage Authority

(DWASA). The general consensus, however, was that water is a scarce resource that is often wasted in riverine Bangladesh.

The inability to implement or enforce existing rules and regulations intended to protect the environment was widely noted in Bangladesh and India. When such laws were implemented, many in India noted that the sanctions for breaching them were insufficient. By contrast, the lack of coherent water conservation legislation or policy in Pakistan and Nepal was flagged as a source of major concern. Many Indian respondents felt that the desire to conserve water (whether to enhance supply or to reduce demand) would only be effective once water is 'reprogrammed' as an exhaustible resource.

The sense that Western water management models had failed in India was widespread, and this was reflected in the strong support for localized conservation techniques – such as rainwater harvesting and watershed management – which could help counter over-exploitation of groundwater. However, the belief that such techniques were not scalable was also commonplace. Instead, community-based action was required to supplement (more scalable) government efforts.

In Nepal – the most water-secure of the five countries covered by the project – there was little awareness of the notion of water conservation in rural areas, although it was seen as a burgeoning idea in urban areas in view of water shortages. Water conservation efforts were seen to be reactive rather than proactive. Attitudes did vary, perhaps unsurprisingly, between flood-prone areas and areas where water is more scarce. Concerns were expressed, moreover, regarding the impact of concretization and surface run-off on groundwater recharge.

Relatively low levels of industrialization in Nepal limit the relevance of water conservation in industry. That said, instances were cited where Nepal's private sector had started re-examining traditional water conservation practices and water harvesting practices for commercial reasons. In India respondents expressed strong support for strict water audits for industries.

## Role of religion

Various notions, some relating to religion, permeate attitudes towards water conservation. In Bangladesh water conservation efforts are undermined by the notion of water as an infinite resource. In Afghanistan, similarly, the belief that water is a God-given resource hinders attempts at conservation. In a number of countries the UN-backed notion of water as a 'human right' was held to be problematic in encouraging better water use. In India

several respondents suggested that efforts to preserve the Ganges should take account of its mythological significance and the fact that Hindus hold the river as sacred. In Afghanistan and Pakistan there was mixed support for using religious arguments to conserve water. There was somewhat stronger support for such an approach in India, enabling leveraging of the social and cultural values that relate to the country's rivers.

In Pakistan, notably, there was a significant divergence between those who believed the two issues should be kept separate (frequently because of the impact of introducing religious arguments into other discourses) and those who felt that it could be positive to use such arguments (on issues such as water conservation or environmental concerns) and/or use religious leaders as a network for public messaging.

In Afghanistan Islamic law already permeates domestic laws and water management. Religious leaders are often represented in local water councils, providing Islamic guidance to decision-makers – although often, as several interviewees pointed out, in the absence of awareness of technical data. One interviewee argued that 'Islam cannot help build dams and irrigation channels'. Many Afghan respondents pointed out that the 2009 Water Law was based on the Qur'an. This idea was reflected in many interviews, including those with government officials. According to an MRRD official in Kabul: 'It is said that Allah's throne is not on gold or precious metal but on water.' In Afghanistan (though less in Pakistan) several commentators supported the use of Islam to give information regarding sanitation practices.

An additional issue in India relates to the use of the Ganges for burial rituals. On this, again, major differences of opinions were expressed. While some respondents held the view that religion was a factor contributing pollution to the river, others were adamant that the religious value of the river was non-negotiable, with a smaller group arguing that the impact on the river was low. In Nepal, too most respondents felt that the religious connotations of the Bagmati river had not helped in terms of limiting pollution.

## Climate change

The ability of countries of South Asia to deal with the possible effects of climate change will be in part determined by their ability to manage water – and by association their ability to deal with weather events such as floods and droughts. While many respondents across the region felt that other immediate concerns were more pressing, the majority of those interviewed expressed concern that their governments were giving the issue of climate change insufficient attention.

Having said that, the idea that the countries that are largely responsible for climate change should take responsibility for dealing with its effects was also widespread.

Afghanistan's approach to climate change was clearly viewed with a good deal of scepticism. Even where respondents had some knowledge of the National Environmental Protection Agency (NEPA), identifying it as the body responsible for setting government-wide policy on climate change, they were equally certain that the amount of practical action on the issue was virtually zero. The majority of interviewees were not aware of any coherent effort on the part of the government to address the challenges of climate change, and most were only vaguely aware of individual pronouncements or project-related efforts in respect of the problem.

Many Afghans felt that extreme weather events such as floods and droughts had become more frequent over the past decade, but few were able to cite any implementation of mitigation programmes. As with a range of initiatives in Afghanistan, policy towards climate change apparently highlights the gulf between the national policy framework (which is often of an internationally recognized high standard) and implementation on the ground (which is underfunded and lacking oversight, and appears uncoordinated with national policy). A few respondents recommended that Afghanistan's inclusion in regional frameworks would facilitate discussion and help ground-level operations focus more on climate change and how it could be tackled.

## Most respondents felt that Bangladesh had done well in spreading international awareness of its vulnerability, but that the international community had not been sufficiently responsive.

Given its low-lying position, most respondents in Bangladesh were acutely aware of climate change and its possible effects. There was a general consensus that the government had made climate change a priority and had set aside funds for both adaptation and mitigation. Some commentators suggested that Bangladesh's Climate Change Strategy and Action Plan needed scope for revision in order to tackle emerging challenges such as migration, and to secure climate change-related technologies.

Most respondents felt that Bangladesh had done well in spreading international awareness of its vulnerability, but that the international community had not been sufficiently responsive. Both Bangladeshi and Afghan respondents noted the common failure to translate policy documents into local languages: in both countries important documents were written in English and not translated.



In India most respondents felt that climate change was not a major priority for the government, although the feeling that it could wreak havoc on the country was widespread. Most felt that India's policy framework with regard to climate change was inadequate. Climate change was often linked to the question of inadequate water storage.

Inadequate storage leaves farmers vulnerable to the vagaries of the weather, suggesting an urgent need for appropriate investment in such facilities in order to increase agricultural productivity and to ensure that farmers have options to adjust to a changing climate. Respondents across the region were of the view that the impact of climate change on transboundary water relations would also prove to be substantive. In the case of India and Bangladesh, some feared that a variation in the timing and intensity of monsoon rains could affect agricultural production and weaken food security, driving tension between the two over access to water during dry periods.

In Nepal awareness of climate change and its impact was relatively underdeveloped. Climate change was perceived to be a future threat – certainly in comparison with immediate challenges and the need to increase access to water and electricity. At the same time, low levels of industrialization mean that there is little Nepal can do to mitigate climate change, which was regarded by respondents more as a challenge for industrialized countries. That said, most respondents felt that Nepal's approach was inadequate.

As elsewhere, the gap between national plans and local implementation was widely noted. Many respondents saw the issue of climate change through the lens of glacial melt, while issues of (the lack of) data or relevant research were also noted.

### **A climate change expert working in the federal government argued that Pakistan stood on the brink of an environmental cataclysm, with the seasonal monsoons shifting away from traditional catchment areas towards Afghanistan.**

A broad cross-section of experts in Pakistan believed that the country's approach to climate change lacked the requisite urgency. Several respondents argued that the downsizing of the Ministry for Climate Change to the status of a Climate Change Division, as well as the slashing of its budget, were signs that not enough importance was being given to an issue that was in need of immediate attention.

A climate change expert working in the federal government argued that Pakistan stood on the brink of an environmental cataclysm, with the seasonal monsoons shifting away from traditional catchment areas towards Afghanistan. This trend, reinforced by climate change, increased the likelihood of extraordinary rainfall patterns, cloudburst and flash floods.

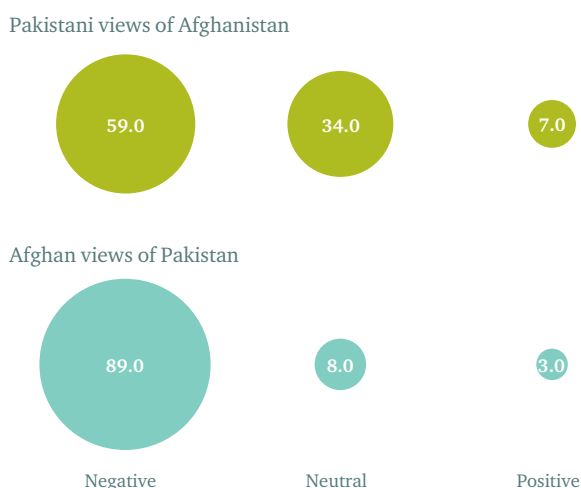
## 4. Attitudes Towards Transboundary Water

Current assessments of transboundary cooperation are negative. When asked to rate relations on water issues with their neighbours, most respondents across the region described them as poor. Discussions of transboundary water matters in South Asia suffer from increasing politicization and negative attitudes towards the issue generally, linked with overarching political distrust between neighbouring countries. Transboundary negotiations generally focus on the availability of a volume of water for a downstream riparian, and have been disconnected from other human development and environmental issues. They have rarely involved more than two riparian states.

Consequently, transboundary debates are set around concerns about the impact of the construction of infrastructure, notably dams, on a downstream riparian. While transboundary water issues give rise to concern throughout South Asia, the context in which debates are framed diverges from country to country.

In Afghanistan, Bangladesh, Nepal and Pakistan attitudes towards water are conditioned by transboundary issues and stances towards neighbours: Afghan stakeholders focus on Iran and Pakistan, in particular, while those in Bangladesh, Nepal and Pakistan focus on India. In India, by contrast, there is a clear divide between a community that focuses on domestic water issues and one that looks at transboundary issues. Only in India, for instance, was it common for an individual who was clearly an expert on domestic water issues to profess to have no knowledge of, or opinion about, transboundary water issues. In Bangladesh, however, there was near unanimity regarding the importance of India in relation to Bangladesh's internal water security.

**Figure 4.1: Perceptions of transboundary water cooperation (%)**



The impact of 30 years of conflict filtered through the interviews in Afghanistan. Most respondents there argued that the country should simply ignore the demands of its neighbours and do what it had to do in order to secure sufficient water for its own people and land. While admitting the practical difficulties of such actions, some went so far as to completely reject the necessity of water-sharing agreements with neighbours, regardless of the implications for lower riparians. A similar view was that Afghanistan's priority should be to develop control over its own water before attempting to negotiate international agreements.

Rather than being seen as a shared resource, the Amu Darya, along with the Panj river, is the literal and metaphorical boundary between Afghanistan and Central Asia. But most respondents felt that there was a marginally greater opportunity to engage on water issues with Afghanistan's northern neighbours – and with Tajikistan in particular – than with Iran or Pakistan. Some hoped that Afghanistan could plug into existing water agreements between the Central Asian states. Given similar conditions to both north and south of the river, many of the problems facing Afghanistan also affect its neighbours. The countries bordering these rivers all require reliable irrigation, flood control and hydropower, as well as safe supplies for drinking and domestic use, and conditions are apposite for a comprehensive regional agreement. However, a lack of trust between neighbouring states and the instability within Afghanistan mean that the political will to reach agreement has fallen short.

Afghanistan's relations with Pakistan in general, and concerning water in particular, were judged by most to be the poorest of all the neighbouring countries. While interviewees noted the lack of agreement and cooperation in relation to Central Asia, Pakistan was regarded as a malign influence that could not and should not be trusted. This view was most common among Afghan respondents, many of whom felt that Pakistan was almost certainly exerting pressure to prevent international organizations funding water projects within Afghanistan. While international staff – i.e. advisers to government departments, academics and representatives of NGOs – were less convinced that this was the case, they too felt that it would be difficult to forge any agreement with Pakistan given current political animosities.

Respondents' opinions of Iran and Pakistan were overwhelmingly negative, and this varied little geographically (that is, between respondents in Herat, near the Iranian border, and those in Jalalabad, near the border with Pakistan). The only structure of regional cooperation between Afghanistan and its neighbours is the Helmand River Treaty, negotiated with Iran in 1973. The treaty determined the precise amount of water that should flow

across the border to Iran. While it nominally came into force in 1977, the process through which it was arranged was opaque and its ratification and implementation are still subject to dispute.<sup>4</sup> The revolution in Iran in 1979, and the turmoil that engulfed Afghanistan soon after, meant that there was little opportunity to build on what is, by many accounts, a modern benefit-sharing water agreement. Efforts have continued to revive and implement the treaty, but accusations of Iranian actions affecting water supply within Afghanistan, and Iran's avoidance of compensation payments as set out in the 1973 treaty, have only increased mistrust. Mutual suspicion and wider political disagreements have remained obstacles to further development of cooperative water relations.

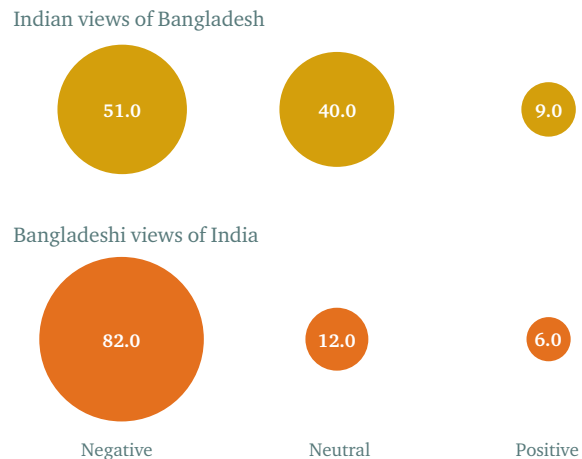
The perception of neighbouring countries' position with respect to Afghanistan varied between different communities themselves. While international staff talked about the political influence of Pakistan and Iran on the politics of natural resources in Afghanistan, Afghans themselves were generally much more hostile, accusing Pakistan of attempting to keep Afghanistan in a state of instability from which Pakistan would benefit. Foreign malevolence was a common theme, cutting across geographic locations; even so, the vehemence with which some respondents expressed their opinion was startling. Some even felt that any attempt to negotiate a treaty with Pakistan or Iran should be opposed, on the grounds that individual political interests would trump Afghan national interests in negotiations. Afghanistan's national interest, they maintained, should be the sole calculation in relation to water storage infrastructure. In short, unless overall political relations improve, it is difficult to envisage an improvement in Afghanistan's transboundary water relations.

In Bangladesh, in contrast, better water relations with India could presage a broader improvement in bilateral relations. Water issues play a key role in explaining anti-Indian sentiment. There is widespread support in Bangladesh for basin-wide transboundary river management. Both government and civil society figures who participated in the survey talked about the need for regional integrated water management, looking at other multilateral examples such as the Mekong River Commission.

Consider how India is pressing China over proposed Brahmaputra dams, it is similar to our case with India. If there is diversion and mismanagement in the upstream, the lower riparian countries face multifaceted consequences.

**Environmental activist, Bangladesh**

**Figure 4.2: Perceptions of transboundary water cooperation (%)**



In Bangladesh the idea of a 'holistic' approach to water was evident in the interviews. Many suggested that social scientists and ecologists should be more engaged in questions relating to water, particularly regarding the construction of water infrastructure. Their responses conveyed a growing rejection of the idea that water is treated as a technical problem to be solved solely by engineers.

That said, the overwhelming majority of respondents in Bangladesh expressed feelings of disappointment, frustration and helplessness in relation to transboundary rivers, and particularly in relation to India. Many emphasized the fact that of the 54 transboundary rivers between Bangladesh and India, there is only one water-sharing arrangement – the 1996 Ganges Water Treaty. Long-standing disputes over the diversions by the Farraka and the Teesta barrages, plus soil salinization caused by the Tipaimukh dam, remain ongoing sources of contention between India and Bangladesh.

Attitudes towards water-sharing in India are of course crucial to regional progress. The results of the interviews there contained many grounds for optimism, but also indicated several stumbling blocks impeding better relations. Interestingly, respondents were generally much surer in their replies when discussing the lower riparians – Pakistan and Bangladesh – rather than upper riparians – China and Nepal. Concerning the upper riparians, responses were much more varied, with many interviewees saying that they did not know enough about the subject.<sup>5</sup>

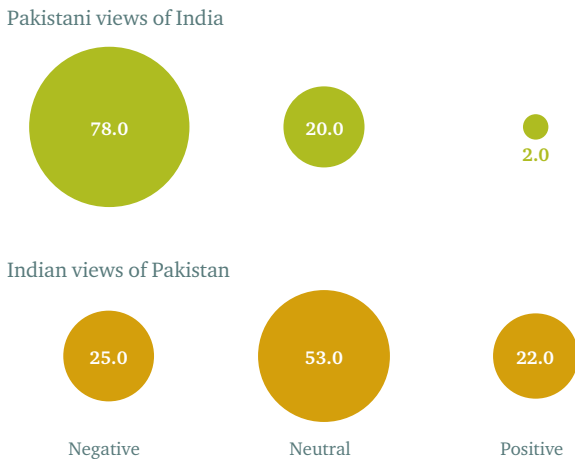
Geopolitical issues cause problems. It is usually not the water issue which causes problems, it is generally politics, which then also affects negotiations and cooperation on water.

**Researcher, India**

<sup>4</sup> Bill Samii, RFE/RL, 'Iran/Afghanistan: Still No Resolution for Century-Old Water Dispute,' 7 September 2005, <http://www.rferl.org/content/article/1061209.html>.

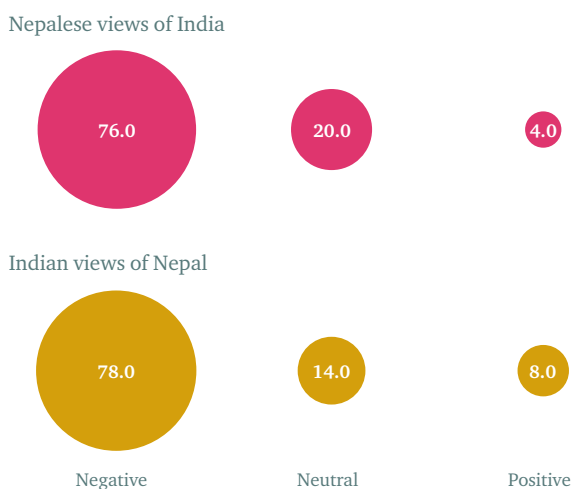
<sup>5</sup> Our figures have excluded those respondents who responded 'do not know', as well as those who 'preferred not to comment'. In most countries in the survey, these numbers were small. The exception was India, where a significant number of respondents were unable to rate transboundary water relations. As many as 50 per cent of Indian respondents said that they did not know enough to rate India's relations with Nepal; 33 per cent did not know regarding Bangladesh, and 27 per cent regarding Pakistan.

**Figure 4.3: Perceptions of transboundary water cooperation (%)**



This statement may go some way to explain why India’s relationship with Pakistan over water was seen as fair by more than half of the interviewees. A similar proportion described the relationship with Bangladesh as poor, and the relationship with Nepal was seen to be even worse. Given that the IWT has survived the political differences and even wars between India and Pakistan, the dominant feeling in India is that the water relationship with Pakistan is positive. In the case of Nepal and Bangladesh, where the overall political relationship with India is easier, expectations have not been met. Lack of political will both in India and on the part of its neighbours was often blamed for deadlock.

**Figure 4.4: Perceptions of transboundary water cooperation (%)**



There is nothing more beneficial than two countries affected by the same rivers, coming together to prevent calamities. There cannot be an easier method of cooperation.  
Government official, India

As regards lower riparians, however, interviewees in India supported working on smaller and less controversial projects of joint interest. Some suggested that a ‘benefit-sharing’ model could be worked out, dividing external costs and subsequent benefits. A few argued that a parallel communication network comprising hydrologists, sociologists and other specialists could be facilitated to circumvent the politics that hinders official negotiations and dialogues.

If we all remain stuck to reductionist and statist mentality, our water future and stability in the region is doomed. A sense of commonality, responsibility and joint ownership needs to be brought in place for transboundary rivers management.  
Senior researcher, India

Some former officials were more sanguine:

Relations are good; instruments are in place, such as a commission on the ministerial level. There is an active dialogue and the treaties work. Unfortunately there is a lot of noise from the media.  
Former diplomat, India

In Nepal, views of relations with India mirrored those of Indian respondents asked about Nepal. While many Nepalis believe that India scuppers major projects within the country, a parallel view argues that Nepal prevents India from implementing large projects in response to the latter’s unbalanced control over Nepal’s rivers. While some interviewees felt that the treaties were meant to provide mutual benefits to both countries, many argued that India had failed adequately to fulfil its commitments on various fronts. The treaties and their application are now seen as adding to Nepal’s distrust of India.

To improve cooperation between the two countries, transparency and honesty is essential on both sides. The trust factor is very low on the Nepal side with regard to India. This general perception is not doctored and there is an element of truth. There is no smoke without fire. Somewhere down the line Nepal has been given the short end of the deal with India using a bulldozing attitude. Invisible layer after layer of resentment has built up towards India due to their attitude towards Nepal.  
Managing Director, private sector

Many respondents in Pakistan suggested that opportunities for better water cooperation were stymied by politics. Many were positive about the idea of engaging with Afghanistan over the Kabul river, and even about helping Afghanistan to develop infrastructure, but with the caveat that water was highly unlikely to be on the bilateral agenda anytime soon. Similarly, the idea of a basin-wide approach towards water was widely supported, with the proviso that it would be difficult to translate into practice. The stark contrast with perceptions in Afghanistan suggests that respondents in Pakistan lack a real sense of understanding of current thinking in Afghanistan.

Given the shared pressures of population growth and rising demand, and the political difficulties involved in engaging with India, some respondents in Pakistan suggested the need for a ‘South Asia Water Compact’. While most respondents were relatively sanguine with regard to India’s actions on the upstream tributaries of the Indus, scepticism about India’s unverifiable data was more widespread, and a minority of respondents felt that India was not adhering to the letter or the spirit of the IWT.

### Treaties and agreements

In relation to water treaties and agreements, the picture is mixed. In Afghanistan the dominant idea was that its neighbours would have no interest in working towards a treaty. Bangladesh hopes for treaties with India to cover its remaining rivers, beginning with the Teesta. Many respondents in India appeared to agree that India had been unfair towards its neighbours in past treaties and were open to reviewing them – something desired in Nepal. In Pakistan too, despite Afghan doubts, there was a widespread sense that a treaty with Afghanistan, as well as a review of the IWT, were possible.

Pakistan and Afghanistan do not have a treaty to regulate the Kabul river. Bilateral cooperation between Afghanistan and its neighbours is weak to non-existent. The **Helmand River Treaty** was negotiated with Iran in 1973, and determined the precise amount of water that should flow into Iran. However, while it nominally came into force in 1977, its ratification and implementation are still subject to dispute. The Iranian revolution in 1979, and the subsequent turmoil in Afghanistan, meant that there was little opportunity to build on what is, by many accounts, a modern, benefit-sharing water agreement. Efforts have continued to revive and implement the treaty, but accusations against Iran, and Iran’s failure to make compensation payments as set out in the treaty, have served to increase mistrust. Mutual suspicion and wider political disagreements have remained obstacles to the further development of cooperative water relations. While some respondents mentioned the Helmand River Treaty, a number of interviewees, particularly those from NGOs, believed that other agreements were in existence.

Another treaty had been agreed between the Soviet Union and the former Kingdom of Afghanistan in 1958, specifying that both countries would be able to use their ‘boundary’ waters up to the frontier line, without restriction. The Amu Darya river was defined as forming the border between the two states, and the agreement committed both parties to take measures to ensure that all mutual rights and interests were respected. It did not discuss quotas.

Figure 4.5: Bangladeshi views of the Ganges Water Treaty (%)

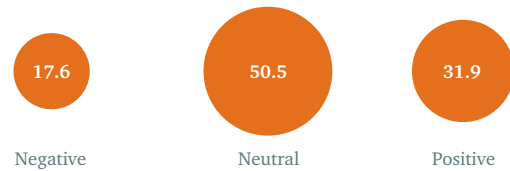
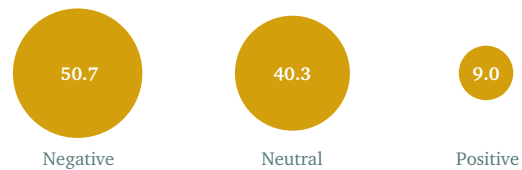


Figure 4.6: Indian views of the Ganges Water Treaty (%)



The **Ganges Water Treaty** between India and Bangladesh in 1996 outlined principles for sharing water at Farakka and for the creation of joint river commissions. While most of the comments in Bangladesh regarding the Ganges Water Treaty were negative and pointed to the treaty’s shortcomings, most respondents there felt that it had been broadly successful. Criticisms given included the lack of an arbitration clause, the short time-frame (30 years) and the lack of any guarantee clause. Some suggested that India did not always provide Bangladesh with its fair share of water, while others focused on Article IX, which states that the treaty would be replicated for Bangladesh’s other rivers. India’s ability to withdraw unlimited water before the Farakka barrage was also criticized.

In India, by contrast, views were more diverse. While most respondents accepted that relations with Bangladesh were asymmetric, they also felt that India had largely been generous with Bangladesh with regard to water-sharing. India’s secrecy concerning future plans and water storage projects was accepted as something that fuelled suspicion in Bangladesh.

India and Bangladesh came close to signing a treaty concerning the Teesta river in 2011, but the agreement was scuppered by West Bengal’s Chief Minister, Mamata Banerjee. While most respondents in Bangladesh were highly critical of her actions, many reflected on the difficulties that Bangladesh would encounter in negotiating treaties on its other shared rivers, given the increasing power of state governments within India. This led many interviewees in Bangladesh to conclude that basin-wide river management would provide a better approach to water agreements, while most felt that a multilateral and basin-wide approach would encourage a shift away from a ‘zero-sum’ political game towards a more mutually beneficial system.

Figure 4.7: Indian views of the Indus Water Treaty (%)

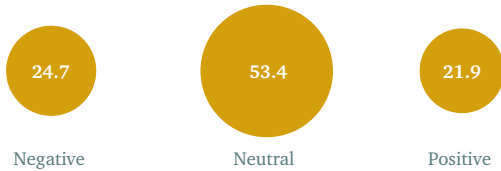
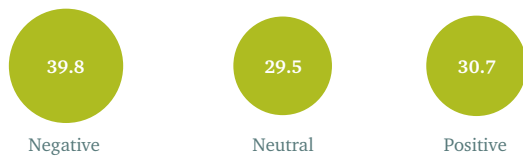


Figure 4.8: Pakistani views of the Indus Water Treaty (%)



As noted, the 1960 IWT between India and Pakistan divides the rivers rather than the water of the Indus basin. The waters of the eastern rivers – the Ravi, the Beas and the Sutlej – were allocated for exclusive use by India before they flow into Pakistan. Pakistan has exclusive use of the waters of the western rivers – the Jhelum, the Chenab and the Indus itself – subject to India’s limited domestic consumption and hydropower generation. The IWT is regulated by the Permanent Indus Commission, with a commissioner for each of India and Pakistan. Despite the relative success of the treaty, unilateral development of water infrastructure by both India and Pakistan, along with changing environmental and climatic conditions and technological improvements, have led to a stalemate in water diplomacy.

Interviewees in Pakistan had mixed views on the IWT. Those who thought it successful frequently attributed this to the dispute resolution mechanism. Many thought it could be used as a model for a treaty for the Kabul river, if it could be reviewed and updated for climate sensitivity as well as to take account of rising population and consequent demand for both water and energy. The treaty’s focus on engineering was considered to be rooted in the approach of the 1950s and 1960s, whereby rivers were to be controlled scientifically. Others were critical of the treaty for conceding to India the right to continue building dams on the western rivers.

In India, too, the IWT was largely seen as positive, having lasted for more than 50 years, and many also felt there was a strong case for it to be updated. However, the sense that water was subsumed into political tensions also came out strongly, as did the idea that genuine initiatives by India to address its water concerns were interpreted by Pakistan as geopolitical moves.

India and Nepal have signed three agreements: the 1954 **Koshi Agreement**, the 1959 **Gandak Agreement** and the 1996 **Mahakali Treaty**. From the point of view of Nepal, most respondents felt that the treaties epitomized India’s attempts to transgress Nepal’s sovereignty. Among concerns

expressed were the time periods covered – for instance, the Koshi Agreement is valid for 199 years – and the fact that the treaties were signed at a time when education and awareness levels about water in Nepal were low. The agreements are regarded as preventing Nepal from being able to extract water from ‘its own’ rivers, which in turn prevents major projects from being undertaken. The benefits of irrigation are seen to accrue to India, while Nepal, in contrast, is faced with inundation, an inability to prevent floods and an insufficient share of the water. In short, Nepal was seen to be vulnerable to the negative externalities resulting from the agreements, while India was seen to enjoy the positive externalities in terms of irrigation and flood control.

The inability to renegotiate or amend the agreements between Nepal and India – despite rapid changes in both countries – was framed in terms of Indian hegemony. These concerns were exacerbated by a widespread belief that India had failed to fulfil its commitments to maintain infrastructure, particularly in the case of the Mahakali and Gandak projects. Fulfilling existing commitments, or demonstrating that those commitments were being met, would clearly help to build confidence in Nepal. There was also widespread support for steps to renegotiate the existing treaties. There was generally more support for the Koshi Agreement, under which the Melamchi project, providing water to Kathmandu, is being initiated.

Figure 4.9: Indian views of the Mahakali Treaty (%)

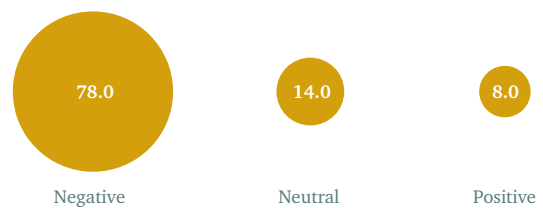
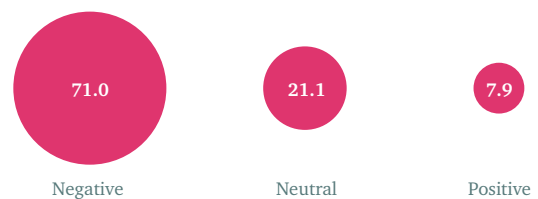


Figure 4.10: Nepalese views of the Mahakali Treaty (%)



Responses in India were more mixed. The view that India had behaved arrogantly towards Nepal was expressed in a number of interviews, while other respondents felt that the problem was more a lack of trust towards India on the part of Nepal. Lack of coordination within Nepal was also seen to be a difficulty. However, it is worth noting that a large number of Indian respondents had no particular awareness of the various agreements in existence with Nepal.

## Dams

While dams are a concern of domestic water management, with its focus on water flow volumes, transboundary water debates frequently focus on the impact of the construction of dams in upstream countries on water flows downstream. In South Asia, notably, two of the upstream countries – Afghanistan and Nepal – perceive themselves to be weak, and many interviewees in these countries blamed their inability to build water infrastructure on the machinations of more powerful downstream riparians.

While the concept of ‘water wars’ is theoretical at present in the rest of South Asia, in **Afghanistan** almost all respondents agreed that disputes over transboundary water had the potential to escalate into violent conflict, and many said that certain situations had already reached that point. Some cited violent incidents at the Salma dam in Herat, where Indian contract workers were killed, while others talked about the Kunar river dam, where attacks have taken place over the last few years. Violence in both these locations was attributed to foreign-backed armed groups opposed to Afghanistan’s water sovereignty and thus attempting to prevent it having the power to control water flows. Other respondents noted that the Kajaki dam project on the Helmand river had come to a complete halt as a result of insecurity in the area, highlighting the repercussions and difficulties facing large-scale water projects – and even the maintenance of those already in existence.

Interviewees in **Bangladesh** saw many of India’s contemporary water projects in the context of the Farakka barrage, opened in 1975. The barrage, and India’s resulting withdrawal of water, were considered to have harmed southwest Bangladesh in multiple ways: changing seasonal water flows, increasing salinity and adversely affecting Bangladesh’s irrigation capacity. Resultant distrust fed into Bangladesh’s approach to Indian plans to construct a dam at Tipaimukh and the NRLP. In the latter case, there was a divergence between government respondents, who were satisfied with India’s assurances that the project would not affect northern rivers, and civil society respondents, who either were unaware of these assurances or disbelieved them. Many civil society representatives felt that the project would have a disastrous impact, diverting water from Bangladesh and changing the course of rivers. The fear that India was withholding information was widespread.

Attitudes in Bangladesh towards the proposed Tipaimukh dam were overwhelmingly negative. Questions were raised regarding its overall impact on the ecology and environment. While India maintains that the project will generate electricity and help control flooding, a lack of transparency in data-sharing and lack of Bangladeshi involvement in the project have bred mistrust. Other fears

related to the dam’s impact on saline intrusion, and hence on agricultural productivity, particularly in Sylhet. While some government officials offered divergent opinions, suggesting that joint studies are under way and that they have been given assurances that the dam will not affect Bangladesh, the overwhelming majority of respondents from NGOs and civil society argued that India’s unilateral construction of this dam will be a major impediment to regional cooperation.

### **Any water infrastructure planned by India without sufficient or visible collaboration with neighbours fed into the widespread consensus that India used its power to ignore more sustainable solutions to water problems with its co-riparians.**

Calls in Bangladesh for increased data-sharing and joint data collection, as well as greater Bangladeshi involvement in Indian decision-making, dominated the discourse regarding Bangladesh’s relations with India. The feeling that the data India shares at present are ‘dishonest’ was commonplace, and clearly the establishment of further joint surveys would contribute to building trust. Any water infrastructure planned by India without sufficient or visible collaboration with neighbours fed into the widespread consensus that India used its power to ignore more sustainable solutions to water problems with its co-riparians. Many Bangladeshis felt that mistrust was deepened by the lack of reliable data for river flow rates and water utilization, as well as for the precise impact and damage caused by India’s water withdrawal, diversion and construction of large infrastructures on common rivers.

Many respondents in **India**, particularly from civil society, recognized that dam construction caused friction with downstream riparians, in particular Bangladesh. Many recognized that India’s lack of transparency over data contributed to mistrust. Some government officials felt that improving storage capacity upstream (in Jammu and Kashmir) could assist Pakistan by managing water flows better and releasing water in the dry season. But most respondents felt that India was moving away from large dams towards localized, off-grid water storage solutions. The general sense from the interviews in India was that dams were becoming more marginal in importance – notably in contrast to the opinions expressed by its neighbours.

In India respondents across all sectors conceded that the country’s lack of transparency in data-sharing and dam construction plans needlessly contributes to co-riparians’ long-standing suspicion of India’s dealings over water. Therefore, one way for India to negate some of the charges levelled against it would be to ‘inspire confidence’ in its co-

riparians by entering into more multilateral agreements in the region. The dominant critique from Indian respondents was of their country's tendency to remain more focused on internal water issues and conflicts – not just in diplomatic circles but also in civil society groups, which pay far less attention to transboundary rivers – and to view water problems through a 'nationalist' rather than a South Asian lens.

Like Afghanistan, **Nepal** perceives itself to be a weak upstream riparian. Its low technical and financial capacity creates a dependence on outside investors to enable it to move forward in water management, whether in terms of developing hydropower or enhancing water storage capacities. Nepal's limitations were considered to stem from its political weakness relative to India, as well as from treaties that were viewed as giving preference to India and limiting water usage in Nepal. There was also a widespread belief that India lobbies potential investors in hydro projects to maintain a strong hold over water resources in Nepal.

**Pakistan's** views with regard to dam-building were mixed. Domestically, there remained strong support for the construction of more dams, although at the same time the failure of existing dams to meet expectations (often because of silting, as in India) was widely recognized – as was the polarized debate surrounding the Kalabagh dam. Water experts certainly seemed more sanguine about Indian dam construction than the political discourse in Pakistan implied, although again India's approach towards data, and Pakistan's inability to verify Indian data, reinforced mistrust.

## Diplomatic clout

In the context of power asymmetry, weak bargaining positions and lack of data, a number of respondents in Bangladesh, Nepal and Afghanistan mentioned the lack of relative diplomatic capacity in their countries compared with the weight of more powerful neighbours.

In both Bangladesh and Nepal a number of interviewees suggested that more frequent dialogues with India would build trust. There was widespread support for exploring ways to share benefits from water usage better, to conduct joint research, to build a common shared vision and to create structured, multi-track dialogues. Improving both research and negotiation capacity in Bangladesh and Nepal would further strengthen their ability to engage meaningfully with India. At the same time, there was recognition in both countries of the need to set out their own vision for water and to enhance their own data pertaining to water, so as to help prepare better for negotiations with India.

India has a very bureaucratic mind-set, whereas Bangladesh lacks information and expertise, and needs to gain negotiation skills. ... Most issues with India concerning rivers remain unresolved; the boundaries issues must also be settled, especially with the main seven rivers.

*Diplomat, Bangladesh*

Our diplomats often lack negotiation skills. I think in universities, students who are studying water resources engineering should be given lessons on diplomatic negotiations.

*Research fellow, Bangladesh*

Many Bangladeshi interviewees were positive regarding various international conventions such as the UN Convention on the Law of the Non-Navigational Uses of International Watercourses, which they felt would help in negotiations and consultations among co-riparian countries. At the same time, they felt that India did not currently follow internationally agreed rules pertaining to information-sharing with regard to upstream waters. Many interviewees also mentioned the ineffectiveness of the Joint Rivers Commission (JRC).

In Nepal many interviewees were critical of their own country in certain respects. The view that Nepal lacked technical capacity to negotiate with India was widely held. The decision to dissolve the Ministry of Water Resources was criticized as preventing the formulation of an overarching vision and coherent approach in such negotiations. Many thought that India in turn took advantage of this lack of vision.

We need to improve our own capacity in terms of quality of negotiation. We need to strengthen ourselves in all aspects such as proper detailed research, representation etc.

*Regional Technical Advisor, UN Habitat*

Others noted that the discourse relating to water in Nepal was stuck in a 1950s perspective. Nepal's failure to develop hydropower was contrasted with the success of the hydropower sector in Bhutan. Many interviewees argued that new trilateral and multilateral initiatives were needed.

India's federal system was also identified as being problematic. Some interviewees cited instances in which Indian officials were reluctant to sign documents, given the need to ensure the support of a number of competing state governments. The fact that water is a state issue in turn implies that there is a need for India to forge a vision between its states. In reality, on current political trajectories, this would appear to be the most difficult part of the equation.

Many interviewees in both Bangladesh and Nepal commented on the fact that the trend towards coalition government in India already presents a major problem for negotiations over water. But increased *de facto* federalization is not confined to India. This trend is also apparent in Nepal – where discussions about a federal



system are under way – and in Pakistan, where the 18th Amendment (2010) to the constitution shifts a range of powers to the provinces.

This trend is not necessarily negative – bringing decision-making closer to populations is generally regarded as positive – but it will make negotiations over water between and within countries more complex. Stakeholders at state/provincial level will be increasingly important as interlocutors for international negotiations, implying the need for capacity-building for negotiators at multiple levels throughout South Asia.

## Data and data-sharing

Issues of data quality, interpretation and dissemination are of vital importance for domestic water management, but they equally play a role in transboundary water relations. Similar themes recurred throughout the region. Several respondents in different countries critiqued the regular, circular repetition of unfounded or dubious data. Others criticized the quality both of domestic data and of data shared by other countries. Further questions were raised regarding the utility of some raw, uninterpreted data. These concerns are exacerbated by widespread duplication of work, implying a lack of coordination between relevant domestic stakeholders. Furthermore, the survey also revealed that many respondents were not aware of current levels of data-sharing between countries, again suggesting that government and civil society are disconnected.

Afghanistan was something of an outlier. The lack of data there stemmed from conflict-related insecurity, and from a lack of capacity within government – particularly at local level. The data that were collected were generally acknowledged to fall far short of what would be needed for domestic planning and international negotiation. A common question raised was: given the lack of accurate data on even the most basic measures of water flow, use and needs, how could negotiations at any level, whether local or international, take place?

Some NGO respondents in Afghanistan, particularly those responsible for the wide-scale implementation of water supplies, pointed to efforts to measure water and precipitation levels, flow volume and usage, but these were mainly localized. It was unclear whether many of the established measurement stations were actually operational, and it was widely reported that this was not the case. Most interviewees called for significant investment in research and data collection.

In Bangladesh there was general agreement that there is a substantial gap between research and implementation. Many interviewees were of the opinion that data collection

had declined in quality in recent years, blaming the downsizing of ministries and raising concerns over data manipulation – i.e. making up data readings to overcome manpower shortages. A few respondents in Bangladesh – the country in which the greatest number of interviewees stressed the need for a holistic approach to water – argued that the concept of data needed to be expanded to include data pertaining to socio-economics, ecology, the environment and so forth.

Interdisciplinary is different from multidisciplinary. Interdisciplinary research will mean that social scientists, hydraulics engineers, civil engineers will all be working together and trying to find holistic solutions.

*Academic, Bangladesh*

Most interviewees in Bangladesh supported the transparent sharing of data among co-riparian countries.

India, by contrast, has a plethora of data, but most interviewees felt that there was little coordination in their usage and little transparency in data-sharing. But around one-third of respondents felt that the problem was less the availability of data than their poor quality. Almost one-quarter felt that the data collected needed to be more multidisciplinary in order to ensure more holistic solutions.

The development of early-warning systems for floods and droughts and joint disaster responses were seen as important measures that could galvanize India's collaboration on water issues with both China and Nepal. Given the prevalence of floods and droughts in the region, this may be the issue with maximum potential for collaboration. Data-sharing with China already focuses on flood warnings during the monsoon period and, from the point of view of Indian interviewees, deepening this engagement would have traction. Certainly, support for increased engagement on this issue exceeded support for joint hydropower and storage projects.

Nevertheless, several government respondents articulated the potential difficulties in such collaborative approaches. Sharing of data on issues such as consumption, for instance, were not relevant in transboundary negotiations, which focus on the supply of water:

The [transboundary] issue is that of supply and not of demand because only supply issues can be discussed in bilateral transboundary water treaties/forums etc. The issue of demand however is an internal matter of the country and should be determined and settled internally.

*Former government official, India*

Lack of coordination and poor-quality data were recurring themes in Nepal. Many respondents there called for greater data-sharing, in particular in relation to disaster preparedness. A comprehensive regional disaster prevention plan was mooted as one means of building trust in data-sharing. Better data could also make it

easier for Nepal to exploit its hydroelectric potential. In that country, as elsewhere, duplication of work and the lack of subsequent sharing were cited as key concerns. In addition, there is no government-level research institute dedicated to the collection of data related to water in Nepal. The Ministry of Water Resources that would have overseen such collection of data has been dissolved, as a result of which there is no system in place to gather and organize data.

In Pakistan most respondents referred to problems in accessing data on issues such as water flow. On transboundary issues, most complained that India did not share data. Many hoped that new technology could help tackle data problems: satellite imagery and real-time water flow data were cited as possible solutions. At the same time, officials must accept the

need to share data, and research needs to be integrated into a common platform to allow connections to be made between different fields of water research. Improving links between policy-making and research is also imperative.

In relation to both India and Afghanistan, a number of respondents in Pakistan noted that the lack of reliable data on transboundary water flows was a major impediment to improved relations. Some were of the opinion that the information shared under the IWT should be declassified and made public.

In Nepal and India, in particular, several respondents were critical of the government's overstating of successes in relation to water. Poor-quality or insufficient data allow this to go unchallenged.

# 5. Afghanistan

## Introduction

Three decades of conflict – affecting infrastructure, systems of natural resource governance, education to support technical capacity and the environment – have broken down water management systems to the extent that a lack of reliable water supplies now seriously threatens the lives and livelihoods of many people. Only 48 per cent of the population have access to clean water, and only 37 per cent access to proper sanitation facilities.<sup>6</sup> The conflict environment coloured the answers of most respondents, with many reported problems being the direct effect of the conflict and many others exacerbated by the prevalence of insecurity.

Another common theme was the difficulties encountered in relations with Afghanistan's neighbours. Bilateral water-sharing agreements could benefit Afghanistan and its neighbours, but water concerns are subordinate to other cross-border issues, including security, economic and political interests. A significant number of interviewees relayed their belief that international disputes over water could cause violent conflict between Afghanistan and its neighbours.

Yes, [construction of large-scale water projects] would become a security threat. For the last 30 years the government has had no resources to construct anything. Now there is money available to construct a micro-hydro plant on the Kabul river, but resistance from Pakistan has stopped this. It is the same with Iran and the Helmand river.

NGO manager, Kabul

The majority of respondents firmly believed that Afghanistan contains within its borders a sufficient quantity of water to provide the entire population with enough clean, safe water to drink, wash with and irrigate land. The reason that this goal was not being reached was reportedly the poor or non-existent water control and management systems in parts of the country most badly affected by floods, droughts and other forms of water shortage.

In general, respondents were not reluctant to talk about any of the research themes, although some did decline to discuss specifics of water management systems because they thought they did not have the expertise necessary to address the questions adequately. These were mostly people who had no direct involvement with water management issues, such as provincial representatives of the Afghan Ministry of Foreign Affairs, or NGO workers involved in securing water supplies in emergency situations rather than in longer-term developmental water management programmes.

Discussions regarding relations with neighbouring countries often evoked strongly negative reactions, but even bearing

in mind the controversial nature of this subject, only a very small number of respondents refused to talk about it altogether.

Many respondents, even those within the government, did not know about some government policies that may have an impact on water use. There were several government programmes mentioned by some respondents that most others had not heard of, including the water elements of the National Priority Programmes (NPPs). Government policy on climate change was largely unknown beyond those respondents with a specific interest, such as representatives of donor institutions.

Questions about the pricing and payment for water elicited conflicting answers. While almost all respondents acknowledged that water was a natural right as conferred by Islamic jurisprudence, the constitution and the 2009 Water Law, and protected by government agencies, few objected to direct payment for effective water supply and waste systems, providing they offered a reliable service. In an initiative that would be difficult to replicate in other South Asian countries, the urban water supply has effectively been privatized; and while this has had problems, it also enjoys a significant amount of support – to the extent that households are petitioning to be connected to the water supply infrastructure. It speaks to the dearth of viable alternatives that urban residents are prepared to pay directly for what is, in law, a fundamental right protected by the government.

## Water management

Afghanistan's current water management was rated very poorly. Many respondents differentiated between national water management efforts (or the lack of them) introduced by the government, and local community management systems, which were seen as much more efficient and equitable in many instances.

Local schemes, often based on traditional community governance structures, particularly in rural locations, were viewed as better at managing scarce and contested water supplies, although the quality and fairness of each community's system reportedly varied significantly from place to place. Traditional *mirabs* are still employed in many communities, although they can struggle under local pressure to align water distribution with the interests of powerful local actors. One example of this was the diversion of significant quantities of water to service water-intensive crops such as cotton or rice – water usage that is both inequitable and unsustainable.

<sup>6</sup> Afghanistan Country Office, WASH Factsheet, WASH: Water, Sanitation & Hygiene, [www.unicef.org/infobycountry/files/ACO\\_WASH\\_Factsheet\\_-\\_November\\_2011.pdf](http://www.unicef.org/infobycountry/files/ACO_WASH_Factsheet_-_November_2011.pdf).

This demonstrates that the local context plays an important role in the performance of local supply systems, with different natural risks (from drought and floods), local political environments (including influential power-holders), conflict and tribal dynamics all providing the backdrop to the distribution of water to community members.

At the national level, water management efforts were generally regarded as worse, with little practical cooperation evident between government departments at either national or provincial level, and no overarching policy framework to secure water supply. A number of respondents reported that the high-level expertise within government departments – such as the Ministry of Energy and Water (MEW) and the Ministry of Agriculture, Irrigation and Livestock (MAIL) – at the present time was very good, but that this was mostly due to generous donor funds supporting international advisers. At lower levels of the national civil service, and despite individual examples of dedicated and hard-working officials, technical and policy capacity were viewed as poor. Some explained this disparity as a function of the level of payment offered to qualified and skilled local staff, who could earn three to ten times the amount working on contract for development organizations than they would earn as government employees.

The Water Law of 2009 delegates responsibility for water management to a whole range of actors, from river basin management authorities and individual government departments to local decentralized community decision-making bodies such as the Community Development Councils (CDCs) established as part of the National Solidarity Programme (NSP).<sup>7</sup> While this degree of local autonomy is good for identifying community needs clearly and guaranteeing local ‘ownership’ of development projects, decisions can easily stray from water governance best practice and do not guarantee either equitable or reliable water supplies.

As noted above, some respondents commented on both the potential and actual contamination of water – through effluence from extractive industries, but also owing to excessive salt and the proximity of drinking water supplies to sewage systems. However, problems with the quality of water were not seen as urgent priorities, except for those respondents working on projects involved with providing safe, clean drinking water to both urban and rural communities. In general, the issue of greater concern was the availability and reliability of the water supply.

According to the overwhelming majority of respondents, the focus of the government should clearly be on providing clean water and sanitation to households, followed closely by

the water supply to farmers. Industry was seen as important for the country’s economic future, but the immediate needs of households (including the goods produced by farmers to feed their own communities) were considered more important by almost everyone. A small proportion of respondents, noting that all three areas were essential, suggested that the government should focus on them all.

Islam did not influence the use of water in any direct manner, although many respondents talked about the Qur’an and *hadiths* teaching about water use – in particular not wasting any water and not allowing drinking water sources to be situated near sewage systems. Others mentioned that *mirabs* had a religious mandate, but the basis of this claim was not clear, other than that they have been a traditional feature of community leadership for generations.

### **Decisions on where to site pumps, wells or standpipes directly affect the women who have to walk to the water source and carry water back to their communities, and their lack of involvement may well increase the burden of everyday household tasks.**

Most people said that although community members are often intimately involved in decisions affecting local water management, women were not normally included in the decision-making process. Many also pointed out that women were disproportionately affected by these decisions, as they are traditionally the household members responsible for collecting water, cooking and cleaning. Decisions on where to site pumps, wells or standpipes directly affect the women who have to walk to the water source and carry water back to their communities, and their lack of involvement may well increase the burden of everyday household tasks.

According to respondents, Afghanistan is faced with a number of serious problems that work against effective and sustainable water management. These often overlap to create complex problems requiring a coordinated response.

Traditional local structures, centred on the role of the community *mirab*, have been degraded during three decades of conflict, and coupled with large-scale migratory patterns – first away from and then returning to the country – have left traditional mechanisms of water distribution without support. This has led to a failure of local capacity, in terms of both technical knowledge and local legitimacy, to reach the required levels in order to maintain water systems under stress.

<sup>7</sup> Government of the Islamic Republic of Afghanistan (GIROA), Ministry of Energy and Water, ‘Water Law’, <http://mew.gov.af/en/page/9135>.

Natural disasters, most notably floods and droughts, were a commonly reported problem. The lack of flood defences, as well as the lack of dams and reservoirs, contributes to a situation whereby the effects of both flooding and droughts can be devastating to households, and to their land, livestock and livelihoods. While some communities have developed coping mechanisms to deal with sudden shocks of this type, often households have few, if any, choices when faced with these types of adverse environmental events.

Related to this is the increasing prevalence of deforestation, which leads to environmental degradation and the loss of topsoil through landslides. This in turn leads to greater flooding, as fast-flowing snowmelt and rainwater are not absorbed effectively.

Afghanistan has been affected by a consistent drought for the last 15 years or more, I think that this is the biggest threat because it has resulted in the destruction of our traditional way of irrigation.

UN official, Herat

Population increases, particularly severe in urban settings but also evident in many rural environments, were reported as an additional pressure on water resources. Many NGOs now coordinate their efforts to develop local water systems – including standpipes, boreholes and wells – around the country. However, households without access to water supplies often resort to drilling their own wells near to their homes. This was noted particularly in newly established urban communities, where formal supply and sewerage systems have not been set up but where multiple households require significant amounts of water. The proliferation of these informal wells has contributed to a dangerous lowering of the water table, which in some instances has prevented existing wells from providing water. There are no regulations covering this type of informal water supply, and this is one indication of the weakness of institutions, including government departments, to formulate and implement any national water policy. One respondent believed that this was partly due to the project-based nature of development interventions, which left the control of projects in the hands of donors – bypassing national officials and rendering government departments practically irrelevant.

The lack of coordinated planning by government departments concerned with water management was noted by several interviewees as a severe problem, and a significant number saw no evidence of joined-up thinking on water planning or policy from national or provincial government agencies.

I would not rate it [Afghanistan's current approach to water management] at all, how can a teacher mark a blank examination paper from his student?

Civil society activist, Herat

The exact rate of environmental degradation, including the fall in the groundwater table, was reportedly almost impossible to assess because of the lack of reliable and comprehensive data. Some organizations (most notably DACAAR) have tried to establish a network of water measurement stations, but in practice they are difficult to monitor and maintain, and the total number falls far short of the minimum number required for comprehensive national water data-sets.

Some respondents also mentioned the mining and extractives sector, on which, to a large extent, the economic sustainability of the country rests in the long term. These industries will require enormous amounts of water to establish and maintain operations, and some interviewees had serious misgivings regarding the possibility of contamination and the poisoning of water sources by the extractives industry. Legislative safeguards exist to protect against this threat, notably the Environmental Law of 2007, which outlines the granting of pollution control and hazardous waste management licences, and contains specific provisions for the 'Management of water resources' and 'Preventing and remedying effects of pollution of water resources'.<sup>8</sup> However, respondents were generally unaware of, or lacked confidence in, the effectiveness of the legal protection.

Pollution of water sources in general was another concern cited by a number of respondents. Interviewees who had worked with the Ministry of Rural Rehabilitation and Development (MRRD) on rural development projects reported that water quality has declined in many areas, with water sources so contaminated with salt that they are unsuitable even for animals to drink.

### Departmental coordination

The overall impression of the respondents was that there was little cooperation between different departments, and most had no knowledge of any national water or natural resource management strategy. A few claimed that representatives of departments failed to attend their coordinated cluster meetings, or even worked against one another on occasion. Some of their respective projects were seen to be in competition for funding, for prestige or for influence: the MEW and the MRRD were viewed as guilty of this; and although there are existing memoranda of understanding between the different ministries, there is little evidence that they have been put into practice.

Some respondents mentioned the problem that water issues sit uncomfortably *between* different line ministries' responsibilities (although the MEW is ostensibly in charge of the main rivers and primary canals, whereas the MAIL

<sup>8</sup> Islamic Republic of Afghanistan Environmental Law (unofficial English translation), *Official Gazette* No. 912, dated 25 January 2007, [http://mom.gov.af/Content/files/Environmental\\_Law.pdf](http://mom.gov.af/Content/files/Environmental_Law.pdf).

is responsible for secondary and tertiary tributaries and irrigation), and each department had its own budget lines. This was, for many respondents, indicative of a problem across government. Ministries were accused of deflecting responsibility; a single ministry to oversee water throughout the country was suggested more than once as a solution.

NGOs have apparently attempted to address this situation by providing information and meeting with all relevant departments, and some respondents said that the situation was better now than it had been previously, but most non-profit representatives felt that departmental priorities did not reference other departments and were often in direct opposition – even though there are formal structures to encourage and support cross-ministry coordination. These formal structures include the Supreme Council for Water Affairs Management (SCWAM), which was created to coordinate water-related developments and oversee the development and compliance with the Water Law.<sup>9</sup> While this body includes the heads of department for all the relevant ministries, few respondents mentioned its relevance, or indeed seemed to know of its existence. Those who did name SCWAM as the overarching coordinating body questioned its usefulness and said that the same intra-ministerial rivalries were evident within the Council. Some academics said that institutionally SCWAM was a model for other countries in Central Asia, which viewed it as an example of best practice in the sector.

Some interviewees said that the lack of coordination mostly related to departmental policies, often written by international consultants with little input from Afghan government officials and civil servants. Donor coordination came in for criticism from many respondents as well, and several said that donor funds directed for projects through national ministries did not benefit local communities as much as expected – the implication being that most money was being spent or siphoned off at the higher levels of contractual authority.

Some made the distinction between national government and provincial- (or lower-) level authorities, complaining that there was very little cooperation between them, particularly with regard to comprehensive planning for water resources. However, some noted that at lower levels – including provincial, district and community authorities – there were examples of increasing cooperation on joint projects. One adviser said that this was due to the coordination function played by individual project management offices, a project requirement for some institutional donors.

Many of the respondents, while acknowledging that cooperation was fairly poor between departments, said that coordination was built into laws that described the relationship between different departments. Some said that cooperation was slowly improving.

### Lack of capacity

Many of the interviewees pointed to the lack of technical capacity within the Afghan government, including its inability to attract donors, as a major hindrance to the development of comprehensive water management systems. While disagreements on the priorities of water management were common, representatives of the government were almost universally seen as poorly qualified, poorly rewarded and lacking motivation. This is evidenced by the proliferation of international advisers working in the Ministries of Energy and Water, Rural Rehabilitation and Development, Agriculture, Irrigation and Livestock, Finance and others concerned with water issues. NGOs looking at rural water systems and private companies working on urban water supplies also rely heavily on international staff and consultants because of the lack of indigenous capacity.

In addition, government workers, particularly those at provincial and local level, were commonly seen as corrupt and as obstacles to the development of effective water management systems. This only serves to feed the cycle whereby funds are channelled direct through international NGOs to the beneficiary communities, bypassing government departments and thus keeping the capacity of Afghan national public servants at a low level.

### Lack of data

It was generally acknowledged that data currently collected in Afghanistan fell far short of what is needed for planning and negotiation. A common question from respondents was that if no accurate data on even the most basic measures of water flow, use and needs were available, how could negotiations – between communities, local authorities or neighbouring states – even begin?

Some of the NGO respondents, particularly those responsible for the wide-scale implementation of water supplies, pointed to efforts to measure water and precipitation levels, flow volume and usage, but these by no means covered the whole country and it was unclear whether many of the established measurement stations were actually operational. As with other aspects of water management, significant investment in research and data collection was said to be needed, no matter where that support came from.

<sup>9</sup> GIROA Water Sector Strategy (as part of Afghan National Development Strategy), February 2008, <http://moec.gov.af/Content/files/Water%20Sector%20Strategy%20-%20English.pdf>.

Provincial workers seemed to have fewer views on any data and research that could improve water management. This appeared to stem from the fact that they did not know what data the government was already collecting – suggesting that even if it was gathering any substantial data, these were not being shared among relevant actors in the sector. Another common view from professionals based outside Kabul was that data and research were less important than funding and political will to carry out ambitious water management programmes, including building infrastructure.

### Climate change

With a view to the longer term, some respondents discussed the effects of climate change as a burgeoning problem, in that certain extreme weather events within Afghanistan could have been caused by climate change and that the effects will most likely worsen over the next decades.

Afghanistan's approach to climate change was clearly viewed with a good deal of scepticism. Even where respondents had some knowledge of the National Environmental Protection Agency (NEPA), saying that it was the body responsible for setting government-wide policy on climate change, they were equally certain that the amount of practical action on the issue was virtually zero. The majority of interviewees were not aware of any coherent effort on the part of the government to address the challenges of climate change, and most were only vaguely aware of individual pronouncements or project-related efforts in respect of the problem. Provincial staff were less aware of government initiatives surrounding water and the environment. While Kabul-based staff were at least aware of NEPA and the policy work, however meagre, that the agency conducts on climate change, those in Herat and Jalalabad had little idea of the government's policies in this regard, or even the existence of any such policy process.

Current priorities lie in the mitigation of 'shocks', including better preparedness and responses to floods, droughts and other extreme weather events, which respondents reported had become more frequent over the last five to ten years. While these events can be theoretically linked to global anthropogenic climate change, discussions of climate change and its impact on water resources within the country are limited to national and international policy circles. The National Priority Programmes and strategy outlined by NEPA are two of the policy forums in which the issue is given space; but although most respondents were aware of national policy, they were hard-pressed to point to any visible implementation of climate change mitigation programmes.

In common with other natural resource governance initiatives within Afghanistan, this demonstrates the gulf between the national policy framework (which is wide-

ranging, technical and to an internationally recognized high standard) and the measures built into ground-level operations (which are underfunded, lacking oversight and uncoordinated with national policy). Local programmes are often highly decentralized, with many – often competing – decision-making centres.

Some said that responses to climate change should be built into all natural resources management efforts and should be required by donors, with NEPA taking responsibility for the integration of climate change measures into all water plans. In the departments responsible for major decisions about water, such as the MEW, respondents said that there was no effort to prioritize the issue of climate change.

**Some people mentioned that the UN had produced a number of documents about climate change, but these had not been translated into local languages from the original English and so did not achieve the distribution that the issue required.**

NEPA itself was seen as a weak department, under-resourced and lacking technical knowledge, and without the will or power to influence the major water decision-making ministries. Respondents also pointed to the lack of qualified personnel within NEPA, with some suggesting that nepotism had played a part in securing some of the agency's highest-profile roles, notwithstanding its relative obscurity.

International organizations, including donors, were seen as providing some impetus to include elements addressing climate change in development programmes. Measures such as solar and hydroelectric power have been introduced as part of larger energy infrastructure projects, but these were mostly seen as piecemeal and ineffective, and some respondents stated that Afghanistan's economy will need to use *more* carbon if it is to develop: low-carbon-usage targets will, in their view, only hinder crucial economic progress. Some people mentioned that the UN had produced a number of documents about climate change, but these had not been translated into local languages from the original English and so did not achieve the distribution that the issue required.

In general, more immediate problems took precedence, and efforts to test air quality and to reduce urban pollution and contamination of water and air were all mentioned in relation to climate change mitigation. Some interviewees noted that in the most active networks, for example in the water, sanitation and hygiene (WASH) cluster, climate change was not seen as a priority and was not discussed. The lack of interest was also reflected in media coverage and in public exposure to the issue, which is small or non-existent. Still, respondents reported that Afghanistan was

more advanced than many other regional states in thinking about and developing policies to tackle the threat of climate change. Small-scale community efforts to reduce waste and use resources efficiently were cited as examples of projects viewing climate change as a current threat, with communities adapting to immediate climatic effects to increase their resilience. However, other respondents saw no such thinking; and deforestation and water wastage were still reported to be occurring at alarming rates.

A few respondents recommended that Afghanistan's inclusion in regional frameworks would facilitate discussion and help ground-level operations focus more on climate change and how it could be tackled. Others showed a distinctly blasé attitude, saying that climate change was not an issue with which Afghanistan should be overly concerned since the country contributed relatively little to the problem.

The effect of political instability was also an overriding concern for respondents, affecting all aspects of developing a reliable water supply. Insecurity has to be addressed as a factor in planning development projects, gaining community acceptance, collecting data or establishing measurement stations, and assessing what is – and what is not – feasible in terms of water infrastructure. In the context of security transition from international to Afghan responsibility by the end of 2014, many respondents indicated fears that insecurity would further curtail access to communities reliant on development projects for water supplies, decreasing their resilience and preparedness in the face of natural disasters and man-made shocks.

Many respondents, particularly Afghan staff and those working in the provincial research areas, reported that the greatest threats to water availability, and the biggest challenges to water management, stemmed from neighbouring countries – most commonly Iran and Pakistan. It was widely thought that these states fomented instability in Afghanistan so they could benefit through increased water flow into their own countries and political weakness that would hinder Afghanistan's ability to control its own water supplies.

### Water conservation

A number of different water conservation efforts were described by respondents, from small-scale storage and water-harvesting projects to increasing the efficiency of irrigation and traditional *karez* systems. However, the majority thought that not enough was being done to encourage water conservation, either in terms of technical solutions to conservation problems, or in influencing people's attitudes towards conservation. Education on water conservation was seen as a key measure in areas where water is scarce, although the majority of respondents

also stated that large-scale dam construction and better maintenance of existing infrastructure were a higher priority for the government if efficient and reliable water management systems were to be implemented.

### National water governance

Issues around water come under the responsibility of a number of different government departments in Afghanistan, at both national and provincial level. A common view was that there was a need for greater coordination between national ministries, as many people's perception was that individual ministers and their staff worked in competition with other departments for funding, political influence and prestige. Cooperation was regarded as highly dependent on provincial political allegiances and on the individual personalities leading departments, again at both national and provincial level.

Related to this was the desire of the majority of respondents to see greater collaboration on a wider scale – between government departments, NGOs, networks of practitioners, advisers and academics. Although fewer respondents supported it, some said that more cooperation on water-sharing across international borders should also be a goal of the Afghan government, necessarily including higher levels of government and the involvement of the Ministries of Finance and Foreign Affairs.

Most respondents thought that Afghan officials had a clear preference for working on large-scale projects, particularly dams, because of their visibility and the political prestige that they brought. Some mentioned that large-scale – and thus high-value – projects were an obvious target for corruption, and this was another reason put forward for government officials' preference. This was consistent with the general feeling that the government lacked capability in all areas: technical, financial, negotiating, budgeting, responsiveness, accountability and addressing corruption.

Respondents reported a number of significant obstacles to the establishment and implementation of large-scale water projects, varying from the lack of donor funding to the shortage of indigenous technical capacity and the mutual lack of trust between Afghanistan and its neighbours. Some reiterated their concerns over armed opposition attacks – particularly in Nangarhar and Herat provinces – pointing to assaults on existing dam construction projects.

### Local water management

Community-based water management enjoyed a much better standing in the eyes of almost all respondents than did national programmes or policy discussions. Many of the local works carried out by NGOs were received well, and in locations



where traditional *mirabs* are still in place to provide equitable water distribution to whole communities, most respondents reported that they carried out their tasks relatively fairly.

CDCs, formed as part of the NSP, nominally allow all community members to participate in decisions surrounding water use within their community. To some extent built on traditional community councils, but with intended improvement in terms of the inclusion of women and other marginalized groups, the NSP's decentralization of decisions regarding community development priorities has, according to many respondents, helped communities in establishing and maintaining traditional water management systems. In practice, different areas enjoy different levels of success through this system, but most interviewees said that they had confidence that this type of local decision-making – in contrast to national and provincial authorities' decision-making – was generally equitable.

Outside the NSP and government-established structures of local democracy, in some locations it appears that local civil society also has a role in water management decisions. One respondent in Nangarhar reported that local water management projects had been carried out in his area by civil society organizations and youth groups.

### Islam and water management

Water is sacred in Islamic teaching, and cannot be treated as a commodity. According to several respondents, both the constitution and the Water Law of 2009 are nominally based on the teaching of the Qur'an, and these both specify the importance of reducing waste and taking environmental considerations into account. The Water Law explicitly states that rights of way for water resources and infrastructure are to be determined 'in light of the principles of Islamic jurisprudence' by the relevant authorities.<sup>10</sup> This is reflected in many people's attitudes towards water, including those of government officials:

It is said that Allah's throne is not on gold or precious metal but on water.

MRRD official, Kabul

Water systems and the social structures associated with community water distribution are commonly based on traditional social norms such as *Pashtunwali*, although adherents claim that it is Islamic teaching that forms the basis of community water use. In reality, local power-holders have a great deal of autonomy over the distribution of community water, particularly in rural areas, and powerful landowners can monopolize local water sources. Some respondents said that most people were not fully aware of Islamic law and so did not take adequate measures to conserve water.

Religious leaders are often represented on local community water councils, and in this sense Islamic teaching is incorporated within water distribution systems. However, a number of respondents noted that religious leaders should be educated to give information to their communities based on both religious teaching and technical data. The feeling was that, as respected community leaders, they would be listened to more readily than NGO employees or government officials.

Respondents also pointed out that Islam teaches people about hygiene, with practical advice about washing hands before eating and after going to the toilet. This was seen by several respondents as a way to teach basic sanitation to communities, through mullahs and local elders. Some teaching was said to talk more generally about sharing resources, and about being mindful of the environment and neighbours. Water wastage was seen as *haram* (forbidden by Islam), and so religion could be used to make communities more aware of methods of conservation. Others pointed out that praying five times each day requires a reasonably significant amount of water, even though Islamic teachings urge followers not to use too much; and, in practice, if the water is available people think little about the amount they are using.

UN and NGO consultations have demonstrated that Islam is the foundation of many, if not all, communities in Afghanistan, but traditional *zakat* (the giving of alms, one of the five pillars of Islam) has broken down and people are unable to support the most vulnerable in their communities. This has led to a fundamental change in the practice of some communities.

It was also pointed out that although the influence of Islam can affect where water supplies are distributed, religious adherence will not help if the physical systems are not in place. As one respondent put it, 'Islam cannot help build dams and irrigation channels'.

### Water pricing and payment

The question of paying for water elicited mixed reactions from different respondents. Most interviewees representing NGOs and government departments (including those who worked as advisers) maintained that introducing or increasing payment for water supply and sanitation services would be practically impossible to implement. However, representatives of private corporations, in particular the Afghanistan Urban Water Supply and Sewerage Corporation (AUWSSC), claimed that water metering and payment by usage was a viable model for urban water supplies. To support this, examples were given of urban dwellers from Kabul who had approached the

<sup>10</sup> GIRoA, Water Law 2009 Article 8 (8), 'Responsibilities of Government Institutions', (unofficial translation from the Ministry of Justice *Official Gazette* No. 980, 26 April 2009).

corporation demanding to be connected to a supply seen as reliable, and who were fully prepared to pay for the service provided.

Under the 2009 Water Law, water is a public good, owned by the people of Afghanistan and protected by the government, and this was reflected in a number of responses stating that water was a right for which communities should not have to pay. This fundamental right is also referred to in the constitution, where all natural resources are characterized as the property of the state and as such regulated by law. According to the Water Law, and in adherence to *riba* (Islamic prohibition of usury), the *use* of water is free, although the law allows fees to be charged by service providers for the 'supply, storage, transmission, diversion, treatment, operation and maintenance of supply and irrigation systems'. The Water Law also establishes a number of structures to manage water supply. These include SCWAM, which acts as the overarching coordinating body for all water development and operations programmes, and river basin agencies and councils, which are intended to develop local programmes based on the needs of river basin communities.

The Water Law also sets out the responsibilities of councils at river basin and sub-basin level, and the corresponding duties of local Water User Associations (WUAs), including the involvement of *mirabs* and *mirab bashis* (those responsible for the management of a canal) in resolving disputes over water use, supply and distribution.

While the Water Law outlines the structures that should be established for the purposes of water management, it does not specify how communities pay for their water supplies, or what mechanisms should be in place. To a large extent, these are decided locally, often through the community councils established by the NSP, which design, initiate and manage their own programmes of community water administration. This was seen by a number of respondents as a crucial method of securing community acceptance, but was criticized for not reaching consistent standards of quality or utilizing best practice. Some interviewees identified an inevitable trade-off between national and local control: the NSP objectives of community inclusion and a sense of shared responsibility are often in conflict with NGO objectives designed to improve health, sanitation or access to water, or with other projects conducted by national agencies or those perceived as 'external' to the communities.

It was reported that in some of the camps for internally displaced persons around Kabul, residents paid for their water supply, although many could not afford it. Government resettlement schemes offer those living in the camps virtually nothing, and without more support from the government a reliable, sustainable water supply is a faint hope. The fact that many urban dwellers cannot afford drinking water means that they rely on unsafe wells

and streams, which contributes to increases in water-borne diseases. Wealthier Kabul residents have their own supplies and septic tanks, which although expensive offer round-the-clock water and sewage services. Water supplies in rural areas were seen as community assets which every member had a hand in maintaining. While this fosters a sense of ownership, these projects are mostly initiated by NGOs without national coordination.

The agency responsible for the water supply and sewerage system in Kabul and Herat has been hived off to the AUWSSC, although it remains technically under government oversight. This private company provides water meters for payment according to usage, with more than two-thirds of connections metered in Kabul and Herat, and prices varying between planned (more expensive) and unplanned (less expensive) urban settlements. AUWSSC employees quoted a 60–70 per cent collection rate for urban water fees. Some respondents suggested that pricing should be standardized across all regions to make it equitable, and a number of interviewees reported that water distribution by private companies, either through infrastructure or water tankers, was increasing – but only to those who could afford it.

Urban dwellers in cities beyond AUWSSC's remit pay the municipal authorities a fee for connection and usage, with some even operating a credit system whereby consumers pay for usage at the end of each month. In general, people are willing to pay for a consistent supply; and even if the price seems reasonable, it is not a good deal for a supply that is constantly interrupted. However, respondents reported that 95 per cent of the population do not have access to clean water through the public system.

Other respondents accused some water companies of hiking up prices for farmers and communities in regions suffering from drought.

A few respondents noted that consumers 'pay' for a supply of water in all cases, whether through direct cash payment or through having to walk to pumps, wait for supplies or carry water from pump to home. In this sense, although water pricing is not common, communities see it as a fair method of distribution if the supply is consistent and their access to water is made easier.

### International support for water management projects

Most respondents were positive about the contribution made by UN agencies, donor institutions and international government departments in promoting water management in Afghanistan.

A common view of international institutional support was that donors provide funds, and are therefore very influential, but when funds are provided through the channels of government

departments they are often appropriated by officials, particularly at sub-national levels. The feeling of many was that because of the lack of direct project oversight by donor institutions, local authorities enjoy not only increasing opportunities to divert funds but also a greater influence over the choice and implementation of different projects.

Government departments concerned with water issues, in particular the MEW, were cited by the majority of respondents as having the most influence over large-scale projects, closely followed by international institutional donors providing the funding for them. However, there were several contrasting views, and some respondents explained that all the bodies with responsibility for water in Afghanistan had let the country down.

None of these institutions have a very strong role. The government does not have capacity, the donors fail to monitor and the contractors deliver the worst quality of work ... I think all of them are complementary to each other and should work closely together.  
*Newspaper editor, Herat*

In general, most respondents omitted to say how influential multilateral institutions such as the UN Development Programme and the World Bank were, or reported that they were not influential in comparison with both government departments and major international donors. Only a very few respondents realized that these same institutions were major water project funders, and therefore had significant bearing on decisions regarding which water programmes were implemented.

Large institutional donors, particularly the Asian Development Bank (ADB), have provided support for water projects throughout the country, including a number designed to improve regional cooperation – among them the regional assistance programme between Afghanistan and Tajikistan. This project has had little impact, however, and respondents reported that even cross-sectional volume flow data from the Amu Darya river were not recorded. In the absence of even the most basic data on usage and flow, discussions stalled at the very beginning. According to one respondent, Germany's Gesellschaft für Internationale Zusammenarbeit (GIZ) is funding a long-term programme of assistance for national policy development designed to improve regional cooperation.<sup>11</sup>

### Future problems

Most respondents agreed that without serious political commitment, international financial support and technical assistance, Afghanistan would continue to labour under the same fundamental problems as now. It was widely recognized that investment in water management systems

across the country, including the funding of large-scale dams and reservoirs, would not be sufficient to address the problems of supplying clean and safe water for households and for irrigation if it continued at current levels.

Indeed, many respondents could only envisage these problems accelerating in the next 20 years, with climate change and population growth placing ever more pressure on underdeveloped mechanisms, and political and institutional structures responsible for addressing problems overwhelmed by numerous, increasingly trenchant crises.

The poor management of water is a result of the negative behaviour of communities. If this behaviour is not changed, then the problems will persist. For instance, communities dig shallow wells because they don't know any better – these are simply a short-term solution.

*NSP implementer, Kabul*

### Transboundary water issues

Relations with Afghanistan's neighbours on water issues were rated extremely poorly, with a number of respondents indicating that they would give negative scores if possible. In general, attitudes coalesced around the opinion that Afghanistan should mostly ignore the demands of neighbouring states and should do whatever was necessary to secure the supply of sufficient water to its own people and land. While admitting the practical difficulties that such action would encounter, respondents appeared bullish when considering the necessity of negotiations with neighbouring states. For some respondents, this attitude went so far as to reject completely the necessity of water-sharing agreements, with an emphasis on controlling water supplies to provide adequate supplies to Afghanistan regardless of the consequences for lower riparians.

### Formal agreements

There were widespread and widely varying misconceptions surrounding the existence of water treaties with neighbouring countries. Among the least informed appeared to be certain national NGO employees, who imagined that some transboundary treaties are in place (albeit remaining unimplemented 'on the ground') where there are none. Even scholars and academics generally held more optimistic views of the number and efficacy of transboundary water agreements than exist in reality. This is perhaps an understandable misperception for practitioners whose main areas of operation are local-level, highly practical projects where government influence and

<sup>11</sup> GIZ website, 'Clean drinking water for Afghanistan', <http://www.giz.de/en/worldwide/14701.html>.

visibility are weak to non-existent. Other participants with exposure to national-level bodies and corresponding policy processes had a more realistic understanding of the lack of any cooperative frameworks through which agreements could be developed.

A few respondents mentioned an existing agreement with Iran, in contrast to the other states with which Afghanistan shares river basins, but most said that there were no functioning mechanisms or even discussions regarding cooperation.

### **Even scholars and academics generally held more optimistic views of the number and efficacy of transboundary water agreements than exist in reality.**

While there is an existing treaty governing the amount of water that should flow from Afghanistan into Iran via the Helmand river, and the compensation that Afghanistan should receive, it was brokered in the early 1970s and is no longer adhered to. According to some respondents, it has never been operational.

Afghanistan's limited political influence was a common explanation for the lack of agreements with neighbouring countries. Pakistan and Iran were regularly cited as having no motive to develop agreements on water-sharing, as this would potentially reduce their share of the water flowing from Afghanistan. Related to this lack of regional political influence were the clear advantages to neighbouring countries of the current situation: many respondents were convinced that Iran and Pakistan had a vested interest in prolonging insecurity in Afghanistan in order to keep it 'weak'. Some interviewees said that it had no option other than to acquiesce to some demands from neighbouring countries, as a regionally cooperative environment was such an important goal, and negotiations were seen only as having the possibility of 'zero-sum' outcomes.

The Central Asian states across Afghanistan's northern border have no agreement and no cooperative framework with it. Some respondents, particularly academics with expertise in the Amu Darya river basin, commented that there was a history of agreements governing water-sharing and trading within and between the former Soviet states, and that these have mainly endured. Afghanistan has, however, historically sat outside these arrangements, as it was never part of the Soviet Union, and therefore has only newly formed links to governmental forums, academic groups or water activist networks.

Tajikistan was reportedly the neighbouring country that had most active cooperation, owing to the better political relations and the geography of the river (which forms the border for much of its length, rather than flowing from one country to the other), although Uzbekistan and Turkmenistan were also mentioned in terms of existing infrastructure (particularly railways) linking them to Afghanistan. Central Asia in general was seen as a more likely partner for water agreements because of these existing links, which were regarded as a potential basis for discussion. Cooperation between the former Soviet states on Afghanistan's northern border was described as very well developed, and the most optimistic respondents saw an opportunity for Afghanistan to 'plug in' to these formal regional structures. Although possible, this would not be a simple task: on a fundamental practical level, the working international language of Afghanistan is now English, whereas countries of the Commonwealth of Independent States use Russian for intra-regional communication.

Several respondents said that Afghanistan's priority was to develop control over its own water supply before entering into any transboundary agreements. This, it was claimed, would strengthen its bargaining position when it came to negotiations, as well as increasing the supply of water to areas of the country where shortages occur.

One minority view was that Afghanistan is complicit in the regional failure to arrive at any transboundary agreements, because it suits certain foreign policy aims to maintain the status quo. Afghanistan will not benefit from negotiations with neighbouring countries and may lose out by committing to providing downstream water volumes that it can ill afford, either now or at some point in the future. In this view, a lack of indigenous capacity (both technical and diplomatic), as was cited by Afghanistan in halting talks with Iran in 2005, is simply a convenient way of maintaining the current position. However, the lack of indigenous capacity was seen as a real and pressing problem by a significant proportion of respondents.

There is competing evidence of Afghanistan's willingness to participate in regional negotiations, and other research has pointed to the country's enthusiasm to work towards an agreement with Iran – as demonstrated by requests by the Ministry of Foreign Affairs for US technical support in negotiations with its western neighbour.<sup>12</sup> UN agencies have also attempted to bolster diplomatic relations, the UN Environment Programme having previously been involved in helping to mediate an ultimately unsuccessful water-sharing agreement between Afghanistan and Iran. Other broader forums for regional cooperation, such as the Istanbul process, while relatively successful, were seen as focused

<sup>12</sup> Sexton, Renard (July 2012), 'Natural Resources and Conflict in Afghanistan: Seven Case Studies, Major Trends and Implications for the Transition', Afghanistan Watch, [www.watchafghanistan.org/files/Natural\\_Resources\\_and\\_Conflict\\_in\\_Afghanistan/Natural\\_Resources\\_and\\_Conflict\\_in\\_Afghanistan\\_Full\\_Report\\_English.pdf](http://www.watchafghanistan.org/files/Natural_Resources_and_Conflict_in_Afghanistan/Natural_Resources_and_Conflict_in_Afghanistan_Full_Report_English.pdf).

mainly on security, terrorism and other regional issues rather than addressing transboundary water. There is residual awareness of the history of regional water diplomacy, and some respondents talked of historical agreements going as far back as 100 years, including water-sharing pacts between the British and Iran over the Helmand river.

### Political relationships

From the research discussions, it is clear that regional water-sharing problems are fundamentally influenced by existing political tensions, but many respondents also hold the view that negotiations over water could have a positive effect on deeper regional relationships. Water thus has the potential to act as a catalyst for both enhancing and damaging interstate relations, and was described as a strategic asset by a number of the experts interviewed. Respondents' opinions and optimism about regional cooperation ranged between these extremes, with some suggesting that the next war will be triggered by dwindling water supplies.

As with many discussions of regional cooperation centred on Afghanistan, there is little trust between neighbouring states. Afghan respondents pointed to (either real or supposed) projects in Iran and Pakistan that undermined Afghanistan's water sovereignty, including Iran's exploitation of water resources in the Sistan wetlands without discussion or agreement with Afghan authorities. As a consequence of the general lack of trust, discussions occurring between government figures only address seemingly more important political, economic and security questions, and do not cover water issues.

Relations with Pakistan in general, and concerning water in particular, were judged by most to be the poorest of all the neighbouring countries. Whereas most interviewees said that it was the lack of common links with Afghanistan's Central Asian neighbours that coloured cross-border relationships, Pakistan was regarded as a malign influence – a neighbour that could not be trusted. This view was most common among Afghan respondents, who in the main indicated that Pakistan was almost certainly putting pressure on international institutions to prevent funding for water projects within Afghanistan. This is a common opinion not only among NGO workers, but also among government officials, reflecting a persistent view that many Afghans share.<sup>13</sup> While international staff were less convinced that this was the case, most of this group conceded that an agreement with Pakistan would be difficult to reach given current political animosities.

Although respondents' opinions of Iran and Pakistan were overwhelmingly negative, there was little qualitative

difference in individuals' attitudes towards each, even where it may have been expected – for instance, between respondents in Herat (near the Iranian border) as opposed to those in Jalalabad (near the border with Pakistan). In both cities, interviewees were uniformly untrusting of both powerful neighbouring states.

Almost all respondents agreed that disputes over transboundary water have the potential to escalate into violent conflict. Indeed, many said that certain situations had already reached that point. Some cited violent incidents at the Salma dam in Herat, where Indian contract workers were killed; and others talked about the Kunar river dam, where attacks have taken place over the last few years. Violence in both of these locations was attributed to foreign-backed armed groups opposing Afghanistan's water sovereignty and attempting to curtail its control over water flowing to other countries.

While not directly related to relations with neighbouring countries, other respondents noted that the Kajaki dam project, on the Helmand river, had come to a complete halt as a result of the lack of security in the area, highlighting the repercussions and difficulties facing large-scale water projects – and even maintenance of those already in existence.

Experts working on Central Asian cooperation also spoke of political obstacles preventing approaches to peer organizations in Afghanistan. One academic mentioned that the Uzbek authorities were reluctant to allow cooperative measures to be explored, because of the risk of instability presented by Afghanistan across its southern border. Despite meetings with Afghan officials and academics, and their mutual attendance at international conferences, diplomatic approval of formal cooperation has not been forthcoming.

Advisers with experience in Afghanistan and neighbouring countries, including Iran, were optimistic that agreements could be drawn up between states if the overt politicization of negotiations could be overcome – a problem reported by most respondents as making any dialogue towards agreement much more complex. Other mechanisms for cooperation included the 'swapping' of technical skills for water. In the case of Iran, this would involve an increased supply from Afghanistan in return for supporting water-harvesting and conservation techniques through technical advice. Other potential exchange mechanisms were also commonly proposed by respondents, including the provision of water in return for goods or energy. However, the starting point for any such scheme would be an honest discussion about one another's water problems and needs – something that most interviewees did not see as plausible in the current political climate.

<sup>13</sup> For example, see quotes from MEW official in Mujib Mashal, 'What Iran and Pakistan want from the Afghans: water', *Time*, 2 December 2012, <http://world.time.com/2012/12/02/what-iran-and-pakistan-want-from-the-afghans-water/>.

Some said that there was a direct correlation between the willingness of neighbouring countries to cooperate and the natural supply of water: in times of water shortage, both Iran and Pakistan were marginally more eager to reach water-sharing agreements with Afghanistan.

### Sources of tension

Dams and other large-scale projects were identified as sources of regional tension, and many interviewees discussed the Salma dam as a locus of insecurity. A combination of Indian engineers and contractors, the Iranian interest in disrupting works that would reduce the amount of water flowing across the border, and local political and military rivalries has resulted in huge delays to construction following numerous deaths and attacks going back over 20 years.

Respondents also referred to a number of dams that Afghanistan was building without consulting neighbouring countries, with some saying that at least five were currently under construction. While most respondents were supportive of Afghanistan's right to build water management infrastructure within its own borders, most notably large-scale dams, they also acknowledged the difficulties presented by the unilateral and *de facto* assertion of sovereignty over water resources that such infrastructure projects represent.

A common attitude was that people in general – and especially people in the border regions – did not understand water as a resource, or its role in causing disputes.

### Areas of potential cooperation

Those interviewed gave very few reasons for optimism about future collaboration with neighbouring states. Many expressed their feeling that Afghanistan's national interest should be the sole calculation when deciding on the construction of dams and other water-retaining measures within the country, with no regard to water-sharing or the needs of lower riparian neighbours.

The overriding view was that popular opinion has ossified to such an extent that any agreement with Iran or Pakistan would be practically unacceptable without significant concessions on their part. The same attitude is also evident with regard to Afghanistan's neighbours to the north, although traditional enmities and long-standing political rivalries do not play such a major part in forming people's opinions.

People want no water to flow to Iran and Pakistan, but [these countries] feel that there should be no dam in Afghanistan controlling the flow of water to their countries. So if any politician tried to broker an agreement, everyone in Afghanistan would oppose it.

UN agency representative, Kabul

Several respondents saw the most likely path to Afghanistan's entering into regional agreements as occurring through the development of bilateral negotiations, gradually evolving into regional agreements. Two respondents suggested that cross-border cooperation between Pashtuns over Afghanistan's southeastern frontier might be easier to achieve because of the shared ethnic identity, and could help stimulate better regional cooperation overall.

Data-sharing was seen by many respondents as a 'quick win' in terms of agreements between countries; so were early-warning systems for floods and droughts, which were described as cheap and quick to implement, given the lack of political will that exists between most neighbouring countries.

Other respondents, particularly those currently involved in regional research groups (and most frequently concerning the countries of Central Asia) showed glimpses of optimism when discussing regional cooperation, and pointed to instances when Afghan academics and technical advisers had attended regional and international conferences. This was seen as an initial starting point for the discussion of common problems and for negotiations leading to regional agreements.

As discussed above, exchange programmes swapping Afghan water for other goods, services or energy were mentioned by some respondents as a way of building trust and moving beyond zero-sum negotiations. Micro-hydro technology could form part of an agreement with Tajikistan, where micro-hydrology as power generation is well used and understood. More generally, the infrastructure to bring in electricity from Iran, Tajikistan, Uzbekistan and Turkmenistan is currently being used, greatly simplifying the implementation of regional agreements based on water-for-power provisions.

### Differences in perception

One major difference was observable in the perception of neighbouring countries' positions with respect to Afghanistan. While international staff – advisers to government departments, academics and representatives of NGOs – talked about the political influence of Pakistan and Iran on the politics of natural resources in Afghanistan, Afghans themselves were generally much more hostile, for example accusing Pakistan of attempting to benefit by keeping their country in a state of instability. Foreign malevolence is a common theme, cutting across social strata, geographic location and educational level within Afghanistan, but even so the vehemence with which some respondents maintained this opinion was startling. There were also differences in opinion over the extent to which the Afghan government worked in the interest of the whole country with respect to water. While most respondents, including those who worked in and with government

departments dealing with water issues, thought that government officials' objectives were to benefit the country, others strongly believed that government workers were looking only to line their own pockets and secure political benefits for themselves. Most of the respondents who took this view were Afghan nationals working for NGOs.

In contrast to most of the Kabul-based national or international staff, interviewees working in Herat and Jalalabad were more strident in their criticism of neighbouring countries, and as a consequence were more likely to favour Afghanistan's self-reliance over treaties or agreements with other countries. This attitude extended to water supply, hydropower and military force.

Local concerns were also evident between respondents in Herat and those in Jalalabad. Discussions on the consequences of cross-border tensions naturally focused on respondents' particular areas, with interviewees in Jalalabad volunteering information about attacks targeting dam construction on the Kunar river by insurgents backed by Pakistan. Respondents in Herat talked more about the difficulties they faced with Iranian-backed armed groups targeting Indian engineers working on the Salma dam.

### Emerging conclusions

A number of broad themes emerged from the Afghanistan research.

- Although water is plentiful, supply to vulnerable communities is poor. Research respondents consistently stated that Afghanistan has enough water to fulfil all its needs, but that the systems of water management are so underdeveloped that most water flows directly into neighbouring countries without obstruction.
- There is a deep lack of trust in neighbouring states. Most respondents agreed that Afghanistan's neighbours were happy that the country was unstable, as they benefited in a number of ways – principally through increased volumes of water for their own use. The deep political distrust between countries colours most Afghan opinions on water-sharing.
- At the same time, there is a lack of trust in the government. While many respondents thought that the government worked in the best interests of the country on transboundary water, in general there is a high level of suspicion towards government employees, and the subject of corrupt and ineffective officials was brought up repeatedly.

- Local water management is good in patches; national water management is not; and regional water management is non-existent. Local water management efforts were often described as successful, including the equitable distribution of water through local mirabs. However, this form of decentralized decision-making is obviously not effective in all areas, and national water management schemes are significant only by their absence. By all accounts, there is no formal governmental cooperation on water issues with neighbouring states – a problem that will be difficult to overcome without significant diplomatic concessions and political will.

### **Local water management is good in patches; national water management is not; and regional water management is non-existent.**

- Large-scale water projects are popular and necessary, but face significant obstacles. The majority of respondents were convinced that Afghanistan should build large-scale water infrastructure, for control of the supply, power and trade. Projects of this type are faced with difficulties in funding, technical capacity and regional relations. While many thought that such work should be done in collaboration with neighbouring countries, they also said that these types of programme could be undertaken whatever the regional consequences.
- Within the country, the legacy of more than three decades of conflict colours all attitudes in relation to water and has had a deep impact on every aspect of life in Afghanistan. Traditional water governance structures, as well as physical water management systems, have been significantly damaged. Attitudes towards water management are therefore highly attuned to the possibility of further conflict.
- Interstate disputes over water have the potential to trigger interstate violence. Insurgent violence targeted at specific dam construction projects is a recurring feature, and there is a fear that, however remote the possibility, neighbouring countries could turn to war in order to resolve disputes over water use.

# 6. Bangladesh

## Introduction

The overwhelming majority of interviewees highlighted a few key issues in relation to water security in Bangladesh. The subject of water is seen through two particular and often cross-cutting prisms: of domestic water usage, and of the need for transboundary water cooperation. By and large, interviewees' responses were uniform in identifying these as major challenges or issues in the water sector. Opinions varied in terms of recommending mitigations or prioritizing challenges. However, the following topics form the crux of the dominant themes that featured in the majority of the interviews.

- Increasing population and rapid urbanization will increase demand for water in the future. It is of critical importance for the growth of Bangladesh that it achieves energy security and food security. Water is a key determinant of both, and thus imperative for growth.
- Inefficient internal water management, lack of coordination between different parts of government and a lack of water storage capacity (because of both geography and population density) are all challenges for the country. Managing water in a holistic and integrated manner is of vital importance.
- Diversion and withdrawal of water upstream, together with the lack of effective treaties or agreements with co-riparian countries, will exacerbate water problems in Bangladesh. As a lower riparian country, it is at a huge disadvantage when it comes to securing its fair share of water from the upper riparian. In addition, the power disparity manifested in the political and economic power of India, as well as in its size, often diminishes the diplomatic bargaining power of Bangladesh. The quality and quantity of water are affected by the lack of bilateral and/or regional cooperation in the water sector.
- Pollution, stemming from industry, agriculture and households, along with a rise in salinity and arsenic contamination, is a serious threat to the quality and availability of water. Different types of pollution, and its disastrous effects, were raised as concerns in most of the interviews: the issue of pollution dominated discussions regarding water quality.
- Environmental degradation and climate change/global temperature rise will contribute to the looming dangers in the future. Different ecological zones have different water predicaments. Holistic policies need to take into account environmental concerns.
- There is generally a lack of research, data, technology, equipment, funding, etc., in the water sector, and

where data exist there are questions about quality and reliability. While there has recently been a growing focus on the water sector, funding has been limited. Expanding awareness-building programmes will be critical to ensure water security.

## Water management

Domestic water management in Bangladesh is a critical issue and there is a wide range of expert opinion on matters related to alternative usage, government policies and regulations, pricing, conservation, tackling pollution, water scarcity and natural calamities. This section highlights views and suggestions on current water management (positive and negative), and policies to mitigate problems and provide holistic solutions to improve internal water management. While there are differences of opinion, the general consensus is that water is a common resource, and that its development and management should involve all beneficiaries/stakeholders.

## Surface water and groundwater challenges

The overwhelming majority of experts from various sectors identified the severe reduction in both groundwater and surface water as major challenges for Bangladesh. There is considerable agreement among experts that within a few years it will not be possible to extract or effectively use groundwater in and around Dhaka. Depletion of groundwater (the result of its growing use for irrigation) and arsenic contamination of groundwater have been identified as major threats. In the case of surface water, there is a general consensus that the major threat remains the withdrawal of water in upper riparian countries as well as non-treatable pollution (especially from heavy metals) within the country.

The majority of the respondents highlighted the uncertainty of the annual quantity of surface water, as more than 90 per cent of surface water comes from outside the country. Infrastructure development such as dams, barrages, diversions and withdrawal of water in upper riparian countries (mainly India) put Bangladesh in an extremely disadvantageous position. Many experts elaborated the threats associated with declining surface water in a number of areas:

Withdrawal of surface water in the upstream not just reduces the groundwater level in Bangladesh, it also increases the salinity of the shallow aquifers in the coastal region. These crises give rise to cyclone-induced storm surges. Coastal zone protection from storm surges has become high priority due to these water problems.

Researcher, Dhaka University



Saline water is penetrating rapidly inland and has reached as far as Chandpur due to low quantity of surface water from upstream. Saline water is penetrating inland (even central Dhaka) as the groundwater level in the capital is 3–4 feet lower than the sea level. Salinity will affect all water bodies. Salinity rise is directly detrimental to food and water security.

*Environmental activist<sup>14</sup>*

Similar views were expressed with regard to salinity and arsenic contamination:

UNICEF suggested the establishment of shallow tube wells to prevent water-borne disease like cholera. However, this was a bad decision, given that as a consequence we are facing acute arsenic contamination. Often women and children of rural areas are more affected by it as they probably lack the mobility that men have and in most cases women are often burdened to carry water.

*Anti-corruption NGO employee*

There is a widespread consensus that general policy should encourage more use of surface water to reduce pressure on groundwater. Erratic climatic conditions, reduced availability of surface water and fluctuating rainfall patterns all serve to hamper the replenishment of groundwater aquifers. Global warming, climate change and upstream water withdrawal will put direct and indirect pressure on groundwater availability. Rising global temperatures will lead to water shortages in northern Bangladesh. Most respondents agreed that groundwater is not being recharged at the rate at which it is being extracted. A few respondents felt that natural disasters will increase because of its decline. According to some, over-extraction of groundwater, as a result of pollution and upstream withdrawal of surface water, could make Bangladesh susceptible to earthquakes. It may also lead to subsidence of land.

### Quality and quantity of water

The majority of respondents suggested that both the quality and the quantity of water available have declined in Bangladesh. The fall in quality is largely attributed to pollution from industrial waste, urban household waste, waste water disposal and agricultural pesticides, as well as concerns about salinity, arsenic contamination and excessive sedimentation. One NGO official said that industries set up in neighbouring countries on the banks of rivers (such as the Ganges) also have an adverse effect as polluted water flows downstream into Bangladesh. Many interviewees mentioned inefficient sanitary facilities and latrines opening into rivers. The situation as regards sanitation in Bangladesh is unimpressive owing to underinvestment, and there should be an integrated approach to safe water supply, sanitation and hygiene (for both rural and urban communities). Community

engagement to ensure that water is not wasted and avoid encroachment on water bodies is also a concern.

Water hydrographs and necessary data of the recent years show that quantity of surface water in rivers has declined. Even water has declined during monsoon in some rivers. I was working on nine rivers in the South West region and technical data showed declining quantity and quality of water in rivers.

*Academic and Researcher, IWFM, BUET*

Another, anonymous, respondent added:

Even if annually we are getting more or less the same amount as before, seasonal water flow has considerably changed due to upstream withdrawal and diversion. Therefore, even if neighbouring countries argue that Bangladesh has enough water, the reality is that there is too much water in monsoon (which Bangladesh cannot conserve due to shortage of space) and there is serious lack of water during dry season. This hampers natural ecosystem, food production and livelihoods.

In terms of quantity, the majority believe that water availability has declined because of excessively large-scale dams, construction projects and enhanced water storage in India. India's diversion and withdrawal of water are seen as a huge disadvantage for Bangladesh, and several felt that it was responsible for declining water-flow volumes – and even for a decline in the number of rivers.

A thousand years back this delta had 15,000 rivers. Now there are just 156 perennial rivers. Even 5–6 years back Bangladesh had 230. In 20 years, we will probably have less than 50 perennial rivers.

This is mainly due to upstream actions as only 8–9% of GBM basin is in Bangladesh, and Bangladesh has no control over the actions of India and China.

*Environmental Activist/NGO official*

Another researcher stated that encroachment on wetlands and declining groundwater tables, together with the longer dry season facing Bangladesh, have created a shortage of water. River encroachment was regularly mentioned in relation to the decline of water bodies. Many experts suggested that there is a need for rigorous data collection on the scale of encroachment, something Bangladesh currently lacks.

### Water conservation

There was a general consensus among experts that water management in the country has not focused sufficiently on conservation and that generally people are unaware of the importance of conserving water. Experts' different interpretations of the survey questions concerning water conservation and prioritization in the water sector generated varied responses.

Interesting views emerged: industries use and pollute river water in abundance; there is no limitation/cap on water

<sup>14</sup> Note that many experts are more sceptical about the current threat from salinity to groundwater in Dhaka.

usage; as a geographically low-lying delta, Bangladesh does not have storage capacity to conserve water because of topographical restrictions; there is not much initiative on rainwater harvesting, implying a lack of innovative thinking; there is insufficient focus on preserving natural water bodies such as *haor*, *baor* and *beel* (ponds or depressions) that have unique ecosystems; over-extraction of groundwater suggests the need to increase dependence on surface water; dried-up rivers are occurring as a result of upstream water diversion and withdrawal; and a rise in salinity is affecting food production and health. In addition, people's general attitudes with regard to types of water usage were considered obstacles in conserving and preserving natural water bodies.

Four major rivers near Dhaka, the Buriganga, the Shitalakhya, the Turag and the Balu, receive 1.5 million cubic metres of waste water every day from 7,000 industrial units in surrounding areas and another 0.5 million cubic metres from other sources.

Academic

Private companies are charging 25 Taka for 1 litre of water, the same water that is supplied by WASA for 6 Taka per 1,000 litres. Therefore, people have a tendency to waste water in urban households.

Government official

Water conservation was also looked at from the perspective of changing agricultural practices and using technologically modern equipment.

Government should introduce water conservation policy at union level. There should be strict laws about using groundwater.

Respondent from Brotee, NGO

Water Resources Planning in Bangladesh is made on the basis of Hydrological zones North West (NW), North East (NE), North Central (NC), South West (SW), South Central (SC), Chittagong Hill Tracts, Rivers & Estuary. Different zones have been suffering from different water and sanitation related challenges. For example the Barind Tract in North West is a less rainfall zone and compares poorly with the rest of the country. Salinity is a key problem in the coastal belt.

Polders in coastal areas are not designed for storm surges. Therefore, conservation and priority needs to be area specific and strategic.

Excerpt from NGO Forum Publication, given by one interviewee

### Priority sectors in water management

With regard to questions about which sectors should be prioritized, respondents often picked farmers, as Bangladesh is an agrarian country. However, the majority of scholars and researchers stated that 'prioritization' is not a holistic solution and argued that 'Integrated Water Resource Management' should be the strategy adopted. This would require giving equal priority to the needs of all sectors, and ensuring optimum water allocation to each.

There is also a widespread sentiment that industrialists should pay more for using water and that there should be restrictions or caps on industrial water usage and pollution. Time and again it came up that effluent treatment plant is not used in industries. Some government officials and researchers also noted that it is difficult to generalize farming or industrial communities.

There are various sections/groups/strata in the agricultural community, and equity in farmer community is a tangled affair. If a Local Government Department wants to pursue a project for the betterment of traditional fishermen, it may inadvertently affect other fishermen by offsetting the process of captive fishes.

International NGO employee

Many respondents from ministries and government bodies emphasized that the Bangladesh Water Act of 2013 already makes safe drinking water the first priority. This legislation has been enacted and government officials believe that strict compliance will bring regulatory measures in the protection of water bodies, water quality and water resources leading towards integrated water resources management. One environmental lawyer claimed that water management in Bangladesh is a centralized affair and the Water Act should have adequately addressed the issue of 'decentralization'. She said that if a region in Bangladesh is threatened with water scarcity, no organization except the government can designate it a 'water scarce zone'.

The Ministry of Water Resources has adopted a master plan [of *haor* areas] from 2012 to 2031 under which only Haor and Wetland Development Board has 9 projects in 17 development areas and all of them are underway. Building sluice gates in different areas are the examples of a water conservation approach.

Haor and Wetland Development Board employee

In general, the government priorities were ranked as (1) pollution; (2) operation and maintenance of water infrastructure; (3) water conservation; and (4) changing agricultural practices. On the issue of infrastructure, two points were made: first, the need to maintain major embankments and structures; and, second, the need for new structures that are environmentally friendly and sustainable.

There are about 40,000 kilometres of embankment in the country ... Every year around 9cm of the top of these embankments are damaged by rivers. So there needs to be maintenance work. However, that requires manpower and, most importantly, funding. Often we do not have that.

NGO officer and former government official

As a lower riparian, Bangladesh must focus on the development and management of the main rivers – for example, building barrages and other structural measures for multipurpose use. The need to preserve wetlands and natural water bodies came up in numerous interviews. One respondent mentioned that the latter are being sacrificed

for agricultural expansion and food production. Therefore, zoning management is needed for water bodies and agriculture.

The proposed Ganga barrage is an example of water conservation. But it is not cost free. It must have a beneficial effect on the people of downstream. If we do not get enough water from India, this barrage will not be successful. Natural canals and human made canals need to be restructured.

Government official

Water reservoirs hold many life forms, fishes, vegetation and aquatic birds, all of which need to be protected. Many species have become extinct in Bangladesh due to these difficulties. There is a huge ecosystem that is slowly changing due to pressure and incorrect practice management. There is a lot of scope for advocacy which needs to be taken advantage of.

IUCN official

Another issue that has become prominent – not just in these questions but also in many others – is that the overall challenge remains the enforcement of laws and regulations specifically to protect water bodies. There are multiple laws in place, but there is a lack of coordination among governmental bodies. For example, in Dhaka the drinking and domestic water supply and drainage are managed by the Dhaka Water Supply and Sewerage Authority (DWASA), along with the city corporation, while flood protection is the responsibility of the Bangladesh Water Development Board (BWDB). As different organizations deal with different aspects, laws are implemented haphazardly or not enforced properly. The blame for project failure is often shifted between different organizations because of unclear responsibilities.

The overwhelming majority of experts regard water management in Bangladesh as a high-priority issue. Opinions are diverse, but a consensus prevails that water is a scarce resource and is currently often ill-used and/or wasted in riverine Bangladesh. Respondents cited the Water Act 2013 to highlight that the government has indeed accorded high-priority status to the issue of water management, but that this has not always translated into practice.

### Divergent problems in different ecological zones

Although Bangladesh is a small country, there is a consensus that its different ecological zones have different water security concerns, vulnerabilities and challenges. Water resource management therefore needs a holistic and sustainable approach. This issue was emphasized repeatedly in the interviews. Some respondents stressed the geographical differences. For instance, in the northeastern region of Bangladesh, the Sylhet basin which receives heavy

precipitation, has many *haors* which in turn have unique ecosystems. However, the region is extremely prone to flash flooding.

In Haor areas, there are flash floods in March and April. It is difficult to have early warning for flash floods.

Academic, Department of Water Resources Engineering, BUET<sup>15</sup>

Regardless of whether it is northwestern *chars* (river islands) or the *chars* of the coastal belt, erosion, high salinity and floods are the major vulnerabilities of the *char* areas. One expert shed light on the situation of the dynamic Meghna estuary, which is threatened by erosion and deposition. The erosion of vast stretches of land was highlighted in many interviews, with some respondents pointing out the lack of a sediment management plan:

In the last twenty years there has been a lot of attrition. We need to know where erosion can take place and act accordingly.

NGO officer

Natural disasters, shrimp cultivation and rising salinity in coastal areas were noted in many interviews. The erratic climate means that coastal areas are known not only for natural hazards, but also for a poor supply of safe drinking water. Sea encroachment and wide-scale unplanned developments next to the sea were identified by some experts as serious environmental threats. In addition, climate change and the rise in global temperature were identified by many experts as critical factors for the coastal areas and indeed the whole of Bangladesh. The excessive use of groundwater in Barind Tract (because of a lack of surface water and longer dry seasons) and lack of drinking water supply in the Hill Tracts were repeatedly mentioned as concerns. Preserving the unique ecosystem of the *haor* from environmental degradation, and sustaining the world's largest mangrove forest, the Sundarbans, came up in many interviews. The issue of urban waterlogging was also mentioned. A few academics and hydraulics engineers highlighted the need to ensure E-flow (environmental flow). One respondent said 'E-flow is crucial for the sustenance of aquatic life, flora and fauna. There is not much research on E-flow for mighty and medium rivers.' Another stated, 'We need to save the Sundarbans, as there is increase in salinity level. There needs to be equilibrium in fresh water flow from the upstream and salinity intrusion from downstream.'

### Pricing of water

The issue of pricing came under scrutiny and opinions were diverse in this regard. Many respondents felt that the price should be increased; however, changes should be equitable and pro-poor. Others felt that water is a basic necessity

<sup>15</sup> Forecasting flash floods can depend on external data, but the Flash Flooding Warning Centre, part of the BWDB, is conducting pilot modelling on this.

and so the current, heavily subsidized, DWASA price is fair. Some experts highlighted the lack of a proper pricing mechanism for piped water outside Dhaka.

[The] city should provide 80% of the citizens with access to safe water. Only 65%<sup>16</sup> actually get access (slum dwellers pay from Tk. 100–1000 to various suppliers which is 15 times higher than normal WASA price).

International NGO official

Corruption in the water sector was also flagged.

Often consumers face exaggerated bills, demand for bribes for reduction of billing, anomalies in meter reading record books, extortion for the changes of the meters.

Officer, Transparency International Bangladesh

There is now metered and non-metered pricing of water in different areas. There should be a study on the issue for metered and non-metered water for domestic or commercial use. Water meters should be manufactured and produced in Bangladesh and not imported from abroad so that when it malfunctions it can be replaced or fixed quickly in the country.

Former DWASA official

Many respondents recommended progressive pricing of water (as for electricity). Nevertheless, most said that the pricing for the government's irrigation water supply should probably remain the same. For commercial and industrial water usage, the consensus was that the price should rise. Some experts remarked that the affluent and the poor should not pay the same rate for water usage, and that people who use more should also pay more. A handful of water experts called for 'ecosystem serving'.

Government officials and departmental heads asserted that the current pricing of water for irrigation water supply in large projects is far less than the cost of delivery (being almost free of cost).

This is unfair considering that farmers are willing to pay for groundwater at a higher rate where surface water is limited. The scarcity values are complex issues which differ when interpreted under different circumstances.

Government official

For irrigation, private companies have deep tube wells for which they charge farmers. Private-sector monopolies over groundwater extraction for irrigation are a cause for concern as private operators often charge farmers extremely high prices. One respondent mentioned that in northern zones, 'almost 65% of deep tube wells in 7 Upazillas [subdistricts] for extracting groundwater are privately monitored. Only 30% is under BMDA [Barind Multipurpose Development Authority] control'.

Thus the key issues in the debate around water pricing in Bangladesh centred round discrepancies in water pricing in rural and urban areas, private and governmental irrigation

water supply, bottled water/piped water, corruption, the lack of an authoritative body on water management, metered and non-metered pricing, etc.

### Rivers: encroachment, navigability and sedimentation

The overwhelming majority of respondents asserted that river encroachment is a serious problem and that there should be stringent application of laws and regulations, strict punishment for encroachers, and awareness-building programmes to stop encroachment. The majority of interviewees claimed that the perpetrators are often economically and politically powerful people who are able to get away with encroaching on water bodies. Some called for the drawing up of proper river boundaries according to the natural or original course of the river. Where the natural course has changed, boundaries need to be redrawn by measuring water flow during the high monsoon. One environmental lawyer mentioned that in the developed world local governments have a major role to play in stopping encroachment: 'there are also voluntary "river keepers" who protect rivers from encroachment, pollution, etc.'

Water bodies were identified as being vulnerable throughout the country:

175 out of 230 large water bodies have dried up or have been occupied illegally. Five major rivers (the Shitalakkha, the Dakatiya, the Karnafuli, the Betna and the Surma) have been almost completely encroached. This is creating serious water security issues. Almost 1,200 encroachers are functioning within Dhaka, even under BIWTA's [Bangladesh Inland Water Transport Authority] watch.

INGO official

Experts also identified increased sediment input over natural levels as a major and widespread threat for rivers. This is linked to soil erosion and loss of navigability.

Rivers have substantially lost their water carrying capacity. Think of sedimentation in this regard. The rivers in the south-east carry a lot of sediment. Many tributaries of south-western rivers have died out. Lower tidal prism has meant that water cannot come from the sea. Rivers are drying up for upstream water withdrawal, climatic conditions, pollution, etc. Think about how since 1972 steamers stopped sailing on the Madhumati River, due to low water carrying capacity. There is river dredging to mitigate the problem; however, it is very costly.

IUCN official

There were calls for room to be given to rivers and for the application of a natural, rather than cordon, approach. Expelling encroachers from the area and stringent application of the law without the influence of corruption and political patronage were considered to be crucial to saving water bodies, reflecting the need for greater political attention to be given to these issues.

<sup>16</sup> Other sources suggest a higher figure.

One expert commented that the River Task Force has recently been given the duty of drawing up boundaries of rivers. Unfortunately, many boundary poles for rivers were put in the wrong places and the structural plan was not followed. Therefore, leaving proper room for rivers has not been ensured during implementation and large sections of river area/flood plain have become legalized as 'land area', beyond the river boundary.

Another expert proposed an independent river commission to deal with this problem, and the government is currently forming a National River Protection Commission to this end. The main issue is the lack of coordination among different governmental bodies.

BWDB and BIWTA execute dredging in inland river routes. This is a good initiative to deal with water management. However, they are extremely costly – both the process and maintenance.

Academic, Dhaka University

Another expert shed light on how the earlier 'flood control plan' hampered the peaceful hydrodynamics of rivers. A centralized heavy engineering approach in order to control floods and the construction of heavily engineered flood control infrastructure have unforeseen consequences such as increasing floods in adjacent areas.

Floods are a natural occurrence and it provides numerous benefits to the floodplain (e.g. flushing of stagnant water in low-lying areas, deposition of fertile loam on agricultural fields, etc.). Therefore, the solution is probably not building embankments haphazardly. Consider the Khoai River (Habiganj) and the Gomati River (Comilla): embankments in these rivers have meant sediments were not able to settle on the flood plain. So, they have basically settled in the rivers and the water capacity of these rivers has diminished over the years.

Bangladesh Paribesh Andolon (BAPA) employee

Issues such as excessive sedimentation, loss of navigability and loss of water-carrying capacity of rivers are thus related to man-made interventions (ranging from infrastructure construction to encroachment and urbanization) as well as upstream diversion and may be further impacted by climate change.

### National water governance

The overwhelming majority of respondents viewed the National Water Policy (NWP) of 1999 as an excellent policy document, introducing the idea of integrated water management. According to one university professor, 'Conservation of environment and ecosystem is highly prioritised in the policy, which makes it one of the best policies in the world.' 'The 1999 National Water Policy (NWP) recognised for the first time the role of water in

poverty alleviation. In addition, economic development, food security, public health and safety and a decent standard of living for the people and protection of the natural environment are incorporated in its stated goal of inclusive water management.'<sup>17</sup>

In our National Water Policy, there is an article on the need of local communities and women, therefore, this encourages community engagement ... BWDB takes decision through participatory process as stipulated by NWP. For instance, while fixing price of irrigational water there is discussion with the farmers.

Government official

Some suggestions were made with regard to strengthening the NWP, such as placing a greater stress on decentralization; providing more stringent guidelines for usage criteria and distribution of groundwater and surface water; placing a greater emphasis on the possible impact of climate change and on the detrimental impacts of the commercialization of water.

To facilitate the implementation of the NWP, the government approved a 25-year National Water Management Plan (NWMP) in 2004.<sup>18</sup> 'The main elements of the NWMP include the multi-use approach to water (not just flood protection but also irrigation, drinking water and other uses) and an emphasis on "soft" approaches, such as better management of water resources, instead of just hard engineering approaches.'<sup>19</sup> Some researchers expressed concern that there was no logical or sequential implementation of these plans. Lack of coordination among government bodies was identified by many respondents as an obstacle to the successful implementation of the policy. It is interesting to note that different organizations focus on different aspects of water management.

### The overriding issue is a serious lack of coordination among government bodies when it comes to the implementation of projects and managing water.

Despite the policy being a government document, DWASA is not legally bound to follow the NWMP. The BWDB manages mainly irrigation and floods. The Bangladesh Inland Water Transport Authority (BIWTA) focuses more specifically on rivers and navigational routes. Thus the overriding issue is a serious lack of coordination among government bodies when it comes to the implementation of projects and managing water.

The lack of monitoring bodies and schemes for water projects was also raised. Monitoring mechanisms for

<sup>17</sup> Website of Ministry of Water Resources, Documents on National Water Policy 1999. Bangladesh's 2006 Coastal Zone Strategy further focuses on the aspirations of coastal zone dwellers.

<sup>18</sup> See Water Resources Planning Organization (WARPO), [www.warpo.gov.bd/](http://www.warpo.gov.bd/).

<sup>19</sup> Golam Rasul and AKM Jahir Uddin Chowdhury (July 2010), 'Equity and Social Justice in Water Resource Management in Bangladesh', Gatekeeper series No. 146, Natural Resources Group, International Institute for Environment and Development, London, [www.iied.org](http://www.iied.org). Also available at Global Water Partnership, [www.gwp.org](http://www.gwp.org).

infrastructure on water bodies are inadequate for a variety of reasons – lack of will, technology, manpower, funds, etc. Corruption was also linked with ineffective implementation. Overall, there was perceived to be a gap between policy and practice. Respondents shed light on the recent Water Act 2013, which the overwhelming majority viewed positively.

### Research and data

There was general agreement among the experts that there is a substantial gap in research and implementation. Data collection needs to be modernized and time-series data need to be built up. ‘Rigorous data collection seems to be a thing of the past,’ remarked one professor from Jahangirnagar University. One water expert said that BWDB lacks the manpower and funding for data collection:

Department of Hydrology of BWDB was downsized due to the prescription of World Bank and this has had a bad effect. The Water Board used to keep rigorous data before. Now due to shortage of manpower and funding they cannot keep it. So there has been a significant gap in data collection. The situation has improved a little recently.

Water expert

Ideally, river water levels should be measured three times a day. Because of a shortage of manpower, data manipulation might occur in recording such rigorous, daily data. There needs to be more funding to acquire newer and more efficient equipment for data collection. Another expert claimed that human data should be compiled along with technical and hydraulic data. There is currently a lack of data on the broader relationship between communities and water bodies. Holistic water management would require social and economic data, ecological data, impact assessments on communities as well as environmental and ecological data. Another researcher shed light on the lack of data on river erosion and lack of data on water availability during the dry season.

There are gaps in the research method. There needs to be interdisciplinary research as any water issue needs to be solved holistically. Interdisciplinary is different from multidisciplinary. Interdisciplinary research will mean that social scientists, hydraulics engineers, civil engineers will all be working together and trying to find holistic solutions.

Academic, IWFM, BUET

Additionally, there was sometimes a lack of awareness when quoting statistics or data on water usage in different sectors (agriculture/domestic). One expert claimed that in a recent conference, government officials provided a very conservative estimate of agricultural and industrial water consumption, stating that just 20 per cent of water was used in agriculture. He argued that in reality a mere 5 per cent of water is for domestic use and the rest is for agricultural and industrial use. A majority of experts supported transparent data-sharing among co-riparian countries and considered this of particular importance.

### Disaster management

There was a general consensus that national capacity in dealing with floods has improved, in both pre- and post-flood situations. In general, there was a feeling that early-warning systems, disaster response and mitigation have all improved. Dissemination of information and the mechanisms for evacuation communities to safe places in coastal areas have improved. Bangladesh is far better at dealing with the aftermath of natural disasters like floods and at lessening damage compared with the situation 10 years ago, and several innovative initiatives are under way.

CEGIS [Center for Environmental and Geographic Information Services] has done an extraordinary job in community level flood forecasting for the last few years. By determining the level of water in the main river, people have successfully forecast how much water can rise in their arable lands next to the rivers and placed flags to determine the future impact (Example – Sirajganj).

Water expert

The example of the G.K. (Ganges Kobadak) Project was repeatedly cited by respondents, as the first and largest flood control, drainage improvement and irrigation project in Bangladesh. However, experts suggested a need for considerable improvement in flash-flood warning and in defences against storm and tidal surges and cyclones (e.g. Aila, Sidr). For example, it is important to maintain polders, which play a crucial role in avoiding waterlogging from tidal surges and in allowing drainage from excess rain. Also important are flood-zoning and flood-proofing through farming and animal husbandry, and constructing flood-resilient infrastructure and shelters. Disaster mitigation by means of both structural and non-structural interventions is necessary.

One researcher asserted that there has been a change in the understanding of floods. Authorities do not use the term ‘flood control’ any more; rather, they use ‘flood management’. This shows that there is general awareness of the positive aspects of floods:

Giving more room to rivers is crucial to mitigating flood damage. It is also important to realize that average sedimentation during floods is important.

Professor, IWFM, BUET

One researcher noted that in the West hydraulics engineers work with the environment in mind. Hence, plans and infrastructure are environment-friendly. In Bangladesh, by contrast, there is often a tendency to build embankments on both sides of a river in order to control the overflow of water fully, without taking account of the environmental impact.

Experts repeatedly mentioned the regional aspect in flood and drought cases. Many suggested that there should be a common understanding of the problems, whether floods or erosion among the co-riparian countries. India diverts flow during the dry season and this is a huge disadvantage to Bangladesh as the lower riparian. Many experts believed

that if data on water-gate stations in India were provided to Bangladesh, the flood forecasting system would improve considerably. In general, there needs to be more data-sharing with India. Interestingly, two researchers – unlike all the other respondents – claimed that since there has not been any major flood in Bangladesh in the last 10 years, it is hard to assess Bangladesh's capability.

Bangladesh's vulnerability to droughts has been heightened by environmental degradation in recent decades. Variable and declining annual rainfall has made western Bangladesh even more vulnerable than the rest of the country. A wide range of agricultural crops is grown in this region and these have become vulnerable because of drought. It became evident from the interviews that experts are more aware of flood-mitigation scenarios in the country than they are with regard to drought. The general consensus considers water withdrawal and diversion upstream, as well as lack of rainfall, as the major causes of drought. In addition, water storage in India and the consequent change in seasonal water flow in Bangladesh have caused droughts and failure of crops.

We need to realise that any place in the world which receives more than 400mm rain cannot be labelled as a drought prone place. So when we talk about drought, it is not 'meteorological drought'. What we have is 'agricultural drought' in certain parts of the country. I personally think we are still very vulnerable to agricultural drought and do not always have the necessary means to deal with it. Agricultural practices and upstream water diversion are directly related to this. Also, unlike flood, we do not have an early warning system for drought.

*NGO employee, former government official*

Respondents elaborated on the issue of upstream dams and infrastructures in relation to droughts. One academic argued that the main issue is upstream dams, noting that the Indo-Nepal Saptakoshi dam project was intended to construct 29 dams upstream from Bangladesh. Another respondent argued that Bangladesh's capacity to deal with drought has improved owing to opportunities available for using groundwater during times of water scarcity. However, there were concerns about the overuse of groundwater. Many organizations are working in drought-prone areas.

### Climate change

Global challenges of environmental degradation and climate change are serious threats to Bangladesh. The country's particular vulnerability to climate change was highlighted in many interviews and respondents were fearful of the possibility of enforced migration. There is a general consensus that the government has given this priority and has set up funds for adaptation and mitigation.

Bangladesh Climate Change Strategy and Action Plan (2008) is an important document. But there has been no review of this plan. This plan should be constantly revised to tackle environmental challenges ... There has been a rapid change in vulnerability structure. Adaptation and Prioritization should be the way forward. We need better direction and also modern technology to combat climate change ... Climate change will induce rural-urban migration. Almost 30 million people will have migrated by 2030/2050. No adequate measures have been taken to counter that.

*International NGO official working on climate change and community-level advocacy*

Another respondent called for adaptation, arguing that development projects need to be adapted to deal with climate change and suggested that climate change projects should be differentiated from development. At present, in this view, local capacity and local government were frequently bypassed by higher authorities, leading – after Cyclone Aila, for instance – to acute water crises.

The need to alert the international community to the country's vulnerability has been identified and acted on. Most of the respondents believed that Bangladesh has undertaken sufficient international campaigning and lobbying to let the world know its concerns regarding the possible impact of climate change. Similarly, there was a feeling that Bangladesh is paying the price for actions taken by developed countries, and many interviewees considered that the international community had not been responsive enough or allocated adequate funds for Bangladesh despite repeated promises.

Our approach is not expert-oriented, nor consultant-driven. There are inherent problems in Bangladesh Climate Change Strategy and Action Plan (BCCSAP). For a long time BCCSAP was in English, no one thought of translating it for the local population. We have to adopt something similar to Nepal's Local Action Policy Plan (LAPA).<sup>20</sup> Local government needs to have resources to deal with Khash lands. A generalised fund for climate change remains superficial and vague. Local communities and local government departments are the ones who actually need the money to undertake small scale projects. They should have local funds to tackle climate change related problems.

*Environmental activist*

### Transboundary water issues

In developing countries, scarce natural resources can have security implications, potentially leading to conflict. According to Pia Malhotra:

Water issues in South Asia are especially threatening because the political equation between a number of countries in the region is highly volatile.<sup>21</sup>

<sup>20</sup> Bangladesh did set out a National Adaptation Programme of Action in 2005.

<sup>21</sup> Pia Malhotra (2010), *Water Issues between Nepal, India & Bangladesh: A Literature Review*, Special Report (New Delhi: Institute of Peace and Conflict Studies), p. 3.

In the light of this reality, this section elaborates on opinions on Bangladesh's transboundary and regional water relations, assessing the positives and negatives, concerns about diplomatic efforts and ideas on how to improve transboundary water cooperation constructively.

### Lack of trust and cooperation

The overwhelming majority of respondents expressed feelings of disappointment, frustration and helplessness towards issues of transboundary rivers, particularly with India. Many emphasized that of the 54 common rivers between Bangladesh and India, there is only one water-sharing arrangement between the two neighbours (the 1996 Ganges Water Treaty). The general consensus was that, as the economic, military and politically dominant power in South Asia, India has ignored sustainable solutions to water problems with its neighbours. Being the lower riparian, Bangladesh is powerless when India diverts or withdraws water and is unable to persuade it to consider Bangladesh's water needs. The examples of Teesta, Tipaimukh, the National River Linking Project (NRLP) and previous issues with the Farakka barrage were seen to demonstrate the lack of will and cooperation on the part of India.

The majority of respondents mentioned the issue of the Farakka barrage, which started operating in 1975. India's unilateral withdrawal of water had a disastrous impact in the southwest region in terms of flood control, irrigation, navigation, livelihood, salinity intrusion, lack of water in the dry season and ecology:

Around 685 km waterways were available in the pre-diversion era of Farakka, which has now been reduced to 230 km.

Researcher

Respondents used the example of the upstream withdrawal of water from the Ganges to highlight how Bangladesh is inherently at a disadvantage. In addition, water experts mentioned power disparities between the co-riparian countries. India's one-sided policy and the overt politicization of water issues in South Asia were perceived as contributing to a lack of trust and cooperation. Most of the respondents rated the level of cooperation as very poor or poor.

Another issue that was emphasized in interviews was Bangladesh's lack of diplomatic bargaining power. Respondents often mentioned the 'ineffectiveness of JRC' (the Joint Rivers Commission).

India has a very bureaucratic mind-set, whereas Bangladesh lacks information and expertise, and needs to gain negotiation skills ... Most issues with India concerning rivers remain unresolved; the boundaries issues must also be settled, especially with the main seven rivers.

Diplomat

Our diplomats often lack negotiation skills. I think in universities, students who are studying water resources engineering should be given lessons on diplomatic negotiations.

Researcher

India does not follow internationally agreed rules in regard to sharing of information on what it is doing and what is the state of water resources upstream (flood water level, rainfall, etc.).

Government official

Lack of data-sharing has created an information gap. Many respondents believed that India's lack of reassurance and reciprocity has impeded cooperation.

We need to improve the knowledge base – build shared knowledge. For instance, data of both countries does not match. Knowledge should be built on jointly managing and augmenting water so neither side misuses their share of water.

Senior government adviser

It was also highlighted that other political issues (border disputes, maritime boundary, etc.) often complicate bilateral/regional cooperation. The matter of international water conventions (presumably, the UN Convention on the Law of the Non-Navigational Uses of International Watercourses) came up. Some experts believed that such conventions help in matters of negotiation and consultation among co-riparian countries.

### Ganges Water Treaty

Most respondents felt that the 1996 Ganges Water Treaty was successful (varying from 'limited success' to 'good results'). It is a successful example of Bangladesh's diplomatic endeavour, as it is the only treaty on transboundary water-sharing with India. Some believed that, by virtue of this treaty, the flow in the Padma river in Bangladesh is good in comparison with the country's other rivers. For instance, one expert suggested that at least Bangladesh is getting some water, demonstrating that the treaty is working, although India did not always keep to its promise and ensure Bangladesh received its fair share of water.

Article IX of the treaty specified that this would be replicated in other transboundary rivers. Unfortunately, we can see that it has not happened.

NGO official

The concerns with regard to the treaty centre on its improper implementation, lack of guarantee clause and the fact that there is no international arbitration clause. One respondent said, 'There is no clause to stop water diversion and withdrawal before the Farakka point.' Bangladesh has often blamed India for failing to maintain the quantum of water at Farakka. It was also highlighted in the interviews that obstruction to the natural flow of a mighty river affects a huge array of small rivers. So upstream activities have a severe impact on the majority



of small and medium-sized rivers directly or indirectly connected to the Ganges.

We did not get our fair share for nine years after the treaty. During high tide the flow has to increase. There are many barrages in India on this river. And there is no guarantee clause.

*Environmental activist*

In addition, there is no proper augmentation of the Ganges water flow in the basin states:

The flow measured at Hardinge bridge point shows no appreciable discrepancies in the division of flow reaching at Farakka point. The GWT [Ganges Water Treaty] does not include the limits for upstream states withdrawing water unlike the Indus River treaty. Therefore, the flow has historically reduced over the years and is expected to reduce in the critical 10-day period.

*Government official*

There were comments on the inadequacy of the treaty for extreme drought situations. Respondents questioned the time-frame of the treaty (30 years) and asked what will happen if India does not renew the treaty when it expires. One diplomat observed that 'India refused to agree to an international arbitration clause':

JRC is overseeing the implementation and evaluation of the treaty. According to them, Bangladesh is getting a fair share of water as per agreement. We can take some lessons from the Nile Basin Initiative or Mekong River Commission for mutually beneficial policies, strategic programmes, policy advice and scientific approach for water management among co-riparian countries.

*Government official*

### Tipaimukh dam project

An overwhelming majority of respondents felt that the Tipaimukh dam, a proposed construction in the upstream Indian state of Manipur, will adversely affect Bangladesh in multiple ways. Experts raised questions about the dam in terms of the restriction of water availability to the Kushiara and Surma rivers, and regarding the likely overall ecological-environmental impact of the project. Although India maintains that it is a hydroelectric project to generate 1,500 MW of electricity, with provision to control floods, a lack of transparency in data-sharing and unilateral plans on the part of India have generated serious controversy in Bangladesh. One respondent said:

Among the GBM Rivers, the only river which is free of India's large scale constructions is Meghna. It seems this will not be the case anymore. Netrokona and Sylhet are areas that yield the maximum amount of crop (consider boro rice). Change and decline in water flow will mean that crops will be hampered. Too much water in monsoon and too little water in the dry season will be the norm. In addition, the dam is being constructed in an earthquake-prone area.

*Anonymous*

The debate concerning the Tipaimukh dam is dominated by a general fear of large infrastructure being constructed

upstream, based on historical precedents, and the likely negative impact this may have on hydrology, biodiversity and food security, as well as the threat of desertification arising from water storage by India or risks from dam failure. The discourse in Bangladesh is that India is carrying out the project without any prior consultation with the lower riparian country, which is likely to bear the brunt of the adverse impact of the dam.

If the post-drainage is quick in Tipaimukh dam then Haor area becomes very dry. However, delayed drainage means in the post-monsoon period there will be more water in Haors. So when people think that desertification will be the effect of the dam, they actually do not realise that our main problem will be excess water in the wrong season. Think how excess water will hamper crop production – scientifically if the temperature is below 17°C during sowing of rice, it does not fertilize. So as the Tipaimukh dam will hamper seasonal water flow – it means farmers will not be able to sow rice in January. What is the problem if rice is sown earlier than January? It is simple. As the temperature during November, December will be less than 17 degrees rice sowing will not yield any harvest as the crop will not fertilize.

*Officer, IUCN*

Even on the website of the Indian government on Tipaimukh, the EIA [environmental impact assessment] says 1/3 of water will be held in India. In our FAP6 [Flood Action Plan] study in 1998, it shows why this is not good for the North-East region of our country. There was also a study done in 2007, which identified consequences of the Tipaimukh dam. However, India does not give us information on this. So it is difficult for us to conduct detailed research on the matter.

*Anonymous*

Academics highlighted the lack of adequate information from India about the dam, which was considered to impede full evaluation on Bangladesh's part. They added that the potential impact of Tipaimukh on the vast wetlands of Sylhet and Sunamganj, and on their unique ecosystems, needs to be evaluated. There were contradictory views regarding the impact of the Tipaimukh dam. A few government officials claimed that as joint studies are currently under way, it was prudent not to discuss this; or that they have been given assurances that the dam will not affect Bangladesh. However, the overwhelming majority of respondents from NGOs and civil society organizations said that India's unilateral construction of this dam is a huge impediment to cooperation. India's assertion that the dam will not affect water flow into Bangladesh must be proved and tested before any project is implemented.

India should stick to its assurance that it will only generate hydro power and also design the dam and its operation rules such that released flows maintain minimum negative impacts during operation. A Bangladesh team should be involved in the management of the dam.

*Government official*

## Teesta river

The Teesta river is another highly emotive subject between Bangladesh and India. The overwhelming majority of respondents referred to West Bengal's intransigent stance as an obstacle to signing a proposed treaty on equal and fair share of water.

On Teesta, we want 50-50 sharing of available water. The contract proposed by Mamata Banerjee of 25-75 would be difficult to sell in Bangladesh and we cannot agree to that. It could be up to 49-51 for technical reasons, as India might say we have a larger area under irrigation, so the technical sharing might work. However, 50-50 would be standard.

Diplomat

'We want 50:50 share, similar to the Ganges Water Treaty,' added one respondent from a government organization.

The Teesta ensures the livelihood of inhabitants residing in the catchment area, keeps navigation active, allows irrigation, protects farmers from the disastrous effects of climate change, etc. Respondents identified that because of the declining water volume in the Teesta, the Teesta barrage has not been able to function properly. The vast agricultural land of the Teesta catchment area is suffering from a lack of water. One respondent observed that the proposed Teesta treaty should include a guarantee clause. The dominant theme of the Teesta debate revolves around strong feelings of injustice, as India (in particular West Bengal) is refusing to acknowledge Bangladesh's rights as a lower riparian.

When we talk about Teesta, we have a tendency of considering it as a single river with no network. In reality, Teesta is a river network. It originates from Sikkim. India has already built 53 barrages on it while it flows through India. These 53 dams mean that India already retains 80% of water for their need. The amount of water we actually get is only 20% of the actual water of Teesta. Now India is proposing to build another 23 barrages on Teesta. And they are willing to give us 25% of the water. Mind you, this 25% is not of the whole water of Teesta but 25% of the negligible amount of the 20% we now get. We need to consider the whole Teesta network and not just when it enters our country. Consider the Gajaldoba barrage and the other barrages upstream on this river network during diplomatic dialogues.

Environmental activist

Respondents repeatedly mentioned the difficulty of negotiating agreements for each of the 54 transboundary rivers with India. The consensus was to move towards basin-wide management and a gradual multilateral approach.

Win-win approach for the co-riparian countries is a must. There is an attitude in India that they are giving us a lot of water, this is wrong. If in dry season we have no water, but in monsoon we have floods, that shows a serious problem in our water sharing situation.

Academic

Interviewees mentioned that the effect of Teesta water withdrawal/diversion can be clearly understood from

realizing the short-term and long-term consequences arising from the Farakka barrage scheme. Strengthening diplomatic power and strategic vision, as well as increasing the efficiency of the JRC in relation to regional water-sharing and getting an equal and fair share of water, were highlighted.

## The NRLP and trade of water/non-water benefits with India

India's NRLP and the matter of trade of water with India generated strong responses in Bangladesh. There was near unanimity among non-government interviewees in thinking that the NRLP will have a disastrous impact on Bangladesh and that India needs to abandon the project. Respondents claimed that diversion of water, withdrawal of water, changing the natural course of rivers, etc., are bound to affect the lower riparian adversely and substantially in many ways. One interviewee mentioned that if the Farakka effect is multiplied a thousandfold, and not restricted just to the southwest region but applied to the whole country, then the magnitude of the effect can be understood. However, some government officials clearly stated that India has already abandoned the NRLP in view of the probable adverse impact on the environment. Another official from Bangladesh's Ministry of Water Resources added that India has already assured Bangladesh that it will not pursue the Himalayan component of the project. Generally, respondents felt that India is withholding information from the lower riparian country.

## There was near unanimity among non-government interviewees in thinking that the NRLP will have a disastrous impact on Bangladesh and that India needs to abandon the project.

The question concerning trade generated contradictory and polarizing views. An overwhelming majority of respondents replied in terms such as: 'water is a natural resource', 'water is our national right', 'there can be no trade-off with water', 'power and water are different, we need water more than we need power'. Some respondents pointed to the ineffectiveness of a bargain arrangement with India. However, a few researchers and government officials said that this is a viable option.

I believe this is a pragmatic approach. For example – Bhutan in cooperation with India has undertaken several hydroelectric projects whose output is traded between the countries. Think about the Dagachhu project by Tata Power (Indian private power utility) in Bhutan which has a huge potential for hydro power generation.

Anonymous

In the case of Bangladesh – giving transit to India or the issue of a gas pipe line from Myanmar via Bangladesh to India can be considered.

*Anonymous*

This sort of cooperation should not be limited only to Bangladesh and India. Nepal and Bhutan should also be integrated into this process to realize the full potential of this sort of interaction.

*Anonymous*

Otherwise, Bangladesh will not get the benefit in the long run. A government adviser added, ‘There is already an agreement between the two countries for Bangladesh to get access to power which excludes trading the right to water from India for non-water benefits.’

### Basin-wide management: moving forward and improving regional cooperation

All respondents spoke of the positives of basin-wide management of transboundary rivers. The issues of making treaties multilateral and involving big international players, so as to ease the pressure on two parties and establish international accountability for the conduct of each country, were highlighted. ‘It is important to make treaties multilateral. For example, the Ganges Treaty does not have Nepal as a party,’ remarked one NGO official. Government and NGO officials talked about international examples of successful water-sharing treaties and river commissions.

Regional integrated water management needs to be implemented. Consider the Indus River Treaty, the Mekong River Commission, the Danube River Commission, etc. and learn from these examples of a win-win approach. Consider how India is pressing China over proposed Brahmaputra dams, it is similar to our case with India. If there is diversion and mismanagement in the upstream, the lower riparian countries face multifaceted consequences.

*Environmental activist*

The overwhelming majority of respondents rated basin-wide and basin-wise management as the only way to improve regional cooperation and ensure the fair sharing of water between South Asian countries. This type of management, and a multilateral approach, will force countries to pursue collective altruism and move away from a zero-sum political game. The experts claimed that river basin management is not just a natural and pragmatic way of managing a transboundary resource like rivers: it will ensure a win-win situation for co-riparian countries. The importance of multi-track diplomacy, transparency and data-sharing was also emphasized. Furthermore, disputes with India were exacerbated by the lack of reliable data in terms of river flow rates and water utilization, as well as the precise impact of and damage caused by India’s water withdrawal, diversion and construction of large infrastructure on common rivers. Given the general atmosphere of mistrust between the

two countries, there is little sharing of data and available data are often unreliable. Therefore, data dissemination between the respective governments is not coordinated and systematic.

To improve cooperation with India we need to improve the political and security understanding with India. Joint surveys should be conducted to understand how much water each country needs. It is crucial to make India understand that water issues are regional and not bilateral, and emphasize that India has similar water problems with China.

*Diplomat*

Bangladesh needs to develop a platform to innovatively address water issues with India and seek international arbitration. We need to realize that water is a ‘state issue’ in India. Therefore, just having the nod of approval from New Delhi does not mean much, if the states involved do not agree to a fair share (as we have seen in the Teesta case). It is a very difficult situation for Bangladesh as we need to persuade these states to consider our legal rights every time the issue of water sharing comes up.

*Diplomat*

Dialogues and multi-track diplomacy were rated highly as means to build trust and cooperation. Some ideas suggested included initiating multilateral diplomacy so that all countries are accountable; increasing multi-track diplomacy; improving interdisciplinary research (involving all stakeholders). One diplomat suggested that there should be a mechanism ‘where the Indian PM, along with India Chief Ministers of Indian states will agree to meet the Bangladeshi PM four times every year to discuss water issues’. International arbitration and innovative ways of raising national, regional and international awareness of Bangladesh’s legal rights and concerns as a lower riparian, via a team of Bangladeshi experts, were considered important.

We need to arrange more and more frequent dialogues between India and Bangladesh. Arranging intergovernmental conferences over common rivers water sharing and conducting joint research are imperative to build trust.

*Academic*

We need a common shared vision (identify common interests and work on building trust). Sharing of benefits (mutual and equitable), building strong resilient institutions (River Commission) and conducting Multi-track diplomacy: Track 1 (JRC) and Track 2 (For example, CPD organizes this) and Track 3 (Academics, NGOs, etc.), are important in improving ties.

*Academic*

Power disparities, negotiation capacity, inefficiency of JRC members, etc., were also cited as issues.

Domestically we need to improve our research, knowledge and expertise so we do not lose out on diplomatic negotiations with India (Indian bureaucrats are far better prepared than ours).

*Researcher, Bangladesh Institute of International and Strategic Studies*

## Emerging conclusions

Along with energy security, water security was seen as a major problem in Bangladesh, which is not a water-abundant country. There are many factors making water a high-priority issue: the rising population and urbanization, groundwater depletion and the decline in surface water, climate change, topographical difficulties preventing water storage, dried-up rivers, excessive sedimentation, loss of navigability and rising salinity and pollution. Many respondents claimed that there is every possibility that upstream withdrawal and climate change, among other factors, will hamper downstream water flow in the coming years. In view of this, alternative sources of water for Bangladesh – such as rainwater harvesting – must be prioritized. There is a need to scale up pilot projects and successful innovations. These ideas and approaches must be adequately developed in order to prepare for possible dangers ahead in the water sector.

Internal water management lacks coordination and effective implementation. The decentralization of the water sector needs focus. The overwhelming majority of respondents highlighted the gap between centre and periphery; and many asserted that ‘water should be managed at the lowest possible level’.

Pollution (of varying types) and loss of water bodies were among issues repeatedly mentioned in the interviews, with arsenic contamination and the rise in salinity receiving particular attention. The environmental impact of water insecurity was mentioned in many interviews. In addition, respondents talked of Bangladesh’s vulnerability to climate change and the impact of rising global temperature rise on sea levels.

Bangladesh faces serious resource constraints (in terms of data, technology, equipment, funding, expertise, etc.), as well as particular challenges such as sediment management.

The general consensus was that water policies, laws and regulations are more than adequate, but that implementation is the biggest challenge. Inefficient implementation has stemmed from the lack of coordination among various governmental bodies in the water sector. There was overwhelming support for the view that there needs to be coordination among different organizations so that responsibilities are backed up by proper accountability and there is no duplication in the implementation of projects, or wastage of resources. Respondents also acknowledged that issues such as pricing, research, calamity, climate change or river encroachment are fundamental elements in the water sector that need holistic and sustainable policies. For example, many respondents claimed that pricing is related to the overall attitude towards water (conservation) and that there should be progressive pricing; however, this should be pro-poor.

Discussion of pricing raised the question of the commercialization of water. The majority of interviewees considered the private business of supplying irrigational water and bottled water as exploitative and therefore detrimental practices.

## A deficit of trust and the overt politicization of the water issue are major obstacles in transboundary/regional cooperation.

Apart from arsenic contamination, respondents repeatedly mentioned the overall situation with regard to sanitation and hygiene as a high-priority issue. Further analysis of this would be beneficial, along with research into the needs of women and communities. The analysis of internal water management also clearly shows that the discourse was very much dominated by regional issues (i.e. upstream activities).

Questions on regional cooperation generated a wave of agreement on critical issues. The overwhelming majority of respondents believed that basin-wide river management and a multilateral approach are the way forward for regional cooperation. Experts believed that, as the lower riparian, Bangladesh is inherently at a disadvantage, and India does not recognize Bangladesh’s rights and needs as a co-riparian. This is evident from the cases of the Farakka Barrage, Teesta, Tipaimukh and India’s NRLP. Upstream activities have induced a severe decline in surface water, together with change of seasonal water flow, drying up of rivers, rise in salinity, soil salinity, loss of navigability, hampered ecosystems, exacerbated droughts, etc.

A deficit of trust and the overt politicization of the water issue are major obstacles in transboundary/regional cooperation. Experts asserted that improvements should come from understanding both the conditions that enable change and the impediments that hamper change. Effective engagement should include transparent data-sharing, confidence-building, multi-track diplomacy, joint studies, and improved diplomatic skills in Bangladesh.

Data-sharing, fair deals on water-sharing, a pragmatic approach on the part of Bangladesh when it comes to dealing with overly politicized issues, etc., dominated the discourse on regional water. One interesting issue that came out in the interviews is that government officials were less critical of India than were civil society, NGO and academic respondents.

Strengthening regional cooperation is crucial. Bangladesh’s topographical constraints on its ability to conserve water need to be clearly explained to India; the majority of respondents believed that India’s historical unwillingness to cooperate, and its pursuit of unilateral projects without

any concern for its lower riparian neighbour, are major challenges in ensuring effective cooperation. In addition, international cooperation/arbitration and working towards basin-wide and basin-wise management were seen as potentially helping to mitigate regional difficulties.

Overall, water needs to be understood from a multi-dimensional perspective. Research and mitigation measures in the water sector need the input of various stakeholders. Therefore, along with a technical approach, it needs both a socio-economic and environmental approach. The

importance of the environment and building awareness about climate change, including methods of adaptation and mitigation, need to be developed in a broader context.

The overt politicization of natural resources is detrimental for countries. A nation needs to be united when it comes to dealing with natural resources that are indispensable for both upper and lower riparian countries, their people and their growth. Water is a finite resource, and therefore countries of the GBM basin should pursue holistic and sustainable policies in the sector.

# 7. India

## Introduction

The lack of a coherent water management strategy was identified as the most pressing water challenge for India. As a developing country, it is in the midst of a resource crunch – compounded by the effects of immense population growth, urban expansion and rapid industrialization. According to projections of the National Commission for Integrated Water Resources Development Plan, supply will definitively fall short of demand in the near future, with a crisis likely unless timely measures are taken to balance demand and supply. A commonly raised issue was the belief that water management strategies in India were followed on an ad hoc basis, without any clear objectives or coherent plan to optimize water efficiency, and water management was deemed a ‘headless, leaderless’ process.

A general challenge to water management collectively flagged by respondents was the country’s dependence on the monsoon for its water needs, along with its spatial and geographical variability. Most of the precipitation in India occurs between July and October, with the northern and eastern parts of the country receiving the bulk of the rainfall. India’s inability to harness this natural abundance of water further contributes to its water inefficiency.

Water conflicts and insecurity are all-pervasive in South Asia, but India’s regional role in this regard is especially critical. Having contiguous borders with, *inter alia*, Pakistan, Bangladesh and Nepal, India is the largest country in the region (along with China) in terms of size, population and economy, and is therefore crucial to any cooperation being achieved in South Asia. In view of this reality, this chapter highlights expert opinions on India’s transboundary water dealings, setting out issues related to hydro-diplomacy, treaties and measures for constructive improvement of transboundary water cooperation efforts.

## Water management

Central to discussions of challenges to water management is the sectoral distribution of water consumption in India, whereby agriculture takes up the bulk of water available and the domestic sector – i.e. households and their drinking water requirements – consumes a much smaller share. There was a widespread perception that deeper systemic changes were needed in order to promote water efficiency, starting with reducing economic reliance on the agricultural sector and creating more employment opportunities in the industrial sector, which utilizes very little water by comparison. It was widely believed among respondents that, in the long term, if these agrarian changes were not brought about, optimum water use would not be achieved.

The high rate of urban expansion in India was seen as a vital area that was affecting water demand and its efficient usage. As one respondent noted, councils such the National Research Council (NCR) and the National Intelligence Council (NIC) suggest that 60 per cent of India’s population will be in the urban areas by 2030/40. By the time economic growth starts peaking, he argued, water demand will be more urban than agricultural. Common views included that ‘urbanization is going to give rise to a very different kind of demand’, and that ‘urbanization patterns are going to be key to solving all our developmental issues, whether in terms of climate, water availability or sustainable development and India is still groping towards that framework of development’.

While at least 80 per cent of the total water supply was used for irrigation, the supply of drinking water in urban areas was irregular and inequitable, being almost non-existent in slums. In rural areas, despite commitments on the part of successive governments to provide full drinking water coverage, a large number of villages remained ‘no source villages’.

Scarcity of water was believed to be ‘a condition of poor management’, which in turn created ‘inequitable access’, rather than a natural shortage. In the words of another respondent:

Improved water management is of utmost importance because water is of a fixed amount. The availability is fixed and finite. The greatest concern would be to devise means of how to distribute water on a rational basis so that the wealthy as well as the poor can receive water at appropriate pricing.

*Ex-Member, Central Water Commission*

The primary causes of this ‘poor management’ were identified as the unclear division of power between the centre, the state and local bodies with regard to the water sector. While water is a constitutionally enshrined ‘state subject’, in rural areas the *panchayat* (village council) bodies require greater institutional and financial strength in order to provide drinking water for their communities. Furthermore, it was felt that multiple levels of bureaucracy in the functioning of water jurisdiction and government bodies added to the chaos and mismanagement:

There are eight different departments in the government that look after different facets of water, its use, supply, pollution level etc. There is no integration between these different departments. There is a need to reorganize the ministries so that information sharing and cumulative problem solving can take place.

*Retired bureaucrat, Ministry of Water Resources*

A commonly suggested solution to the lack of access to water was to make the right to water constitutionally guaranteed. However, this would entail changing the status of water as a state subject and including it on the Concurrent List (concerning relations between the Union and the states)

by amending the constitution. Many respondents conceded that this would prove to be a long and tedious process which would need to be addressed with proper care:

While enacting Right to Water, the government should ensure a proper mechanism is in place to meet the growing demands of water and availability of water with equal emphasis on necessary infrastructure for water.

*Bureaucrat, Ministry of Water Resources*

Respondents felt that, thus far, water policies addressing the needs of the country were strong in letter. The most commonly cited example was the National Water Policy (2012), which in calling for an improved water infrastructure and in highlighting the need to recognize ‘environmental flows’ as necessary to maintain the ecological health of the river and ensure clean and safe water supply for all, was seen as a ‘fairly comprehensive document, but – on the basis of the socio-economic indicators and persistent gaps in water access and supply – one that was very poor in implementation. This was further indicative of a widening gulf between policy and practice.

It was felt that NGOs had done commendable work in promoting community-based water management programmes and off-grid water storage systems to supplement the gaps in the mainstream methods, and it was considered crucial that this should continue with more public participation.

### Water conservation

Water conservation was seen as linked to community participation. Many respondents pointed out the proliferation of water conservation measures introduced in the few years, such as the Environment (Protection) Act, the Water (Prevention and Control of Pollution) Act and the National Water Policy. These were seen as strong in letter, but their effectiveness was blunted by a lack of penalties and poor implementation. Many cited programmes such as the Ganga Action Plan, which was launched in 1986 but had to be withdrawn in 2000 owing to ineffective results and increasing costs of approximately Rs 9,000 million. Overwhelmingly, respondents demanded strict water audits for industries, in order for environmental conservation laws to have an impact. The responsibility both of individuals and of civil society in supplementing government efforts towards water conservation was also deemed paramount.

There is no national or state level water conservation policy. There is a need for capacity building of the people in water conservation by sensitizing, incentivizing and galvanizing them about water conservation. Prizes such as Water Man/Woman of the Year and some rebate in water bill for a person who excels in water conservation can be instituted to galvanize the people in participating in water conservation campaigns and thus their support can be elicited in water conservation.

*President, India Water Foundation*

Beyond the ‘supplementary’ role of the wider population in water conservation, many respondents also felt that the ethic to conserve water would only follow once people started to think of water as an exhaustible resource, and it was only through such social awareness with regard to water that laws would become effective.

Water conservation is not something that the government can do or order. The government can only create awareness among the people and it's the people on the ground who have to do their work, and we have lots of demonstrative projects and fund schemes like the Rehabilitation and Renovation of Water Bodies all over the country wherein we have tried to promote water conservation efforts. Earlier there used to be local water bodies in the village like ponds and lakes, which have slowly been taken over for other land usages. So we need to encourage mass awareness programmes to educate local people in the benefits of such local water resources and also encourage them to conserve water since it is no more a commodity that is freely available.

*Academic, TERI University*

With regard to community participation, a majority of the interviewees agreed that micro-conservation techniques – such as watershed treatment, rainwater harvesting, tanks and *bunds* (small stone dams) – were crucial to achieving water efficiency and needed to be promoted. However, there was also a clear consensus that these were not scalable techniques. Hence, community participation and rural initiatives were needed to complement the more scalable, mainstream efforts of the state with micro-conservation initiatives. Several respondents mentioned the efforts of a water users’ association in Andhra Pradesh as a good example of a participatory irrigation management system in which the association worked in conjunction with the state.

It is when mechanisms and not the people are put at the forefront that the administration fails. One must always supplement the other.

*Former bureaucrat, New Delhi*

A recurring issue in this respect was the over-extraction of groundwater in order to meet irrigation demands and domestic consumption, which has led to an alarming lowering of the water table. Since legislation and controls imposed by the state have so far been unsuccessful in ensuring the sustainable use of groundwater, it was felt that ‘local community-based institutions that are adequately supported by scientific methods’ would go a long way in curbing groundwater exploitation. This would also ensure respite from what respondents called ‘votebank politics’, employed by national political organizations and at local level, whereby politicians promised free electricity to farmers, in turn allowing them to run pumps and thus overuse groundwater to cultivate more water-intensive crops. The ‘politics of subsidies for votes’, in the words of one respondent, was seen to have wreaked havoc on water usage patterns and groundwater tables in rural India.

## Water pricing and privatization

Following on from the debate on water conservation, an overwhelming number of respondents felt that allowing water pricing and market mechanisms to operate in the sector would be the most effective way of ensuring responsible use of water. Most commonly, it was believed that maximum wastage of water occurs in the agricultural sector, where water-intensive crops and irrigation subsidies for farmers have led to wanton use of water at very low prices.

There was a consensus that water supply distribution in India needs a higher degree of reform and water prices need to be equitable. Most respondents were also comfortable with the idea of the entry of private players to handle the water delivery system, under the National Water Policy, if this ensured continuous supply. In the current scenario, it was agreed, the poor pay disproportionately high prices for water while the wealthy get a continuous supply at a price that, compared with their income, was relatively low. This was regarded as unfair, and differential pricing was seen as the best way to meet the water needs of the poor while also encouraging judicious use of water among the elite.

Better usage can only be done through effective pricing of water. In India, the greatest problem is that we do not know how to value water both literally as well as figuratively. Pricing policy needs to be regulated so that the poor should not have to pay more and the wealthy pay less. The farmers' lobby decides not to price water, therefore leading to misuse and wastage of water. Therefore water use efficiency needs to be promoted.

Researcher, think-tank

However, the majority of respondents did not weigh the benefits of water pricing against its underlying ideology. The common thinking was that the moment water became an economic good, people's attitude towards it would change positively and that 'the market forces will also ensure that water supply meets demand'.

An alternative view among a small number of respondents – from the NGO sector – was to be wary of treating water as an economic good and of leaving its governance to the market and economic instruments:

Water is practically free at the moment. But even then, the question that needs to be asked is that even if water prices were to be hiked up, would that guarantee or ensure that water use and water management techniques would substantially improve because high prices are being levied? Or do we need to follow a different model?

NGO head, New Delhi

Respondents also pointed to the emergence of a growing market for water in rural areas, particularly in Punjab and Haryana, sold by local pump owners. While this marketization of water was expected to counter the effects of groundwater depletion and the wastage of water caused as side-effect of agricultural subsidies, it has only reified

inequalities in the agricultural structure, with the rural elite controlling pump ownership and hence access to water.

Similarly, critics of privatization suggested that water is a common-pool resource and should be viewed as such. Should the state start functioning simply as a regulator or facilitator, and the service delivery be handed over to the private sector, instead of exploring how to make continuous delivery possible by strengthening the capacity of the public sector, such a move would exacerbate the water crisis by producing more inequitable and hierarchical access to water.

## In order to achieve this level of water efficiency, more income is needed on the demand side, so that people are able to afford the expensive water-efficient appliances or equipment required.

Many of the interviewees asserted that the manner in which the water management debate is framed needs to change. Whether seen through the lens of integrated resources management or the emerging 'food-water-energy nexus', water needs to be viewed in a holistic manner: as being intrinsic to food security, energy security, economic growth and social equality, as well as to health. This would go a long way to ensuring that water becomes a resource that is treated as a priority in policy-making.

Of the broader debates in water management, a recurring theme was the question of demand-side versus supply-side management. It was largely agreed by respondents that a management technique that includes control of both demand and supply would be the most balanced and productive. As one respondent put it:

With increased demand in water, there is increased wastage. Since supply is limited, demand needs to be managed.

Government official, Ministry of Water Resources

Therefore, there is a need for better pricing of water as well as promoting the use of water-efficient technology. But in order to achieve this level of water efficiency, more income is needed on the demand side, so that people are able to afford the expensive water-efficient appliances or equipment required. Similarly, having an integrated water management system on the supply side was seen as integral to preventing aggravated dispute situations over supply at both state and district levels.

## Gender

Water collection is an entirely female domain in rural areas. It is for this reason that the inaccessibility of water and the opportunity cost of trying to procure potable water were felt most keenly by women. Better roads



and enhanced last-mile connectivity in rural areas were thus seen as crucial steps in ensuring better access to resources. As one respondent put it, 'roads in India are the primary mode of mobilizing resources, be it food, water consumables or other goods'.

In urban areas, it was thought that since low-income households and slums have no fixed source of water, they often have to rely on irregular and distant public or private water tanks or taps. Generally, it is women from migrant labour families who struggle with the collection and transport of water for daily use. This was also considered to have a direct impact on health and livelihoods.

Additionally, poor sanitation facilities were regarded by respondents as demanding quick redress in order to facilitate access to water for women in rural areas. While women often have the primary responsibility for the management of household water supply, it was noted that they are rarely consulted or involved in its planning and management.

Many respondents thought that, theoretically, the government's 2012 National Water Policy, as well as the water policies of some state governments, did address the water needs of communities and women. However, most maintained that in the absence of consolidated data to this effect, it is difficult to say whether water management takes sufficient account of the needs of communities, regardless of whether women are included. It was felt that the water needs of women and marginalized communities, especially in rural areas, must be accorded priority in the relevant water policy documents, with a monitoring mechanism to oversee compliance with this provision.

### Quantity, quality and data

As highlighted earlier, an overwhelming number of interviewees agreed that the quantity of water available remains the same, and it is in fact questions of utilization, access and management that determine how much is available.

None the less, among the environmental factors listed by respondents as affecting the quantity of water were silting, which decreases the carrying capacity of the rivers; climate change; decreasing size of glaciers; diversion of streams for river valley projects – whereby water quantity falls in the main course of the river, altering its flow pattern; and over-extraction of groundwater.

All respondents agreed that the quality of water had declined. This was mainly due to the effects of industrialization, or untreated industrial effluents and poor sewage disposal, which have caused water pollution on a large scale and have had an impact on the river

bodies. Notably, respondents from all sectors (government, media, the private and NGO sectors) were widely aware of the extent of pollution in the Ganges river, counting it among the 'most over polluted and over-exploited' even while remaining mindful of its 'sacred' value. The decline in the water table and heavy pollution were seen to have huge environmental, social and economic costs and to be causing increased vulnerability for the communities of the Ganges basin.

### The decline in the water table and heavy pollution were seen to have huge environmental, social and economic costs and to be causing increased vulnerability for the communities of the Ganges basin.

High levels of salinity caused by over-extraction of groundwater and surface water were a vital factor marring water quality. Water pollution was also seen as a major problem in rural areas, compounded by links between upstream and downstream villages with pollution upstream transferred to downstream communities. Some expressed concern that, when water was supplied to rural communities, over-consumption resulted in pools of stagnant, standing water which encourages mosquitoes to breed, and diseases such as dengue to result (see Appendix 3 for further detail on this).

There was a fair amount of discontent among respondents with regard to the government's lack of attention to water pollution and its ensuing health hazards. As one respondent put it:

The Government spent about 19–20K crores [Rs190–200m] to clean up the Yamuna. What did they do with the money? They created sewage effluent plants at one end of the town without connecting it to the feeder drains. How do we manage sewage if we don't have the basic infrastructure? People who live in the marginal areas have no land, no sewage facility and there are a huge number of these people. We cannot deal with the past baggage of sewage accumulation with the available technology, so we need to have a very different model of sewage treatment than what we are using now.

*Executive Engineer, Water Supply and Sewerage Board*

With regard to data, it was felt that the Indian government needed to make its hydrological data more accessible to the people and that in order to have a sound development model, real-life performance assessment data on dams and large-scale projects were critical. Similarly, data on the impact of individual water projects and their impact on the overall economic development should be made available.

Other areas of data gathering that could improve water management include supply data, which would entail proper metering records; basin data on rivulets and smaller

rivers; data on industrial consumption; information on transboundary water bodies such as aquifers, groundwater and rivers; and data on real-time flow of rivers.

Overall, however, it was felt that there was no problem with the abundance and availability of data, with the Central Water Commission releasing data used regularly in mapping rivers. There was also thought to be a profusion of privately funded, quality research by premier institutions such as the Indian Institutes of Technology (IITs) and Indian Institutes of Management (IIMs), which have been assigned specific projects on the Indus, Ganges and Brahmaputra rivers in accordance with the National Water Mission. However, the real problem as regards data – as in the general bureaucratic functioning of water management – was considered to be in the coordination of competing data-sets and information from different departments. According to one respondent:

There should be proper mechanism to promote inter-sectoral cooperation and coordination between different departments of the Central Government and states in sharing data/research about water quality, contamination of water etc. There is a need for close cooperation between Water Pollution Control Boards and the Department of Water Supply at the Centre as well as in the states in respect of water quality.

*Ex-member, Central Water Commission*

### Climate change

With regard to climate change, most respondents were of the opinion that although its effects would have detrimental effects on India's ecological system and water availability in the next 20 years, it was not high on the list of priorities of policy-makers at present. Nor was the impact of climate change on water availability clear, either among scientists or politicians, or among other respondents.

The country's current approach to climate change was deemed inadequate, even though India had pledged at the 2009 UN Climate Change Conference in Copenhagen to reduce its carbon emissions rate, and had also instituted a National Action Plan on Climate Change.

The need of the hour, as pointed to by several respondents, was to recognize the urgent need for adaptation strategies and a national climate adaptation policy. Such a strategy should emphasize river basin development, improvement of livelihoods and development of the entrepreneurship skills of people living in eco-fragile zones, along with increased national, regional and international cooperation in climate adaptation policy. Furthermore, there was a need to understand fully the impact of climate change on water availability and access, and the potential of variable rainfall to provide for greater insurance measures – in terms of water storage and proper distribution systems – to protect India's water needs against the vagaries of climate change in the future.

A smaller minority of respondents also felt that climate change should be prioritized because of its impact on transboundary water relations. In their view, a variation in the timing and intensity of monsoon rains would affect agricultural production and pose a threat to food security, thereby exacerbating tensions between countries over water access during the dry seasons.

### Regional variations

Several respondents seemed to believe that there was a north–south divide when it came to assessing the urban service delivery record and water access, with the southern states scoring higher. Respondents most commonly attributed this to a positive correlation between water adequacy and social indicators such as education, life expectancy and income. States in southern India were considered to have incorporated indigenous water conservation practices into their city planning methods. This was also thought by respondents to be an important marker for sound water management.

Sanitation coverage in India, especially in rural areas, was regarded as poor, with a consequent effect on mortality rates resulting from water-borne diseases. Many thought that sanitation correlated with literacy levels, whereby Tamil Nadu and Karnataka were thought to have the best coverage while Uttar Pradesh, Chhattisgarh and Bihar were thought to have the worst. In the words of one respondent:

The only way to make health and sanitation a matter of priority is to ensure there is awareness via innovative means. There is much to learn from Karnataka's Integrated Rural Water Supply and Sanitation programme (IRWSS1993) and Swacha Grama Yojane which ensured the construction of storm water drains and provision of community toilets were achieved.

*Academic*

To improve last-mile connectivity in rural areas requires better transport links to connect rural pockets to highways. Many saw this as vital to address inequitable access to water and promote overall economic progress. Road networks were seen as unevenly developed: while rural areas in the northeast, Rajasthan and Bihar were badly connected, Madhya Pradesh and Kashmir, because of their industrial or strategic importance, were considered to have better links. This suggests that regional development – and consequently access to water – depended on the government's political will. One respondent suggested that this had created a 'vicious circle', whereby developed states, with greater economic potential, had better facilities and access to water while less developed states continually fall behind because of a perceived lack of potential. In relation to urban India, and particularly its megacities, many thought that Urban Local Bodies (ULBs) did not take sufficient account of either the safety or the convenience of women.

Many respondents argued that inter-state conflicts within India, such as the dispute between Haryana and Punjab over the Sutlej Yamuna canal link, between Karnataka, Tamil Nadu and Kerala over the Kaveri river and between Gujarat and Maharashtra over the Narmada river, create internal ‘upstream versus downstream’ water problems within India. The lack of an effective dispute-solving mechanism for interstate conflicts was seen as further compounding the problem.

While there are tribunals set up as part of the Inter-state River Water Disputes Act, 1956 that will adjudicate conflicts between riparian states, the verdict of the tribunal becomes binding only when it is accepted by the Central government, which under pressure from state governments takes forever, as seen in the case of the Cauvery tribunal which carried forth interminably.

Lawyer

### Floods and droughts

Floods and droughts have been recurring environmental issues for India. However, there was no clear consensus among respondents to the survey as to whether India’s capacity to deal with them had improved, declined or remained the same.

A large number of respondents felt that the frequency of floods and droughts, and their scale of devastation, had increased. The most commonly given reasons for this were faulty urban planning based on floodplain zoning (as in the case of Uttarakhand) and trying to ‘stem the natural flow of water’ by building dams which, according to many, created man-made floods and droughts.

Many respondents also felt that while India had a poor track record in respect of land use management, it had done well in flood forecasting and warning systems *vis-à-vis* both floods and droughts. Models also exist to reduce the impact of climate change. But the issues had not been completely addressed because, as one respondent stated, ‘We have done well in terms of retroactive measures, but haven’t improved on the proactive measures.’

Another set of respondents saw floods and droughts as natural phenomena that will continue to occur as a part of the natural hydrological cycle. Therefore, in their view, flood-control policy should be devised in such a way that natural ecology is not tampered with, but at the same time an attempt is made to reduce people’s vulnerability to floods.

Droughts are a natural phenomenon as well and I think state and district level officials are doing a good job trying to improve the situation.

Journalist, *Times of India*

Another divergent view claimed that damming rivers had resulted in better storage capacity and channelling of surplus water, leading to less frequent flooding; at the same time, drought management had improved because of a better network of water diversion and channelling of water to places of drought and water scarcity.

**There was a general consensus that there is currently a greater tendency for communities to be adversely affected by floods. This is because the rising population and consequent pressure on existing resources mean that people are being forced to occupy floodplains that should ideally be left unoccupied.**

While the capacity to mitigate disasters had increased, the patterns of urban settlements still needed overhauling in order to minimize the threat of natural disaster. There was a general consensus that there is currently a greater tendency for communities to be adversely affected by floods. This is because the rising population and consequent pressure on existing resources mean that people are being forced to occupy floodplains that should ideally be left unoccupied. As regards droughts, likewise, people have now moved to the marginal areas of a region, where resources are scarce, thus rendering them vulnerable to the pressures of resource availability and environmental disturbances.

### Religious and cultural value of rivers

The religious value of rivers in India is a contentious, ideological issue and, accordingly, responses on this theme were the most divided. While a large number of interviewees felt that the ‘sacred’ value of the Ganges and its ensuing religious rituals were harmful because they contributed to the pollution in the river, an equally large number of respondents felt that the value of the river was sacrosanct and therefore non-negotiable. Some respondents even suggested that the scale of traditional rituals of immersion in the Ganges was so low that it ‘did not really upset the ecological balance or biodiversity of the Great River’ and that immersion of dead bodies in the river had in ‘no way been found to hinder water management initiatives in the Ganga’. Several interviewees also pointed to the widely believed myth of the Ganges possessing self-purifying properties. The belief was that, as one interviewee pointed out, its ‘sacred nature’ and purported scientific ability of retaining oxygen prevented the spread of diseases among the millions of Indians who bathe in it.

The political economy of India's rivers has a rich and diverse history. All of the respondents claimed a sense of pride in the intertwined spiritual and cultural space assumed by the Ganges and other rivers in India, even if they could not agree with its 'sacredness'. Respondents often, for instance, compared the value of the Ganges as being 'intrinsic to the Indian consciousness as the Nile is to the Egyptian one'. But despite the multiple political, economic and cultural stakes involved in the management of the Ganges, respondents felt that there was a lack of responsibility to protect the ecology of India's rivers and their basins among its citizens and policy-makers.

Opinions across the board were that the religious and cultural value of rivers could be successfully leveraged as part of a drive to promote water conservation.

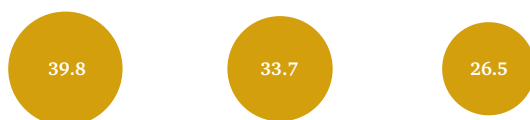
All rivers are sacred. Our culture, our nationalism if you will, is related to one river or the other. The problem occurs when people consider it holy but do not stop polluting it. There is a need for a greater awareness programme, especially among the youth, not just in terms of environment and health but regarding every other facet of life revolving around the river.

Private consultant, New Delhi

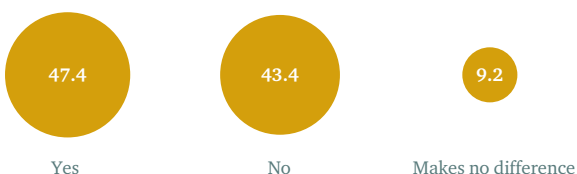
Respondents pointed to a couple of cases in the recent past where protests – by a Hindu priest in 2011, against mining in the Ganges basin, or a fast-until-death campaign for a cleaner river by an environmental activist the following year – had led to the government taking remedial action and 'refocusing its attention on the millions sanctioned for creating sewer networks, sewage treatment plants and community toilets', as one water activist put it, highlighting that government funds 'were never an issue' but instead 'individuals need to stand up and [put] their personal value of the Ganga to good use'.

**Figure 7.1: Perceptions of water and its socio-cultural impact (%)**

Should religion be used to promote water conservation?



Should religion be used to tackle pollution?



## National River Linking Project

The Indian government's proposed National River Linking Project (NRLP) is touted as a highly ambitious inter-basin water transfer project, aimed at easing water shortages in western and southern India as well as the impacts of recurrent floods in the eastern parts of the Ganges basin. The scheme, however, has evoked polarized views. About half the respondents to the survey agreed with the logic of the project, bearing in mind that linking rivers would allow inter-basin transfer of river water, which would in turn keep the surplus and deficit of water in check and reduce the unreliability of monsoons.

On the other hand, a large number of respondents vehemently disagreed with the project, as they believed that 'tampering' with nature on such a large scale would be an ecological disaster. Others declared the project to be legally and economically unviable.

In the words of one respondent:

Transferring water to areas of water scarcity may cause problems which were not anticipated (disturbing the river ecosystem etc). But the question is how much water is really needed? Also, its operation and planning is too centralized, not taking the same aspects into account as decentralized planning would.

Senior journalist, New Delhi

As a consequence, this scheme would invariably become mired in bureaucratic wrangling, adding to the cost and the time-frame. The most important factor in the successful achievement of complex and controversial measures such as the NRLP is ensuring that the dialogue starts at the community level.

Other critics of the NRLP also pointed to the detrimental transboundary impact of the scheme on riparians such as Bangladesh, although this was not a popular concern. This raised interesting questions about the relative lack of attention paid to transboundary compared with domestic water matters.

## Sectoral divergences

Since the interview was conducted across different sectors – i.e. government, NGO, private sector and academia – answers to key questions yielded interesting divergences. These divergences (principally between the government and civil society) reflected a marked divide between two competing water worldviews: one that sees water as a marketable commodity with vital technical dimensions and as the basis for urbanization patterns in the future; the other apparently focusing on the social underpinnings of water and the 'human' face of development (although these two worldviews were not seen as mutually exclusive

in every case). Interestingly, there was often a convergence between the views of the government and those of the private sector.

### Water challenges

A recurring trope found in this study was the ‘rural versus urban divide’. The water measures and interventions considered most crucial by respondents were related to urban concerns about water management and consumption. Specifically, when asked to identify the most pressing water challenges, interviewees chose formulation of a strong water management strategy and tackling the pressures of urbanization as their priority. However, when this question was broken down according to the sectoral identity of the respondents, this answer was most commonly given by public-sector employees. In contrast, academics and NGO workers chose ‘inequitable access to water’ and ‘exclusion of certain social groups from access to water’ as the biggest water issues for India. They felt that framing the water debate in wholly urban terms obliterates the urgency of access in rural areas. In the words of one respondent:

A country like ours has had a history of caste, class and religious exclusion, so it is not surprising that socioeconomic identities have created an exclusionary matrix for the have-nots. And this is most keenly felt when it comes to access to resources that are crucial for survival, particularly in rural areas. That we barely count this as a ‘water problem’ next to questions of efficiency and management shows us where our priorities are.

Academic, Jawahar Lal Nehru University

### Dams

The issue of dams brought up many competing ideas of development. Respondents from the government as well as the private sector believed that dams and large-scale infrastructure were crucial for meeting the water needs of any country, specifically to mitigate the effects of natural water shortage and generate hydroelectric power. But academics and even media people seemed more cautious about the logic of big constructions.

The enthusiasm for dam-construction in India, ever since Independence, has left in its wake a history of displacement, of choosing the concerns of certain interest groups over the welfare of citizens, of inter-state conflicts and of man-made scarcities. We have the Bhakra Nangal dam and the Sardar Sarovar dam as the biggest illustrations of this. Dam constructions do have their benefits so the answer is not this or that, but a more thoughtful consideration of the ecological measures we take for ‘better water results’ and at what costs?

Journalist, *Indian Express*

Respondents from the non-governmental sector and researchers pointed to their experiences of witnessing rural populations increasingly opt for localized and ‘off-grid’

water storage options. *Bunds, ahars* and *pynes* (rural canal systems in Bihar) were some of the oft-quoted indigenous methods for the same.

At a certain level it is about making ends meet in the face of the failure of the modern state, whether it’s the duty to provide basic facilities, or man-made scarcity created in part by large constructions and diversions. In a sense these are indigenous, tried and tested ‘pre-colonial’ methods that have served the people long before the developmental drive began. But the fear is, we may make the rural populace more dependent on such measures, rather than include them in the basic framework.

Researcher, Jawahar Lal Nehru University

### Common-pool resource versus economic good

There was a clear schism in the conceptual framework of water. Interviewees from the government as well as the private sector considered pricing and privatization of water a natural direction for the future, bringing with it efficient water usage and delivery. Academics and NGO workers, on the other hand, were much more critical, claiming that the country’s deeply stratified socio-economic structure would crumble under such a move. They remained committed to the belief that water in India should be framed as a common-pool resource and the role of the Indian state should remain central in water service delivery to counteract the pre-existing hierarchical access to water.

Water and sanitation so often become controlled by rural power hierarchies. Marketization or privatization or any form that takes us away from addressing these core inequalities first will lead us not to efficiency but to scarcity and a later stage, maybe even conflict.

Academic, Jawahar Lal Nehru University

### Data

Suggestions for improving data revealed an interesting divide between the ‘technical’ and ‘holistic’ views on water. Respondents from the media, NGOs and think-tanks emphasized the need for making integrated and multidisciplinary data available, in order to assess water issues not just in isolation but along with broader questions of socio-economic contexts, livelihood dependence, agriculture, land, ecology, effects of industrial expansion and climate change. New assessment models which move beyond quantitative assessments, stringent economic principles and structural values were thought essential to help make sustainable choices. While government employees focused on the importance of technical improvements such as supply data, basin data and better-quality information on transboundary water bodies (e.g aquifers, groundwater and rivers), civil society respondents and academics called for a ‘new language’ to bridge the technocratic gap.

Since Independence the focus has been on technical and modern engineering solutions to water issues and this is reflected in the data that feeds into policy making as well. No doubt this approach is paramount. But traditional knowledge needs to be brought to the forefront along with new languages that are comprehensible to policy-decision makers, which must be invented to reduce the gap between science, social dynamics and policies.

*Environmental historian, New Delhi*

## Transboundary water issues

A large number of respondents were of the opinion that India's conflicted relations with its co-riparians Pakistan, Bangladesh and Nepal were caused by a lack of trust in India on the part of its neighbours, as well as water-sharing terms and arrangements that were considered one-sided and not mutually beneficial. Common perceptions indicated that India's tendency to act as a 'big brother' or a 'South Asian hegemon' when negotiating on water treaties and agreements was an impediment to cooperation, along with its often militarized, nationalistic approach to water. The fact that South Asia lacks a regional framework for ecological cooperation and water governance only magnifies such conflicts, as the countries have to depend entirely on bilateral treaties whereby the larger party (in this case India) stands accused of using its power to set unfair water-sharing arrangements.

### India and Nepal

India has had a relatively smooth political relationship with Nepal, compared with its other neighbours. Nepal has enormous hydroelectric potential because of its Himalayan rivers, and the export of power has the potential to reap tremendous financial benefits for the country. However, since Nepal lacks the capital and technology required for such an undertaking, and given India's rising power deficit, India has taken an interest in utilizing Nepal's rivers. This has been the basis of a host of treaties and agreements between India and Nepal, including the Koshi Agreement (1954), the Gandak Agreement (1959) and – most contentiously – the Mahakali Treaty (1996). This last calls for the integrated development of the Mahakali river, recognizes Nepal's prior water rights and provides for a joint Indo-Nepalese Pancheshwar Project for hydroelectricity and irrigation on the basis of an even cost-benefit split between the two countries. This treaty is a point of discontent in Nepal, where the popular perception – as one respondent put it – is that 'Nepal's own water needs are not being given adequate attention and it [the treaty] is merely catering to India's needs. It is commonly thought that in all of our other treaties, we set unfair terms for the other country.'

Dominant views on the Indian side conceded that while India may have acted out of its own interests in negotiating power-sharing arrangements with Nepal, the relationship is still crucial to the progress and water needs of both countries. According to one respondent:

Nepal has huge potential no doubt but the general opinion (not entirely unfounded but still unfair) is that India might behave like a 'big brother' and hurt their interests. These insecurities have made Nepal unwisely shun India and approach expensive international consultation from Japan, Canada, US and Norway. But since this has proved to be a costly affair, it isn't sustainable.

*Senior journalist, Times of India*

There is a lack of trust and political will with regard to India in Nepal that, in the opinion of many respondents, was exaggerated and outweighed the mutual benefits that could be accrued from transparent dealings between the two countries. This anti-India stance was consolidated under the former Maoist government in Nepal, which had taken a tough position on water issues.

The Mahakali treaty may be a great opportunity for Nepal to take advantage of but a lot more needs to be done because there are misgivings on the part of Nepal since the Leftist groups are taking a hard stance on water sharing issues, but even if you factor in the hard political line, in certain areas there is a feeling that there is a need for a certain degree of transparency in terms of dealing with each other. The same kind of sentiment is true between India–Bangladesh and India–Pakistan. The good thing however is that there is continuing dialogue between countries.

*Academic, Galgotia University*

### India and Bangladesh

Since the formation of Bangladesh in 1971, India and Bangladesh have largely been seen as having a cordial mutual relationship (in contrast to the atmosphere of suspicion that pervaded Indo-Pakistani relations after Partition in 1947). Given that the two countries share 54 common rivers, a friendship treaty was signed with a view to achieving greater cooperation on sharing the waters of the Ganges river. An agreement was reached over the newly constructed Farakka barrage, which would be used to augment water flow in the lean season, to be shared by both countries. However, this issue became a bone of contention between India and Bangladesh and by the 1980s the agreement was a cause of discontent on both sides. Fresh trouble has erupted over sharing of the Teesta river, which remains an emotive issue both for the Indian state of West Bengal and for Bangladesh.

In the context of water-sharing arrangements, it was only as late as 1996 that the Ganges Water Treaty was signed between India and Bangladesh, addressing the problem faced by both countries of the seasonal variations in flow in the river. The treaty guarantees Bangladesh a minimum of 35,000 cusecs in the lean season. Only if the Ganges

has more than 75,000 cusecs (cubic feet per second) can India divert 40,000 cusecs and allow the rest to flow to Bangladesh. However, if there is a flow of 70,000 cusecs or less, both sides will share the water equally. India and Bangladesh have also agreed to enter into treaties regarding other common rivers.

The major issues raised with regard to the river-sharing arrangements of the Ganges Waters Treaty are that they do not address the ecological concerns, flood management of the river or how to apportion shared responsibility to deal with water pollution. In the latter regard, many respondents cited the case of successful water-sharing over the Danube as an example where ecological concerns as well as fair sharing of river waters was achieved. Many respondents accepted that there may be a fear in Bangladesh that India secretly diverts a portion of the flow of the Ganges upstream during dry months, causing water shortages in Bangladesh in the dry season when the flow is low. However, most respondents believed that this was a false belief, and that the Farakka waters are much more critical to India for its water needs and the survival of the Kolkata port than they are for Bangladesh. It was felt that water was such 'an emotive issue that nobody wants to budge an inch from their stand'. Respondents generally agreed on the constructive role that civil society organizations from both sides could play, allowing for the exchange of ideas on basin management and flood control.

### **Many respondents cited the case of successful water-sharing over the Danube as an example where ecological concerns as well as fair sharing of river waters was achieved.**

In general, it was the opinion of respondents that the relationship between India and Bangladesh was marred by suspicion and asymmetrical power dynamics. In the words of one respondent, '98% of Bangladesh's waters come from India and therefore Bangladesh is not unreasonably threatened by its relationship with India'. However, it was also mostly felt that India has 'largely been generous about sharing of water', but that what undoes its efforts is the tendency of the Indian government to be secretive about its future plans, data-sharing and water-storage projects, which fuels suspicions in Bangladesh. As one respondent put it:

After the break-up of Bangladesh from Pakistan in 1971, there is a feeling in Indian circles that Bangladesh was instigated against India by other riparians into a state of paranoia about Farakka and India's so-called nefarious motives regarding it. While this 'conspiracy' against India ceased to exist, ... now every source of discontent within Bangladesh is because of Farakka. So our relationship with Bangladesh got caught up with politics.

Senior academic, TERI University

### **India and Pakistan**

Arguably the most tense relationship in South Asia, that between India and Pakistan has a long history of conflict over sharing of the Indus basin with its origins in the pre-Partition-era tussle between Punjab and Sindh over diversions on the Sutlej river. After Partition, tensions between the two countries escalated greatly over the Dipalpur Canal and India's construction of the Bhakra Nangal dam.

In 1960 India and Pakistan signed the Indus Waters Treaty (IWT), after eight years of negotiations to resolve the dispute over the Indus basin, under the terms of which the three eastern rivers of the basin – the Sutlej, the Ravi and the Beas – were allocated to India and the three western rivers – the Jhelum, the Indus and the Chenab – were apportioned to Pakistan. The treaty was mediated by the International Bank for Reconstruction and Development, and included resolutions to disputes over water usage for irrigation and hydropower by both countries.

The IWT was frequently considered to be an example of a successful water-sharing arrangement, with the commonly held belief that it has 'survived four wars' and 'withstood the test of time'. However, this view was offset by the equally strong belief that the terms of the IWT need to be revised in line with the times, especially given the string of hydroelectric projects in the Indus basin that have caused friction between India and Pakistan. The two most contentious projects in this regard have been India's Baglihar hydroelectric project, located on the Chenab river, and the Kishenganga project on the Kishenganga/Neelum river. These projects were considered by Pakistan to be in direct contravention of the IWT, while India claimed that they were not violating the treaty since they did not involve storage of water of the western rivers, and the power generated would benefit the local people. The Baglihar project is further complicated by the fact that it is a venture of the state of Jammu and Kashmir, which is part of a contested territory between India and Pakistan. Moreover, Jammu and Kashmir has also been opposed to the IWT as representing a denial of its own water rights, and respondents were of the opinion that the Baglihar project would help redress this grievance and meet the energy needs of the state.

Other respondents felt that the IWT had been successful in fulfilling its role as a 'symbol of cooperation' between India and Pakistan, but, as one respondent put it, 'the fine print of the treaty reads more like a divorce settlement than a true water-sharing arrangement'. This is because instead of the Indus river basin and river waters being shared equitably between India and Pakistan, each country has been 'awarded' three rivers apiece.

The common consensus among respondents was that water cooperation between India and Pakistan since independence had been affected by historical tensions and a pervasive

feeling of mistrust and suspicion on both sides. This had been further fuelled by Pakistan's security concerns, which may be based on the fear that India's hydroelectric projects are not in fact intended to address the water concerns of Jammu and Kashmir, but are geopolitical moves to make its presence and control felt across the border.

The treaty is a good one, especially when one hardly sees any functional international treaties between tense neighbours. The treaty is still being implemented on the ground, so in that sense it is a good treaty but there are loopholes being exploited by Pakistan to stop India from developing the permissible usages, that is a drawback. But otherwise the treaty calls for mutually beneficial cooperation in the river system, so if Pakistan wants, they can easily benefit from it by allowing India to construct some storage dams so that during the drought period, water can be released from here and they can avail themselves of the water.

Member, Central Water Commission

### De-securitization of the water discourse

It was felt among respondents that too often issues of transboundary water management and hydro-diplomacy between India and Pakistan, and India and Nepal, take place in such a manner that matters of national security and high politics are grafted onto water concerns. Themes of war and national security have dominated the scene in the last decade to such an extent that issues of ecology and the environment have taken a back seat, and water issues have in turn assumed a militaristic, statist and hierarchical shape. The Kishenganga and Baglihar projects in Jammu and Kashmir were commonly interpreted by respondents as being 'motivated by India's geostrategic concerns *vis-à-vis* Pakistan'. Similarly, in the context of Nepal, India's actions – for instance its decision to station its troops at Kalapani (a disputed territory), at the headquarters of Mahakali, or its construction of the Koshi and Gandak barrages – have become irritants regarded as a sign of India 'protecting its national security at the cost of Nepal's sovereignty'. Such actions were regarded as promoting dissatisfaction among India's co-riparians, and as deflecting attention from important areas of water cooperation and power generation on which India might genuinely require collaboration.

The majority of the Indian respondents to the survey themselves saw the lack of transparency in data-sharing and dam construction plans as needlessly contributing to co-riparians' long-standing suspicion of India's water dealings.

India favours a bilateral approach to water issues, whereas Nepal and Bangladesh would, as one respondent put it, prefer a 'more regional approach, being as they are wary of India's big brother role and bulldozing actions when it enters into bilateral arrangements'. Therefore, one way for India to counter some of the charges levelled against it would be to 'inspire confidence' on the part of its co-riparians by entering into more multilateral agreements in the region.

The dominant critique among respondents was of the tendency in India to remain more focused on internal water issues and conflicts – not just in diplomatic circles but also in civil society groups, which pay far less attention to transboundary rivers – and to view water problems through a 'nationalist' rather than a South Asian lens.

A balanced approach to transboundary cooperation is what we need. India should cooperate with China and Nepal on all issues from national dam-building to water sharing to floods to aquifer mapping, without sacrificing its strategic stakes and on the principles of equity, reciprocity and good neighbourliness

Ex-member, Indus Water Commission

### Best method for regional cooperation: a basin-oriented approach

On the question of the best method for South Asian cooperation for India, respondents were largely united in the belief that while India's national water interests needed to be safeguarded, basin-level cooperation between co-riparians was paramount in terms of meeting water needs and achieving stability in the region. While many were of the opinion that a national approach to transboundary water management could not be completely abandoned, it was crucial to reach a decision-making process that balanced the views of the centre, the affected state and concerns of the basin. Many respondents cited the example of the Teesta river, over which India and Bangladesh were unable to achieve cooperation because of conflicting opinions between the state of West Bengal, the central governments and civil society organizations in West Bengal.

Since a river basin is a common-pool resource, it is only natural that water use in one part of the basin will have external effects in another. Therefore, the most sustainable method of cooperation was considered to be benefit-sharing models that do not promote unilateral actions, but rather encourage bilateral coordination and multilateral agreements between nations sharing transboundary river waters – with the river basin as the centre of negotiation. Basin states, many felt, needed to be made aware that water, as a scarce resource, cannot be managed in isolation and by one country alone. Many respondents cited the examples of the Mekong River Commission, the Nile Basin Initiative and, as noted, the intra-European cooperation over the Danube as successful cases of river-sharing and basin management from which India could benefit.

There were also suggestions to use pre-existing regional frameworks such as the South Asian Association for Regional Cooperation (SAARC) to bolster transboundary coordination with China and other countries, and to use tradable benefits aside from water to strengthen the process of water negotiations.



**The role of civil society organizations**

Ultimately, in the view of respondents, an equal interplay between states, private interests and civil society groups is what will make transboundary water governance successful. While legal water-sharing arrangements and treaties are undoubtedly key formal mechanisms, civil society organizations were regarded as essential in helping the state better understand its riparians’ water needs, which in turn would also filter into policy decisions.

The role of civil societies in sharing knowledge systems about the basin, irrigation practices and flood cycles, as well as in holding Track II dialogues, were considered key to demystifying the ‘riparian curtain’ between borders. What was decisively rejected was the tendency in India to militarize the diplomatic conversations about water; this, according to one respondent, ‘obfuscates and ultimately derails any real collaboration on water between states and inhabitants of the same basin across borders’.

Lately there is a positive attitude among policy makers and the intelligentsia for the need for transboundary cooperation and a need for exchange of information and building trust. The reason for this development has been the realization that transboundary water sharing issues are of critical importance and no nation now can remain in isolation. The awareness and the desire are positive but a lot more needs to be done because there are misgivings in some parts of Nepal towards India and a feeling that there is a need for transparency in terms of dealing with each other. The same kind of sentiment is true between India-Bangladesh and India-Pakistan. The good thing however is that there is continuing dialogue between countries.

Senior fellow, think-tank

**Areas of cooperation**

It is interesting to note that development of early-warning systems for floods and droughts, together with joint disaster responses, were regarded by respondents as important measures that could galvanize India’s collaboration on water issues with each of its two upper riparians – i.e. China and Nepal. Extrapolating from this view, people may regard the issue of floods and droughts as one that affects all countries of South Asia in a similar way and therefore has the maximum potential for cooperation on water with China and Nepal, ahead of proposals for joint hydropower and storage projects.

There is nothing more beneficial than two countries affected by the same rivers, coming together to prevent calamities. There cannot be an easier method of cooperation.

Government official, New Delhi

For India to move beyond the water stalemate with its lower riparian neighbours – Pakistan and Bangladesh – it was recommended that the emphasis should be shifted towards smaller and less controversial projects of joint interest. A ‘benefit-sharing’ model, which divides external costs equally between nations, should be considered. Given that official negotiations and dialogues tend to entail hydro-politics and

indecision, a sizeable number of respondents (mostly civil society actors) argued that, in each case, a parallel network of continual communication should be established between hydrologists, sociologists, water experts and professionals, creating a new entry point for negotiations.

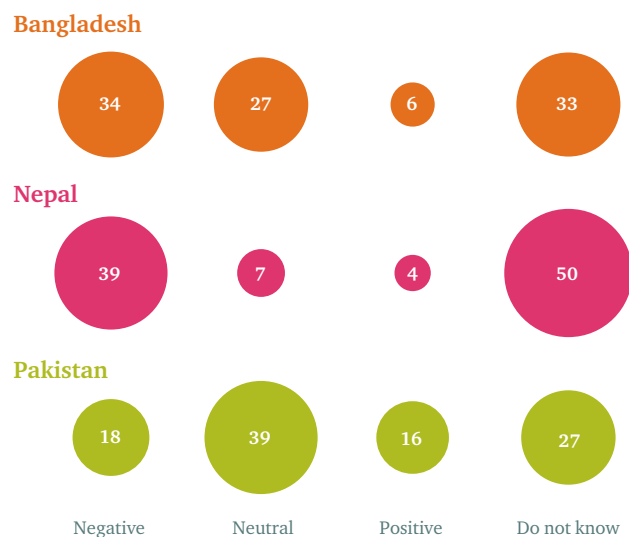
If we all remain stuck in a reductionist and statist mentality, our water future and stability in the region is doomed. A sense of commonality, responsibility and joint ownership needs to be brought in place for transboundary rivers management.

Senior researcher, think-tank, New Delhi

**An opinion and knowledge deficit**

An important trend pervading the study was a distinct lack of awareness and knowledge on the subject of transboundary water issues: when asked to assess India’s bilateral water arrangements with its neighbours, a high percentage of respondents (across all sectors) picked the ‘don’t know’ category (see Figure 7.2). This lack of opinion or knowledge, when juxtaposed with the considerable interest shown in Indian inter-state water conflicts, reflects the secondary position held by transboundary water issues in the national imagination. It also indicates a crucial gap, wherein the agenda for India’s water dealings with co-riparians becomes entirely driven by the ‘perception’ of the importance of certain issues. Since these issues were often related to matters of security, this trend could explain the highly securitized shape taken by water discourses. Crucially, in contrast to the results from the Pakistan, Bangladesh and Nepal studies, respondents in India seemed more concerned with issues of domestic water management and less with intricacies of water-sharing with its neighbours. This is an important area for consideration, since India will play an undeniably important role in the future of South Asia’s water.

**Figure 7.2: Perceptions of India’s transboundary water cooperation (%)**



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## Emerging conclusions

Perceptions of the water debate in India revealed a degree of dissatisfaction with the current situation with regard to water management and policies. Most of the respondents seemed preoccupied with issues of misgovernance in this area. Notably, respondents who were key decision-makers, government employees or policy experts displayed a clear awareness of the high-priority water challenges for the country, and conceded that the gap between knowledge and implementation existed because of a lack of political will. The most severe criticism with regard to water management therefore came from within the government sector itself.

Respondents displayed inadequate knowledge of the intricacies of transboundary treaties, thus suggesting among interviewees a greater preoccupation with, and interest in, the pressing domestic issues for India. Particularly among state actors, this could possibly explain the lack of innovative thinking as regards methods of transboundary negotiations, and the statist shape taken by cross-border water negotiations. Crucially, however, respondents across all sectors (government, academia, NGOs and private sector) were able to convey a degree of self-awareness concerning India's image as a hegemon in the region of South Asia, suggesting both an openness to correcting misperceptions regarding the country's regional image and a commitment to fair negotiations.

The debate regarding access to water for women and disempowered communities appeared to be inchoate and lacking in concrete ideas – with the majority of respondents choosing decentralization and empowerment via legal rights to water as the solution, without paying heed to social factors – and issues such as transport links – that add nuance to the rural and urban picture.

Concerning water as an economic good, water pricing based on differential usage was overwhelmingly believed to be the most viable option in order to curb inefficiency in water usage and to promote conservation. A very large majority also displayed keenness for private players to handle the service delivery of water to households, particularly in urban areas. However, the ideological underpinnings for a developing country like India of deeming water to be an economic good were not deeply explored by those who subscribed to this view. Conversely, a small number of respondents remained committed to the belief that water in India should continue to be framed as a common-pool resource. This is because the Indian state, given the pre-existing inequitable and hierarchical access to water, is not ready to step back from its responsibility to provide water services – regardless of its inefficient track record.

The religious and cultural value of Indian rivers remained an interesting and contentious issue among respondents.

While interviewees, particularly those from the government, seemed cautious and hesitant as regards the sacred nature of rivers (even if they personally differed from the 'sacred' view), they also seemed open to leveraging this religious and cultural aspect to foster a better ethic on water conservation. Thus while most respondents seemed aware that the dangerous view of water as an 'infinite' resource stems from a religious/cultural perspective, they also seemed to think that religious myths surrounding water are not fundamentally incompatible with water governance, as these could be productively included in effective water management policies, particularly in rural areas.

**Notably, respondents who were key decision-makers, government employees or policy experts displayed a clear awareness of the high-priority water challenges for the country, and conceded that the gap between knowledge and implementation existed because of a lack of political will.**

One of the most crucial issues that respondents felt needed to be tackled was the lack of a water governance approach on the part of the Indian government. There is no balanced division of power between the centre and states when it comes to water management, which leads to problems such as protracted inter-state water conflicts, inequitable access to water across different states and unevenly administered methods of conservation. It was felt that, given the regional, cultural and geographical variations in India, a method of management that, while centralized, also takes into account the needs of each state needs to be evolved.

Water policies, environmental laws and anti-pollution legislation were felt to be comprehensive in letter. However, in the view of respondents, there is a huge gap between policy and implementation, since a majority of these policies are not fully enforceable, and this is an area that should be rectified. Water quality was seen to have declined in the last 10 years because of a failure to address industrial and domestic water pollution. Water quantity, on the other hand, was said to have remained the same, with inequitable access and wastage proving to be the biggest impediments to availability.

At the institutional level, a lack of coordination and transparency among government organizations came under scrutiny. 'Lack of political will' to implement projects was considered to be hugely detrimental in the sector. Differences of opinions between government officials and civil society respondents should be analysed (especially those concerning issues of regional cooperation) in order to reach a balanced approach to water measures. While water governance at

present was considered a ‘headless, directionless’ process, larger factors – such as changing patterns of urbanization, water-intensive agricultural practices, large-scale dependence on agriculture, and consumption patterns of water – were also seen as needing to change.

Decentralization of the water sector, and strengthening the *panchayat* bodies in rural areas with decision-making capabilities, is crucial for addressing the centre-periphery gap. This fits with the view that ‘everyday water management should be managed at the lowest possible level and it is only then that questions of access can be sorted’. Community participation must be strengthened, especially when it comes to micro-conservation techniques that are effective but not scalable. Their implementation requires community initiatives to supplement mainstream government efforts.

Water pricing should be administered as the most effective way of curbing wastage of water. This would also foster the idea of water as a finite resource and an economic good, which in turn was seen as the most effective, long-term method of promoting water conservation. In addition, there must be strict water audits for industries, in order for environmental conservation laws to have an impact.

It is clear from the responses of all the interviewees that the water management debate needs to be reshaped in a holistic way, by viewing water as intrinsic to food security, energy security, economic growth and social equality, and therefore as a resource that needs immediate primacy in policy-making.

With regard to data, it was evident from the responses that data-sets that feed into policy-making are considered inadequate and in need of urgent review. It was felt that the most effective way of studying the problem of water management would be by focusing on making integrated and multidisciplinary data available, in order to facilitate assessment of water issues not just in isolation but also alongside broader questions of agriculture, land, ecology, the effects of industrial expansion and climate change. New models that can move beyond quantitative assessments and factor in stringent economic principles and structural values should be worked on to enable sustainable choices.

Concerning transboundary dealings and diplomacy, it was overwhelmingly agreed that India’s approach towards its co-riparians needs to be more basin-oriented and less statist or nationalistic. By this, it was meant that India must align its national water needs in terms of benefit-sharing with co-riparians, since the two cannot be mutually exclusive for regional water cooperation. India’s tendency to foster suspicion on the part of its co-riparians, its lack of data transparency and the securitization of water dialogues in dealing with its neighbours were identified as massive impediments to cooperation. Opportunities exist to improve relations by, for instance, enhanced data-sharing; improving early-warning systems for floods and droughts; hydro-power projects; joint storage capacity and groundwater and aquifer mapping.

Beyond this, transboundary hydro-diplomacy needs to be supplemented by Track II dialogues and more active cross-border collaboration involving civil society organizations and academics engaged in water issues; these factors were seen as most effective in better enabling a cooperative understanding of each country’s water needs that would ultimately filter into policy decisions. Additionally, it was thought that expanding these Track II processes to seek a new entry point for negotiations, and bringing other tradable benefits (besides water) to the table, would make water negotiations more inclusive with a better chance of success. Strengthening the capacity and networks of non-state actors can help supplement negotiating processes.

Finally, the common theme among respondents was that for there to be any real impact on policy formulation, management and regional cooperation in the water sector, there must be a fundamental shift in how water is conceptualized. This implies a need to reconfigure the idea of water as an infinite, sacred and abundant resource; rather, it must be thought of as a limited social, economic and strategic resource.

# 8. Nepal

## Introduction

Water management is considered to be one of the biggest challenges for Nepal, with a vast majority of respondents identifying the country's current approach as being relatively lacking. According to them, water management does not focus sufficiently on conservation. Various issues such as monitoring of groundwater usage, rainwater harvesting, and reuse and recycling of water have not been taken into account in order for there to be an integrated approach towards water management. Nepal does not lack in terms of water resources; however, the problems that face it indicate the need for an efficient and integrated system of management that takes into account coordination between different government departments, managing the increase in demand among the population and thus also the upgrading of water infrastructure.

Nepal is a hydrographic country with many rivers but it is not a water rich country. 90% of the water flow is during monsoons due to which there is an uneven distribution of water, and the country suffers from water scarcity for eight months of the year. The biggest challenge for Nepal is therefore the temporal difference; and bringing about inter-seasonal transfer of water from the wet seasons to the dry ones.

Researcher, International Water Management Institute

Issues such as unplanned urbanization, increased population pressures and climate change have been identified as the reasons behind the decrease in the quality as well as quantity of water. A smooth system of water management requires factors such as these to be taken into account. With regard to the country's capacity to deal with floods and droughts, the common sentiment among respondents indicated that while the capacity to deal with floods had increased, its effectiveness was still questionable. Disaster preparedness and capacity-building are therefore essential, particularly in relation to droughts, as little has been done in this regard.

Climate change is another area in which action is lacking within Nepal. Its impact on the country's water resources has yet to be clearly understood. As this can be drastic and far-reaching, it therefore becomes increasingly important to maintain data on climate change, particularly in relation to potential effects and remedial measures. In terms of federalization, various issues were highlighted, such as the potential for conflict between federal states and the possibilities for effective management through the development of standard operating procedures.

Nepal's research capacity with regard to all water-related issues remains low following the dissolution of the Ministry of Water Resources (MoWR). Additionally, the reliability of available data is often questionable, meaning that the country's research capacity in terms of water resources also needs to be developed.

Improving the effectiveness of water management in all these areas will bring about a system that takes into account not only the country's immediate needs but also its future requirements.

In terms of transboundary water issues, Nepal's main relationship is with India, the lower riparian. The majority opinion was that India has established pre-consumption rights on water it is using, harming Nepal's ability to develop its water infrastructure. Many of the treaties and agreements between the two countries are seen as tilted in India's favour.

## Water management

Nepal follows a largely reactive, rather than proactive, approach to water management. The survey revealed primarily negative attitudes towards the country's current approach in this area. Lack of coordination between government departments, poor physical infrastructure and insufficient water storage capacity were cited as the key reasons behind the water issues facing the country.

The biggest threat to physical availability of water in the country is the lack of an internal Management Plan for available water resources. A single vision is not present and therefore a mechanism to implement is also missing.

...

We are reactive rather than proactive in our approach towards water management. There are many constraints regarding this such as lack of resources for planning. Planning has therefore become secondary with the focus more on dealing with immediate needs. An integrated internal water management plan is therefore essential, as it is the lack of proper planning that leads to issues in water management.

Joint Secretary, Water and Energy Commission Secretariat

## Lack of coordination between government departments

Poor implementation of policies and plans on the part of the government was identified as one of the key reasons underlying inadequate water management in Nepal. Some respondents said that despite most of the required policies and plans being in place, the lack of coordination between government departments, and ineffective implementation, have slowed the pace of improvement in the water sector. Others asserted that putting the responsibility for effective water management on the government alone is impractical and counter-effective. Rather, they considered that a sense of accountability needed to be inculcated among the country's citizens.

There are huge gaps in terms of water management in Nepal. With inadequate numbers of stations, and the extreme understaffing and under-resourcing of water-related departments such as the Department of Hydrology and Meteorology, these departments are constantly

unable to achieve their goals and priorities. The lack of coordination and active work in the water sector was said by respondents to be a result of the dissolution of the MoWR into separate water-related ministries and departments. The lack of a single governing body and overarching vision has therefore resulted in the lack of a holistic approach to water management and conservation. Thus there needs to be a stronger focus on effective implementation, reduction in mismanagement and development of control measures on the part of the government.

There is a mentality among communities that the government should invest, build, and take care of the communities. Local communities should develop a mentality of conservation of water by themselves. There are different types of method that are cheap, easy, and don't require government help. For instance in irrigation, the drip method, micro method, etc. are easy methods that don't require huge capital.

*Irrigation Agronomist, Consolidated Management Services Nepal*

### Managing demand

Survey respondents emphasized that the current water management system in Nepal is supply-driven, and is not focused on areas such as managing demand through water conservation or reduction of water consumption through various technical measures. The lack of any sort of system either to monitor usage or to improve efficiency has therefore resulted in mismanagement. For instance, unplanned urbanization and insufficient water storage capacities, and thus the inability to meet the needs of the population within the Kathmandu Valley, have resulted in the excessive extraction of groundwater. Data from 2007 indicate that more than 48 billion litres of water does not go into the ground as a result of concretization and surface run-off. In terms of physical availability of water in Nepal, there are limited sources such as springs, rainwater and groundwater. The lack of monitoring and control measures with regard to extraction has thus resulted in a rapid decrease in groundwater levels in the valley. It is therefore of utmost importance that policies concerning groundwater usage be introduced – with a focus on monitoring, control and recharge of groundwater resources, followed by strict implementation.

Nepal does not have long term planning and forecasting of what will happen in the future for proper water management. We haven't anticipated demand and supply of water for the future. Melamchi project is the only project that has anticipated the population increase and forecasted the increased supply of water needed for Kathmandu.

*General Manager, Kathmandu Upatyaka Khanepani Ltd.*

Reusing and recycling of water needs to be undertaken. An emphasis needs to be placed on waste water management. Climate change is inevitable due to carbon emissions and the impact cannot be avoided. Integrated fresh water management needs to be introduced.

*Researcher, International Water Management Institute*

Water conservation was also identified as a key area that needed to be prioritized in water management. This area in particular is something that requires an integrated approach, and for this to be achieved awareness among the population is essential. Thus the respondents emphasized the importance of educating the rural as well as the urban population about water conservation, especially in areas of water scarcity. There is no mechanism in place for penalizing and discouraging the misuse of water resources, and a more concerted effort should therefore be made to conserve sources of water – including the conservation of forests, flood planning and plantation.

### Poor physical infrastructure

Physical infrastructure development was also identified as a key priority for improved water management in Nepal. According to respondents, inadequate operational infrastructure, alongside lack of maintenance of existing facilities, are the chief reasons behind the slow pace of growth in water management. The Kathmandu water supply system, in particular, is in need of urgent upgrading, considering the inability to meet the supply needs of the increased population arising from unplanned urbanization. The current status and slow pace of growth in the water sector indicate that physical availability of water is likely to remain a threat to the country for the foreseeable future. The government has been focusing mainly on hydroelectricity and energy; however, as Nepal is an agriculture-based economy, and heavily dependent on rainwater during the monsoons, it is essential that focus be placed on developing new irrigational structures and systems in order to improve the country's agricultural practices.

To survive as a prosperous nation in the long run, Nepal needs to industrialize itself based on raw materials and workmanship available in the country. Provision of sufficient energy is the first priority for industrialization. Electricity has become a necessity in life now, not a luxury, and Nepal has no petroleum products of its own to fulfil its energy needs. Therefore, the cost of its import alone will be more than the total export income of the country in future. Therefore ensuring energy security in the form of hydroelectricity is the key challenge for Nepal in the long term. ...

Ensuring energy security can be achieved only by building storage hydropower projects in the country. Gestation periods for such projects are long by nature as they have to create a balance keeping in mind socio-environmental issues as well. Availability of regulated water from such storage projects will be a by-product, which in turn will ensure food security and water security in the long run. Regarding political issue and internal security, they are interrelated. Resolution of political issues is needed now. If political issues are resolved, internal security will not remain a problem.

*Ex-Director General, Department of Electricity Development*

The adoption of an integrated approach to water management was identified as a priority by respondents. This is all the more important considering Nepal's status as a least developed country (LDC) and therefore issues of sustainability in terms of progress made in the water sector. For instance, statistics from the Department of Water Supply and Sewerage indicate that, based on the construction of pipelines, more than 80 per cent of the population has access to piped drinking water. However, despite the development of pipelines for distribution, most of these have been rendered dysfunctional either as a result of natural disasters such as landslides, or because of a lack of repair and maintenance.

Given the various problems facing the water sector, it is therefore essential to introduce an integrated approach which takes account of the country's needs. There is no national-level plan to tackle issues of water management within Nepal; and for there to be an integrated approach to water management, priorities must be set and long-term plans must be developed and put into action. A comprehensive approach that addresses all the factors mentioned above would thus assist in ensuring water security for Nepal, and eventually lead to food and energy security as well.

There is a lack of proper planning. Nepal has water resources as well as financial investments, however management is lacking. What is missing is a linkage between water resources, finances and effective implementation.

Representative, Japan International Cooperation Agency

### Quantity and quality of water

A majority of respondents to the survey held the view that the quantity as well as the quality of water available in the country had declined over the past decade. Along with climate change, most of them attributed the reduced availability of water to unplanned urbanization and increased population pressures, particularly in the Kathmandu Valley. These factors – alongside increased awareness regarding health and sanitation, and higher standards of living – have resulted in an increase in demand for water that the government has been unable to meet. An inadequate system of waste-water management, old distributive pipelines and human pollution further decrease the quality of water in the valley. It is therefore essential that water infrastructure be upgraded, particularly with regard to pipelines that distribute water and for sewage disposal. The impact of increased population pressures on the water resources available within Nepal can be seen in the decreasing groundwater levels, particularly in the urban areas within the Kathmandu Valley.

Extraction of groundwater is more than recharge in Kathmandu. This is a major threat resulting in the reduction of groundwater resources. Protection of water resources is therefore necessary

Ecologist

The decline in the quality of water was particularly noticeable in urban areas, according to respondents. They saw very small chance of improvement given that the appropriate actions have not yet been taken, and bearing in mind increasing population as well as pollution levels. Another reason cited for the low quality of water available was lack of maintenance of the distribution pipelines.

Water quality is still good at the source, however at the user's end it has declined. For instance the treatment plant that purifies water at Kathmandu Upatyaka Khanepani Limited (KUKL) is very good; however the problem lies within the pipelines used for the distribution of water and lack of maintenance.

Managing Director, One Planet Solution

The effects of climate change were also cited as a reason behind the reduced quantity of water available in Nepal. For instance, various sources of water across the country, such as rivers, have gone dry, as have traditional sources of water within the Kathmandu Valley. Additionally, climate change has affected the temporal and seasonal availability of water – as a result of which the level of rainfall during the wet seasons has increased, often resulting in floods in various pockets of the country, whereas during the dry seasons there are often periods of scarcity. This has led to situations where there is an excess supply of water when it is not required and scarcity when demand for it is high. Meanwhile, some respondents stated that while the quantity of water available was falling, this was not to the extent that had been expected.

The overall supply of water depends on precipitation. According to some respondents, this has not decreased, and so the quantity of water has remained the same, but the seasonal water availability through rainfall has changed, resulting in the illusion of reduced availability of water during the rest of the year.

The 10-year statistics on rainfall also indicate that the quantity of water has not decreased, rather the amount of rainfall in the country is now concentrated into a particular season or period of time, when earlier water availability was spread over a period of time. Therefore while water conservation was relatively easier in the past, it will be a more difficult task in the future, especially if water related infrastructure is not developed. These factors have collectively led to the common misconception of reduced quantity of water available in the country. The fluctuation of water availability should therefore be substantiated by data and figures.

Joint Secretary, Ministry of Energy

#### Pollution

Poor waste-water sewage disposal and management were identified by a large proportion of respondents as the major causes of pollution affecting the quality of water. Respondents also assessed waste-water sewage disposal as being of the highest priority, stating that it needed immediate action. They also identified the discharge of industrial effluents and agricultural pesticides and fertilizers into the rivers as detrimental to the quality of water, particularly because pesticides and fertilizers that are banned in other countries are often used in Nepal. These factors are currently overlooked; however, there is a high chance of their not only having long-term health effects, but also affecting future generations genetically.

Therefore, according to respondents, what is needed is a change in the perception of water with regard to infrastructure, which must be upgraded to reflect the increased demand arising from growing urbanization and population numbers in the cities. Similarly, stewardship, husbandry and harnessing are required for water management alongside large-scale technical guidance.

Pesticides are a big problem in places where there is commercialized agriculture such as Dhankuta and Biratnagar. Chemical fertilizers and pesticides that are completely banned in other countries are often used in Nepal.

*Chairman and former Water Resources Minister*

#### Water management at community level

Water management, particularly in rural areas, is woefully lagging, with most locals travelling for up to four hours to fetch water. However, most respondents held the view that water management in communities has improved in recent years, given the increasing local participation in water management as well as growing levels of education and awareness on water issues. For instance, most districts in Nepal now have a district water committee that looks after the area's water needs. However, a few respondents also identified that there is a need for more proactive measures that tackle not only current needs but also future requirements. None the less, despite increased local participation, the government continues to prioritize issues such as energy and hydroelectricity rather than water at the community level.

With a centralized system of governance in place, decision-making government bureaucrats are often unaware of the actual needs of local communities. Respondents therefore suggested a people-centric, bottom-to-top approach in making community-level decisions, rather than the current top-to-bottom system being followed by the government. In view of the government's inability to manage and distribute effectively the water resources available in the

country, various approaches and concepts have emerged to manage the gap between demand and supply. With the private sector moving forward in Nepal, many respondents suggested that privatization of water infrastructure would increase efficiency. The village of Amarapuri, in Rupandehi district, can be taken as an example where the local community has developed its own methods of water management, distribution of drinking water and waste-water treatment.

#### With 83 per cent of the population still living in rural areas as of the 2011 census, water management is especially important at the community level, as it has positive spillover effects in terms of health, sanitation and even economic development.

Various other communities have also taken matters into their own hands and have developed community-managed systems to meet the needs and requirements of their villages effectively. With 83 per cent of the population still living in rural areas as of the 2011 census, water management is especially important at the community level, as it has positive spillover effects in terms of health, sanitation and even economic development. In many cases, despite financial investments being made to improve water management within communities, operational investment is still lacking, as a result of which benefits do not accrue from these investments.

If we look beyond the Kathmandu valley, in settlements across districts you will find that after class 1, 2 or 3 the dropout in schools increases. The primary reason behind this is that children have to go and fetch water, travelling 2–3 kilometres per day. If 4 hours of the day that goes into water collection is spent on income generating activities then economic development will accelerate at a faster pace. The impact will be huge – in terms of health, education, hygiene, and security.

*Managing Director, One Planet Solution*

#### Pricing of water

With regard to the pricing of water, a large majority of respondents disagreed as to the fairness of the current pricing of water. Despite price levels being relatively low, dissatisfaction stems from the lack of regular supply and low quality of water. However, providing these issues are tackled, respondents showed a willingness to pay more for drinking water. Thus, a tariff structure based on utilization of water – rather than on a fixed-price system – whereby prices are segregated for industrial, commercial and domestic consumers was suggested, as the revenue from the current tariff structure is insufficient to cover management and maintenance costs.

In the Gorkha district households pay NPR 800 per month as compared to an approximate of NPR 100 per month in Kathmandu Valley. This is because the costs of transporting water from the water source to the hilly areas of the Gorkha district are relatively higher than in the valley. However, as the quality of water is good and supply consistent, there are no issues with pricing.

*Executive Director, Melamchi Water Supply Development Board*

## Floods and droughts

When asked about the country's capacity to deal with floods – measured by the effectiveness of early-warning forecasting systems, policies and procedures to deal with disaster mitigation and response, and disaster risk-reduction procedures – a majority of respondents said that the country's capacity had improved over the past decade. One major improvement has been the introduction of the Department of Water Induced Disaster Prevention (DWIDP). The government thus has a separate department dedicated solely to the issue of water-induced disasters, with increased investment for flood management and funds being directed to all districts for disaster protection and management. To a large extent, there is therefore a clear framework, and laws and regulations regarding disaster response and flood management. However, despite the improvement measures undertaken through the introduction of the DWIDP, its effectiveness in terms of implementation remains open to question.

Concerning the country's capacity to deal with droughts, a majority of respondents held the view that there had been no real improvement; there is still a lack of planning, coordination and implementation on the government side and no action plan has been developed. While there is better water management through irrigation systems in agriculture-based pockets, areas prone to drought have yet to see any improvements. In the view of the respondents, as the country is faced with more floods than droughts, focus and attention have been directed largely at the former but there is little to no capacity for dealing with a situation of drought.

Drought has never been in the policy map of Nepal, as can be seen by the country's lack of efforts in water conservation due to which the government has not been able to provide alternative means of water during the drought seasons.

*Chairman and former Water Resources Minister*

One of the ways to tackle drought is to build irrigation canals in the drought affected areas. However, there are no irrigation canals being built currently except for the Sikta Irrigation Project.

*Water activist, West Seti Campaign activist*

According to respondents, progress can be seen in terms of river-bank protection, introduction of river training programmes, disaster management and disaster risk-reduction procedures, establishment of early-warning forecasting systems and vulnerability disaster-mapping

of major flood-prone areas. Similarly, institutional arrangements to deal with such disasters have also improved, with policies and action plans being developed and funds maintained. However, a few respondents also stated that any progress made is futile if the rate of improvement is slow while the scale of problems continues to increase. Therefore, while the volume of, and disaster inflicted by, floods are increasing, the capacity to deal with these is effectively no greater.

Improvement in the country's capacity to deal with floods depends on the severity of impact. If the severity of impact is higher now than it was in the past, then the current improvement will not be enough.

*Executive Director, Melamchi Water Supply Development Board*

Respondents stated that to be prepared for a situation of drought, there needs to be a long-term water-holding system, alongside emergency storage systems to deal with the eventuality of drought and emphasis on watershed management. Even though there have been improvements in water-harvesting technology and in the use of drought-resistant seeds and crops, these are largely due to innovations made elsewhere. For there to be an effective response to a situation of drought, its scale needs to be identified and then appropriate action taken. However, there are minimal data available on droughts, as there has been a very negligible amount of research in this area. According to one respondent, certain pockets in the Mid-Western Development Region are faced with the problem of drought, but no plan or strategy has yet been developed in order to cope with the situation.

A few respondents stated that at the national level efforts are being made to improve water management in rural areas faced with water problems. A few also stated that with the slow expansion of the irrigation network within Nepal, its capacity to deal with droughts was therefore also expanding. A majority of respondents further identified extreme droughts and floods as a major concern, especially bearing in mind the effects of climate change.

A majority of the respondents stated that the country needs to prioritize disaster mitigation through early-warning forecasting systems in order to reduce its vulnerability to floods and droughts. They noted that the focus should be more on disaster preparedness than on disaster response. There is a lack of technical expertise at local government level, as a result of which the populations in flood/drought-prone areas are ill equipped to fight back the effects of these events, and local government units therefore need to be strengthened in this regard. According to a few respondents, decentralized infrastructure such as check dams could help mitigate floods; however, the country does not have the financial capacity to build the required infrastructure.



A combination of many things is required. Firstly there is no proper planning. Secondly the general trend of the country is very reactive rather than proactive. Lastly we do not have an anticipatory or proactive approach to map out potential hazards by analysing the nature of rivers. These three things therefore need to be taken into account.

Joint Secretary, Water and Energy Commission Secretariat

Some respondents considered that the inability to effectively counter the impact of floods is often due to increasing population pressures and unclear demarcation in river-bank areas; these factors have resulted in greater encroachment onto river banks and flood-prone areas, thus putting households at risk. Similarly, one respondent stated that despite the introduction of river training programmes to control floods, the use of substandard materials to build embankments on the Koshi river by the Indian side nullified the potential positive effects of the action. However, support for Nepal's Ministry of Irrigation in disaster management and disaster prevention from international NGOs such as the Japan International Cooperation Agency (JICA) has also resulted in improved institutional capacity on the part of the government to deal with floods. One respondent also identified the need for the government to collect data and study the trends in floods, alongside training local communities in flood-prone areas in emergency procedures.

Capacity has improved in areas where floods used to occur, however capacity still needs to be improved in regions where unexpected floods can occur. To increase capacity, we need to collect data and study the trends of rainfall and floods. For instance, high rain warning systems will help in the collection of data on the amount of rainfall in mountain areas.

General Manager, Nepal Water Supply Corporation

In order to control floods, the government brought about river training. When river trainings are done and river embankments built, quality is not maintained. The Koshi barrage for instance can accommodate around 3 lakhs cusecs of water. During the Koshi flood there was only 2 lakhs cusecs of water, which goes [on] to show that the flood was caused due to the substandard quality of river embankments used.

Fellow Chartered Accountant and Attorney at Law/Visiting Faculty – KU School of Engineering

### Climate change

Most respondents felt that Nepal's approach to climate change was inadequate, whereas a smaller number were neutral on the subject. As regards other issues identified earlier, the general response from respondents was that while those regarding climate change are reflected in policies and action plans, as well as in the development of conceptual and theoretical approaches to dealing with climate change, implementation and action are lacking. For instance, an assessment of vulnerability to climate change has been undertaken as part of the National

Adaptive Plan of Action (NAPA); however, plans and actions identified from this have not been translated into actual implementation.

The focus in Nepal, as an LDC, is thus more on meeting immediate needs rather than on the possible effects of climate change. According to some respondents, it is a late starter in terms of climate change, as a result of which the gravity of the problem – and its effects and impact on the country – have yet to be fully understood. Despite an increased level of awareness within the government as well as among the urban population generally, an in-depth understanding of the effects and future courses of action is still lacking.

A minority of respondents also held the view that Nepal has played a negligible role in terms of contributing to man-made climate change, compared with the role of industrialized economies, but it suffers more from the effects, for instance through increased glacial melting. According to these respondents, there is therefore little that Nepal can do to alleviate the effects of climate change; rather, remedial measures should be undertaken by countries that contribute most towards climate change. Most, however, felt that action should be taken. Although awareness among the urban population has increased, they felt that generating such awareness has become ever more essential. The effects of climate change on Nepal, as primarily an agriculture-based economy, must be taken into account immediately, essentially since climate change causes fluctuations in the availability of water, as a result of which the severity of the impact on the population can be unnaturally high. Additionally, as previously identified, climate change has also affected the quantity of water available in the country, with heavier rainfall during the monsoons and little to no rainfall during dry seasons.

Climate change is a big issue that must be monitored and adapted to. The focus is still on meeting immediate needs rather than the possible effects of climate change. It is therefore currently not a concern for the country as it is more focused on alleviating immediate needs. If future planning is done then definitely climate change will fall into the plan. However, as there is no planning taking place Nepal's approach towards climate change is therefore inadequate.

Joint Secretary, Water and Energy Commission Secretariat

There is currently a lack of adequate data on the possible impacts for Nepal of climate change and on remedial measures that can be undertaken either to alleviate or to counteract them. This area therefore needs to be developed. According to one respondent, climate change as a subject in itself is a relatively new issue for the Nepalese government; as a result, while issues have been discussed at the policy level, implementation at the operational level is still either missing or at an initial stage. Any work regarding climate

change should therefore be championed, highlighted, showcased or demonstrated, to show what has been done and can be replicated.

There are no studies or research or expertise in this sector. Worldwide climate change has to be studied to see how it can affect our country, to make a plan of action on dealing with and adapting to climate change. Policies, funding, planning and implementation need to be undertaken in a planned manner.  
General Manager, Nepal Water Supply Corporation

With increased awareness in the international community regarding climate change, there is an increased flow of funds through donor agencies to facilitate corrective action. However, the lack of clear understanding with regard to the impact of climate change on Nepal often results in no substantial measures being adopted. Despite there being a large flow of money in this sector, funds are often misallocated because of a lack of coordination or capacity among government departments and other agencies. Climate change adaptation programmes therefore need to be introduced at local level in order to improve awareness and action in rural areas, and long-term plans developed to alleviate or address potential hazards in the future.

Climate change directly affects the availability of water in three countries: Nepal, India and Bangladesh. These countries are agriculture dependent countries and scarcity of water can have a very high impact on them.  
Chairman, Hydrosolutions

### Federal government

Regarding the impact of a federal system of government on water management, a high proportion of the respondents to the survey demonstrated a negative attitude towards this. According to most, the effect of federalism on water management depends on whether water is considered to be a federal resource, and whether water basin and watershed boundaries are taken into account by the central government in the process of federalization.

Most respondents were of the opinion that a federal structure of government would create conflict between federal states, as water resources would fall into different federations. There is therefore a high probability of disputes arising on water-sharing across different federations if clear laws and regulation in this regard are not put in place, which could subsequently make the sharing and transfer of water resources between federal states more difficult. Some respondents held the view that, even in a federal structure, ultimate authority over water resources should remain centralized, in order to avoid potential conflict on such issues.

If river basins are divided into different federations it will make water management more complicated. A federal system will allow for local level participation and involvement, which is good, however conflicts may arise between two federal states regarding interstate sharing of federal resources, making water management more complicated. A national water management plan will be required in case of a federal system of government.

Representative, Japan International Cooperation Agency

Long term consequences should be looked at before considering a federal system of government. Some states of India such as Tamil Nadu and Karnataka can be taken as examples in terms of disputes.  
Officiating Chair, Jalsrot Vikas Samiti

However, a minority of respondents also stated that if properly authorized and managed, water management under a federal structure could be successful. A few said that a non-federal structure of governance focuses primarily on the centre, meaning that the government is unaware of water needs at the state level. The requirements of individual provinces would thus be better met under a federal structure, primarily because the direct benefits that they receive would be greater. Additionally, according to one respondent, awareness among communities regarding water management had risen, as a result of which they had started taking responsibility and protecting the natural resource. The introduction of a federal system of government would therefore be a great opportunity to bring together all the fragmented elements within the water sector.

With a federal system in place, the federal government will know the needs of their federations better and will therefore be able to better fulfil it. Usually the centre is biased towards the needs of the centre and does not understand regional needs.

General Manager, Nepal Water Supply Corporation

Looking at India's federal system there has not been any dispute on resources sharing. Resource should therefore be divided judiciously if Nepal introduces a federal system of government.

Irrigation Agronomist, Consolidated Management Services Nepal

There was also a minority of respondents who believed that a federal structure would not affect water management, given that there are many countries that have adopted federalism and also developed proper mechanisms to manage their state resources effectively. In their view, what really matters is that the government should be strong and willing to do so, whether or not a federal structure is in place. Therefore, effective water management has more to do with localized and autonomous decision-making than with the system of government.

In the event that Nepal adopts a federal system of governance, history indicates that boundaries will be based on ethnicity, and water basin boundaries will not be taken into consideration. It is therefore essential that a long-term national water management plan and policy be developed prior to federalization in order to avoid potential disputes.

Below are the various solutions suggested by respondents to the potential disputes that could arise from federalization, particularly if resources are not allocated equally among the proposed federations.

- Policies and plans should clearly define respective areas of authority, and dispute management systems should be introduced, along with guidelines to identify standard operating procedures.
- Water resources should remain centralized, with ultimate authority resting with the central government.
- During the process of federalization, an approach whereby states are divided on the basis of river basins should be considered.
- Clear frameworks and guidelines should be put in place with regard to how resources are shared and managed by federal states.

These solutions may help to avoid or minimize similar problems to those suffered by neighbouring countries, although they are not expected to eradicate conflicts completely.

#### Research capacity

In terms of the key gaps in data or research that could improve water management, an overwhelming majority of respondents felt that research on the water sector was extremely lacking and that there was a crucial need for the country to maintain data related to water.

#### Research findings by development organizations or private entities do not reach the government, and vice versa.

The gap in data in the water sector was attributed to the dissolution of the MoWR, which would otherwise have been the overarching body responsible for the collection, updating and dissemination of water-related data and research. The dissolution of the ministry has resulted in the lack of a fundamental system to gather and organize the required data. Respondents therefore highlighted the strong need for a research institution in the water sector, in order to ensure integrated management of water resources, and inter-sectoral water allocation and management. The gap in research has also been attributed to the lack of financial resources on the government's part to house a research institution.

Most respondents held the view that in order to improve water management procedures within Nepal, historical data are needed to help formulate proactive measures for the future. However, the lack of government-level research

institutions dedicated solely to the collection of such data has resulted in the current chaos in this regard in the water sector.

There is a need for integrated management of available water resources and inter-sectoral water allocation and management in Nepal. However proper research in these areas is required before any action can be undertaken.

[Researcher, International Water Management Institute](#)

While some respondents pointed out that research and data are non-existent in Nepal, others emphasized that data were available, but their quality was inadequate and their current reliability is questionable, since the lack of systematic revision means that they are not up to date. In other cases, the data are rendered redundant in the present context as most of what is available comes from research conducted many years ago. The key issue here was identified as a lack of communication between different water-related ministries, departments and organizations conducting research; as a result, most of these bodies are largely unaware of research activities being conducted by others, leading to duplication of work. Thus research findings by development organizations or private entities do not reach the government, and vice versa. In areas where research activities have been conducted, the concerned stakeholders are largely unaware of the availability of such data.

Historic data is available but not updated. A coordinated updating of data needs to be undertaken to fill this gap. For instance there is no data tracking water resources of the country 20 years ago as compared to now, the effects of climate change on our water resource, or the change in direction of our rivers, or even research on how to best conserve and save water.

[General Manager, Nepal Water Supply Corporation](#)

There is hardly any research that is available, which in itself is a big gap. The government is unaware about research activities being conducted, whereas research findings by development and other organizations do not reach the government. In addition very little serious research is going on, and it is more of a formality with research being either time bound or funding bound as a part of projects.

[Associate Professor/Hydro-geologist, Prime Minister's Council for Climate Change](#)

Apart from rainfall data, there is little concrete data or research available on other water related sectors. Researchers and other individuals continue to refer to data from 2001 in regard to how much groundwater is being depleted, or a 2007 map to determine surface ceiling information. Even when data is available, it is not available in the public domain; or rather people are unaware that the data exists. What is also missing is therefore a mechanism that systematically maintains and distributes this data.

[Managing Director, One Planet Solution](#)

Awareness regarding water management is widespread among the people of Nepal. Even our education systems lacks in teaching our people about the scientific quantity measurement of water. This is why the available data today is still useless for our people.

[President Secretariat](#)

## Transboundary issues

In terms of relations with its neighbours on water-related issues, Nepal, as the upper riparian, is associated primarily with the lower riparian country, India. This relationship on water issues was found among respondents to the survey to be mostly negative, because of an imbalance of benefits in the treaties and agreements signed between the two countries. The general attitude towards India was therefore one of mistrust, as it was considered that India has established pre-consumption rights on the water that it is already using and thus does not want to change them.

As noted earlier, the major agreements/treaties that have been signed with India on water are the Koshi Agreement (1954), the Gandak Agreement (1959) and the Mahakali Treaty (1996). A significant proportion of respondents were relatively unaware of these, while a smaller proportion were reluctant to talk about them; they were primarily seen as negative and unfair. In respect of transboundary issues, most of the respondents were very vocal about how India, through these treaties and agreements, had taken advantage of Nepal in terms of its own interests rather than fair benefit-sharing. This view generally overshadowed all discussions related to transboundary issues. According to the respondents, India has failed to cooperate with Nepal when required, while Nepal's disadvantageous position in the agreements and treaties was also attributed to the weak negotiating skills of Nepalese government officials at the time of dialogue.

Recommendations to enhance cooperation between the countries involved the amendment of pre-existing treaties and agreements, improvement of negotiation skills on the Nepalese side, and the need to promote understanding of impacts on the neighbouring country and to work towards mutual benefit.

Lack of political will was also identified by the majority of respondents as the biggest hurdle to water projects in Nepal. Since these are heavily politicized, even when political will is present there are too many external factors hampering the implementation of water projects. Confidence-building between the two countries is therefore essential for transboundary cooperation.

### Treaties and agreements with India

The treaties and agreements signed between Nepal and India have been the source of much mistrust, and have led to a gradual decline in goodwill between the two countries. Nepalis feel that India maintains a largely dismissive attitude towards their concern about water issues. An insufficient share of water for Nepal was cited as the principal concern in these agreements. Thus the asymmetry

in the sharing of water resources needs to be addressed in order to improve bilateral goodwill.

The practical details of treaties must be thought through before being finalized, with a focus on balanced benefits for both countries. Respondents criticized the lack of provisions for revisiting or reviewing treaties signed decades ago. This has further led to a lack of compliance on various issues, as either there is no dialogue or forum for addressing them, or those that are available are dysfunctional. With India placing restrictions on usage of water for Nepal under the terms of the Gandak Agreement, while there are none for itself, the general attitude in Nepal is that the country is being cheated over its water resources. The following sections detail attitudes in Nepal on specific water-related agreements with India.

#### *The Koshi Agreement*

The Koshi Agreement was signed in 1954 and was last amended in 1966. A majority of respondents to the survey identified the agreement as unsuccessful in terms of the relative imbalance in benefits for Nepal and India. While they saw it as enormously beneficial for India, they felt not only that the gains for Nepal were insufficient, but that there were also negative consequences, namely:

- While 356,310 hectares of land is irrigated on the Indian side, only 11,300 hectares is irrigated in Nepal.
- While the initial agreement had no time-frame, as amended it was specified as 199 years. This is an extremely long period of time, during which the nature of water resources as well as the needs of both countries are likely to change.
- There are no provisions for the agreement to be further revised or amended.
- While the Koshi Project – including the construction of the barrage and its maintenance – falls under India's complete control, India has neglected to maintain it.
- According to water experts, while India was supposed to provide compensation for the land used within the 199 years under the Koshi Project, it has failed to compensate Nepal in this regard.

Nepal has not been able to get whatever was committed in the treaty. There are also no provisions for revision of these treaties, be it in regard to compensation for land, royalty on power generated, or compensation for negative effects resulting from negligence and poor maintenance on the Indian front.

*Government Official, Water and Energy Commission Secretariat*

There are issues such as the incompleteness of the Koshi project or the incompleteness of the power house that was to be built under the request of Nepal. These are the major reasons which have led to the breaching of the Koshi treaty.

*Water expert*

Water-sharing issues have therefore arisen as a result of a major proportion of the water going to India, particularly during periods of scarcity. While there are slight benefits to Nepal from the Koshi Agreement and the Koshi Project, the negatives suffered are far greater. For instance, while the Nepalese side has suffered from inundation of land and displacement of people because of floods, the Indian side has had largely irrigational benefits. Another example is when the Koshi river breached its embankments, leading to widespread destruction and havoc on the Nepalese side. Respondents attributed this to the use of substandard materials in the construction of embankments, as well as to lack of maintenance and neglect on the part of India. The floods caused the displacement of more than 107,000 people, damaged 5,500 hectares of farmland as well as crops, and destroyed about 14 kilometres of the east–west highway.

We have ownership of the water in this treaty. However, the resources (mainly financial) that are supposed to be provided to Nepal according to the agreement have not been made available to Nepal. This has hindered Nepal in terms of benefits from the agreement.

Chairperson, Jalsrot Vikas Samiti

#### **The Gandak Agreement**

The Gandak Agreement signed in 1959 between India and Nepal aimed to reduce floods caused by the river in India, and to divert water from it into Bihar and Uttar Pradesh for irrigation as well as power generation. The following points highlight the issues arising from the agreement:

- While the Gandak Project irrigates more than 1,850,520 hectares of land in India, only 41,900 hectares of land is irrigated in Nepal. Furthermore, while the agreement places regulations on water usage for Nepal, there is no such regulation placed on India. Almost all the flow of water in the Gandak river has thus been secured for India.
- There is no set time-frame for the agreement, meaning that its terms and conditions apply in perpetuity – including the ownership of land in Nepal by the government of India.
- Respondents identified various problems with regard to the Gandak Project, such as the lack of maintenance of its facilities by the Indian side (which holds overall responsibility for the project).
- While water is supposed to be provided in Nepal's canals for irrigation purposes, the Indian government has failed to fulfil this term of the agreement.

As with the Koshi Agreement, while Nepal has suffered negative consequences such as inundation and displacement, India has benefited from mostly positive

effects such as flood control and irrigation. The lack of maintenance and repair of drainage systems – a responsibility of the Indian government – has also led to lands being waterlogged and submerged in Nepal, thus affecting locals in the area.

Nepal has very limited rights as per the Gandak Agreement. We don't have control over inter-basin water transfer, water release or ownership on our water resources. India is taking all the benefit. The time frame of the agreement is also till infinity which is very unusual. Additionally Nepal has not been able to get what was committed in the agreement. There are also no provisions for revision of these treaties.

Senior Divisional Engineer, Water and Energy Commission Secretariat

#### **The Mahakali Treaty**

The Mahakali Treaty was signed in 1996 and incorporates the integrated development of the Mahakali river, including the Sharada barrage, the Tanakpur barrage and the Pancheswar Project. The time period of the treaty is 75 years. Like the Koshi and Gandak Agreements, the treaty was considered to be a failure by the respondents, with most deeming it highly unsuccessful – particularly because even though it was signed almost two decades ago, the two countries are still negotiating on resource- and benefit-sharing.

As with the other agreements, the common sentiment among the respondents was that once again Nepal has been unable to negotiate effectively, with India using a bulldozing attitude to achieve its own objectives. In terms of water resource allocation, it was considered that the Nepalese side scarcely gets water at all during periods of shortage. Additionally, the provisions for Nepal are different from those for India. Most respondents regarded the Mahakali Treaty as a sell-out to India, with Nepal compromising on its rights.

Looking at the policies it was a clear fact right from the beginning that this project would be unsuccessful for Nepal. The way India has framed the treaty it can clearly be seen that their storage is way more than the volume of river flowing itself, thereby leaving no water flow in the Nepal side at all.

President Secretariat

A detailed report for the Pancheswar Project was supposed to be developed within six months of the conclusion of the Mahakali Treaty. However, given the differences that surfaced between the two countries with regard to the provisions of the treaty, almost two decades later the project has failed to move forward. Various issues such as the definition of the Mahakali as the border river between India and Nepal have also arisen.

The Pancheswar Project is expected to generate around 6,500 MW of energy and irrigate 93,000 hectares of land in Nepal, and 1.6 million hectares of land on the Indian side. Most of the respondents were unaware of the project, however.

The Pancheshwar Project needs to be considered in terms of integrated Mahakali development, and sharing of resources, as issues of sharing have not been sorted. There is otherwise no reason to oppose the Pancheshwar Project as it is very attractive. But it depends on issues of equitable sharing of resources. A justifiable benefit sharing mechanism needs to be in place.

Joint Secretary, Water and Energy Commission Secretariat

According to respondents, while Nepal can benefit from the project, it will need to negotiate for the maximum possible benefits and minimize its losses. A few respondents thought that the project could possibly help to address the energy scarcity within the country. Although the scheme has been delayed by controversies, much of the groundwork has been completed and the project has already been ratified by the required two-thirds majority in parliament, so they believed the project could move forward. If the project is put into operation, respondents felt that Nepal should be able to get half of the total power generated, although they believed that India would not agree to this.

Pancheswar has negative as well as positive externalities where negatives are inundation and displacement and positive externalities are flood control and irrigation. So far the Pancheswar project has been designed wherein Nepal faces the negative externalities and India has only positive externalities, so this model is not acceptable.

Water expert

There are additional issues that need to be taken into consideration: for instance, the Pancheswar dam area is an earthquake-prone zone. These issues must be carefully assessed, as large-scale projects such as these have long-term impacts. In terms of the treaties and agreements, provisions need to be made for regular amendments every few years to take account of the changing nature of water resources and economic conditions. This is essential to ensure equal benefits for both countries, as well as to maintain cooperation and goodwill.

### Unequal benefits

Many respondents noted that as most check dams lie on the Indian side of the border, Nepal suffers from negative externalities such as land inundation and displacement whereas India enjoys the positive externalities such as flood control and irrigation systems. Additionally, as referred to in the agreements cited above, while there are limits put on the usage of water resources for Nepal in the agreements and treaties with India, no equivalent limitations are placed on India. Most of the water flows to India, with often none flowing in the canals of Nepal – particularly in dry months. For example, the eastern canal that flows into Bihar is supposed to be sharing water with Nepal, but to date no water has been supplied to the Nepalese side for irrigation. An insufficient share of water for Nepal was also identified as the biggest concern

by respondents in terms of the treaties and agreements signed with India.

Sharing of water resources between Nepal and India is not acceptable. Only 93,000 hectares of land is being irrigated in Nepal whereas 1.6 million hectares of land is irrigated in India. This inequality is inevitable considering that India is larger than Nepal, but even after taking this into account, the amount of irrigable land in both countries is highly unequal.

Water expert

### Weak negotiating power

Other than the Mahakali Treaty, signed in 1996, most of the treaties and agreements with India were signed at a time when awareness of water issues was low in Nepal. Weak negotiating abilities and the poor capacity of political leaders involved in negotiations were also identified as key reasons behind the imbalance. This was considered by respondents to be a primary reason why, for instance, Nepal has no control over inter-basin water transfer, or water release.

The lack of an overarching vision – a result of the dissolution of the MoWR – was identified as one factor in the lack of knowledge and direction in negotiations with India. It is also why different ministries concerned with water are involved in the negotiating process, rather than a single ministry approaching negotiations from a holistic perspective and with a set agenda. The demands put forward by Nepalese government officials are therefore fragmented and based on the interests of the department or ministry that is currently involved in the negotiations. This, in addition to the lack of a holistic vision, has acted as an impediment to Nepal obtaining greater benefits for the country.

Additionally, there is a lack of interest, commitment and determination, as well as of negotiating and bargaining power, among Nepal's political leaders. This must change if the country is to take a decisive stand on amendment of the treaties and agreements. Nepal also lacks financial as well as technical knowledge compared with India, and this acts as a further deterring factor in negotiations.

Often, with regard to amendment of treaties and agreements, water issues are neglected in negotiations, with the focus being placed on other issues – be they power agreements or trade accords.

We need to improve our own capacity in terms of quality of negotiation. We need to strengthen ourselves in all aspects such as proper detailed research, representation etc.

Adviser, UN Habitat

India has greater understanding regarding its country's needs. Nepal is smaller and financially poorer and does not have the same understanding regarding its needs to obtain maximum benefit in negotiation. They are therefore unable to negotiate properly.

Manager, Nepal Water Supply Corporation

#### Preferred sources of funding for water projects

The low level of cooperation is particularly evident in terms of preferred sources of funding for water projects in Nepal. A majority of respondents to the survey identified domestic resources as the best choice, but in their absence, multilateral agencies were cited as the preferred source of funding. Other respondents indicated that funding from any source is good, as long as transparency is maintained and objectives are clear.

Because of the lack of domestic resources, Nepal has had to rely on multilateral agencies for financing of water projects. However, India has displayed extreme resistance to multilateral involvement, lobbying these agencies and organization to reduce their involvement in water projects in Nepal. This has contributed to a rapid decline in the scale of cooperation between India and Nepal.

Political problems between India and Nepal are the reason why multilateral agencies and western donors do not come to Nepal and even if they take a loan from the World Bank and get a project in Nepal that project will never be successful due to political issues and instability.

Programme Coordinator, Institute of Engineering

#### Measures to improve cooperation

In order to improve transboundary cooperation between India and Nepal, both countries should strive to add value and share benefits through an equal degree of cooperation. Treaties and agreements signed decades ago need to be revised and amended; and there needs to be an increase in the frequency and number of dialogues between the two countries. Mutual transparency and honesty were identified as key to successful management and sharing of water resources.

To improve cooperation between the two countries, transparency and honesty is essential on both sides. The trust factor is very low on the Nepal side with regard to India. This general perception is not doctored and there is an element of truth. There is no smoke without fire. Somewhere down the line Nepal has been given the short end of the deal with India using a bulldozing attitude. Invisible layer after layer of resentment has built up towards India due to their attitude towards Nepal.

Managing Director, private company

As regards the preferred approach for transboundary water management in South Asia, a majority of respondents said that a basin-wide approach would be the best and would facilitate cooperation between the countries involved. While, in practical terms, a bilateral approach would be more effective, considering the relationship and scale of cooperation between India and Nepal it would be better to undertake a basin approach. Although more difficult, it was identified as the way

forward. The following points set out additional measures that were cited as needing to be undertaken in order to improve cooperation.

#### Amendment of treaties and agreements

Most of the treaties and agreements signed between the two countries date back to the 1950s, with amendments having been made only once in the 1960s. These agreements are therefore outdated and need immediate amendment, particularly as most of them favour India. Demand and supply patterns for water resources have changed in the intervening decades in India as well as in Nepal. These are factors that the treaties and agreements do not take into consideration – further emphasizing the importance of revisiting the provisions of these accords.

Factors that will reduce impediments to cooperation may be summarized as:

- *Conduct of frequent bilateral negotiations:* respondents indicated the need for an increase in the frequency of bilateral negotiations with regard to water resources and issues, bearing in mind the interests of both parties while maintaining a clear focus on equal benefit-sharing for the two countries.
- *Reducing the term of agreements:* the periods covered by the agreements are too long. Respondents therefore identified the need to claim the rights of the country in terms of its water resources through bilateral negotiations and amendment of treaties and agreements. This would help to improve the scale of cooperation between the two countries.

#### Improvement of negotiating skills

Improvement of the negotiating skills of Nepalese government officials involved in bilateral negotiations will be a big factor in improving the scale of cooperation, provided India is open to negotiations and the amendment of treaties and agreements. In order to improve negotiating skills, the following key issues need to be taken into consideration:

- Sufficient knowledge on the part of government officials, and maintenance of data on the country's water resources;
- A clear understanding of the country's strengths and weaknesses;
- An overarching vision of national interest, in order for government officials to build on their negotiating capabilities in terms of direction.

Nepal needs expertise and detailed studies on available resources, capacity and financials in order for politicians to improve on their negotiation capacities. A single policy rather than party wise policy is also required in regard to water resources so that coordination can be done on the best way forward, rather than on a fragmented basis.

General Manager, Nepal Water Supply Corporation

Respondents noted a lack of effective lobbying on the part of Nepal, as a result of which there needs to be a strong focus on negotiations with set objectives as to what should be achieved. Therefore, a clear national framework with regard to the country's water resources, and how they are managed, needs to be introduced, with set goals and priorities. This framework should then form the basis of all transboundary-related dialogue.

## Emerging conclusions

A number of areas of potential research were identified as knowledge gaps, or as areas in which information is insufficiently disseminated and publicized. Addressing these knowledge shortfalls would enable better policy-making. They include:

- Hydrological status of rivers and watershed information;
- Data on Nepal's river system and number of rivers that have gone dry;
- Tracking of water resources of the country, such as direction of rivers, and stream and river flow;
- Effects of climate change and glacial melt;
- Agricultural, industrial and domestic water usage;
- Forecasts of the potential increase in demand for water usage;
- Rainfall measurement;
- Linkages between water and different sectors of the economy;
- Data on groundwater and surface water levels, as well as groundwater extraction.

The maintenance of such data would, in the view of respondents, allow for a system whereby trends and patterns can be extracted in order to set up early-warning forecasting systems for floods and droughts, and improve water management systems.

In relation to transboundary water, in order to ensure mutual benefits for Nepal and India a high level of reciprocal commitment is necessary whereby all issues agreed on are implemented, leading to a greater degree of cooperation. For there to be a system based on mutual

benefit, respondents felt that India in particular needs to be more broad-minded in terms of water issues, and also take into consideration the impact of its actions on Nepal.

There needs to be strong lobbying on the Nepal front to establish equal rights and mutual benefits from the water resources.

Implementation of proposed issues in treaties is essential. Similarly Nepal needs to undertake detailed studies on all sectors of water management for mutual understanding on water issues and best sharing of water resources available.

National President, Federation of Drinking Water & Sanitation Users Nepal

Additionally, a few respondents indicated that the negative sentiments on both sides are what actually hamper cooperation between Nepal and India. It was therefore suggested that these sentiments be set aside and focus be placed on more proactive measures to ensure mutual water security.

Similarly, a system of corrective action or compensation for negative externalities facing either country was also suggested. The following steps were identified as possible measures to ensure mutual benefit for Nepal and India in terms of transboundary water management and sharing.

- Honest implementation of existing provisions should be either prioritized or negotiated on to provide equal benefits for both countries.
- Involvement of an unbiased third party in negotiations could assist in ensuring equal benefits for both countries.
- Old treaties and agreements should be discarded or completely amended. Actions should be taken bearing in mind the impact on both parties.
- Sharing of data and research on water resources between India and Nepal would jointly improve capacity in this regard and ensure mutual benefit.
- Efforts should be made towards joint improvement of water storage capacities to ensure water security, as well as in establishing early-warning forecasting systems to mitigate potential disasters.

While Nepal has been cooperative towards India on various fronts, it was felt that India has failed to cooperate – whether in terms of releasing data on water resources or in negotiations. Nepal shares data freely, be it with regard to volume of water flow or to other water-related resources, but equivalent information from the Indian side is very hard to come by, despite its availability. Confidence-building between the two countries is therefore essential. Development of mutual understanding on best sharing models of water resources, and working jointly towards common objectives, will benefit both India and Nepal in terms of ensuring water security and improving the scale of bilateral cooperation in the long term. This, in turn, will



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have positive impacts on water resource management for both countries. Nepal and India should therefore strive to add value and share benefits.

The World Bank has also clearly stated that until now there has been no basin wide knowledge base to explore options and facilitate cooperated planning in the Ganges. Information and data are surprisingly scarce and difficult to obtain. In particular very little information is available on hydrology and irrigation withdrawals in India. Even an Indian journalist has clearly mentioned that India has been needlessly paranoid about classifying water resources data. Unless and until India comes out of this kind of mind set no issues can be solved. Therefore while data on the Nepal front is freely available, the same cannot be said for India.

[Water expert](#)

There is a need for increased cooperation at government level on both sides. Cooperation models such as that between India and Bhutan, whereby India pays Bhutan for resources and services, also need to be developed between India and Nepal.

# 9. Pakistan

## Introduction

Pakistan is the worst country when it comes to creating capacity for storage and maintaining infrastructure.

*Anonymous*

Over the course of the interviews, water was flagged as one of the foremost security challenges that confront Pakistan, on a par with the threat of terrorism. A significant proportion of the respondent pool linked the internal water challenge to Pakistan's rapidly urbanizing population, arguing that rapid demographic change and evolving consumption patterns were serving to exacerbate the country's water crisis. Another common theme colouring the responses was a tendency to link the need for water to Pakistan's search for energy security. This was, perhaps, prompted by the fact that Pakistan has faced large-scale energy shortages in recent years, resulting in mass industry closures and widespread load-shedding (planned power cuts) in cities across the country.

Another dominant theme that emerged from the interviews was the short- and long-term danger posed by insufficient water storage capacity to the physical availability of water in Pakistan. Correspondingly, a significant proportion of respondents listed energy security as the country's biggest challenge over the next 20 years. The limits of state capacity to meet water-related challenges, and a deep-rooted distrust of public-sector institutions (particularly from non-government respondents), was another recurrent theme during the interviews. An overwhelming majority of respondents displayed scepticism as to the capability of existing public-sector institutions and infrastructure to address present and future water challenges. In the absence of immediate policy and planning intervention, almost all respondents made disturbing forecasts for the long-term future.

### **An overwhelming majority of respondents displayed scepticism as to the capability of existing public-sector institutions and infrastructure to address present and future water challenges.**

A majority of interviewees believed strongly that there was a lack of equity in the surface irrigation system, and that hydro and engineering investments were the prime solution to Pakistan's water-related challenges. It was agreed that rapidly declining water quality – more than quantity – raised major social, economic and environmental hazards for the country. Marginalized communities, as well as rural women, find their lives and livelihoods threatened in the search for fresh water sources.

Climate change poses a host of challenges that are not fully understood as a result of data-gathering deficits, although

both state and non-state respondents agree on the need to improve data collection to assist public policy interventions. Groundwater recharge is another focus area that merits further research, having been adversely affected by over-pumping and outmoded water pricing policies.

In the transboundary context, the overwhelming consensus was that approaches to India and Afghanistan over water issues had to be separated. Concerning India, opinion was divided on the extent to which the Indus Waters Treaty (IWT) had served to protect Pakistan's interests. The treaty has provided a fairly successful model of conflict resolution, albeit its inadequacies on environmental flows and climate change could be addressed in a supplementary protocol in the future. Political distrust between India and Pakistan inhibits any real cooperation in the Indus basin. Regarding Afghanistan, there was across-the-board agreement that a comprehensive framework was urgently needed to institutionalize water-sharing *vis-à-vis* the Kabul river.

In addition to the debate on the role and relevance of the IWT in the South Asian geopolitical equilibrium, the survey also elicited responses and opinions on issues relating to Pakistan's approach towards climate change, data collection and data-sharing, gender sensitization, state capacity with regard to disaster management and flood control, and inter-provincial water-sharing arrangements. A thematic breakdown of responses in the following sections also identifies baseline responses, instances of innovative thinking, and prevalent gaps and breaks in the existing national and transboundary water discourse in Pakistan.

## Water management

With regard to internal water management, several dominant viewpoints were seen in relation to a number of issues: water quality and quantity, internal storage capacity, floods and droughts, water pricing, climate change, the role of the Indus River System Authority (IRSA), religion and the role of communities. At the same time, on issues such as religion or gender, there was less agreement or knowledge. Several discernible gaps and prominent non-sequiturs emerged in the existing understanding of water and internal water management in Pakistan. These have been identified and highlighted in this report to serve as markers for the planning of future policy and water management projects.

### Water quantity and quality

Pollution has affected the quality, while mismanagement and overpopulation has reduced the per capita availability of water from 5000 units per capita at Partition to 500 units today.

*Anonymous*

A majority of respondents were in agreement that both the quality and quantity of available water in Pakistan had declined substantially. However, others noted that the absolute quantity of water had remained the same as a result of cyclical replenishing through glacial melting, though per capita water availability has decreased. Recent floods demonstrated that water quantity was still relatively high, in turn raising the core issue of storage capacity.

The experts were of the view that the additional water available to Pakistan as a result of floods and the melting of glaciers was an asset that could be realized through development of additional water storage infrastructure. Respondents were also of the view that increasing population, inadequate storage capacity and extremely high water losses were the root causes of decreasing per capita water availability. Interestingly, a sub-section of responses in the online survey indicated the prevalent belief that Indian 'violations' of the IWT were responsible for the decrease in water quantity.

Regarding water quality, opinion across the board was that the quality of Pakistan's national waterways had fallen. This was attributed to the unhindered discharge of city and municipal waste into the Indus and Ravi rivers; over-pumping of groundwater resources; and agricultural pesticides in agricultural run-off. Respondents also gave the examples of increasingly polluted freshwater lakes such as Manchar Lake, as well as the need to drill deeper in order to access clean water from the groundwater table.

Numerous respondents claimed that pollution was more endemic in the lower reaches of the Indus basin, since pollutants flowed south and contaminated the lower parts of the country, while over-pumping in Punjab was resulting in the destruction of Pakistan's groundwater aquifers.

Several respondents also made the distinction between urban and rural requirements, arguing that clean drinking water was more important in the urban centres, while abundant water for agriculture and livestock was a requirement in the rural sector.

### Conservation and storage capacity

Two-thirds of all water flowing through the Indus Basin is lost in transmission.

Anonymous

Almost all respondents agreed that Pakistan was in dire need of additional water storage capacity, as the best means of addressing water and food security issues, and that this was best addressed through the construction of dams and water reservoirs. However, the size of these dams proved to be a source of contention within the respondent pool. The construction of large projects such as the Kalabagh dam was often cited as the best means to improve water storage

capacity, although several experts questioned the rationale for the construction of the dam.

Many interviewees also maintained that improved water conservation strategies were desperately needed in Pakistan, with additional water storage and water conservation seen as two sides of the same argument. The lack of coherent water conservation-related policy or legislation was flagged as a concern, especially after the recent devolution of power to the provinces. Few respondents appreciated the current framework of water management, with a decisive majority identifying poor governance and lack of capacity as key issues in water management in Pakistan. A significant number of those interviewed also cited inadequate coordination and communication between government agencies in the water sector, which were perceived as being able only to respond to emergencies and as otherwise not proactive.

Several respondents also argued that instead of focusing on constructing new projects, equal importance should be given to the repair and maintenance of existing infrastructure in order to address problems such as canal leakages. One respondent noted that the construction of new dams would not prevent transmission losses that presently amount to roughly two-thirds of the river flow. It was added that priming the system through methods such as intermittent canal lining would result in a dramatic reduction in water losses. One political analyst felt that the interests of the newly elected Pakistan Muslim League-Nawaz (PML-N) government were rooted in the economic-industrial complex, and that the promotion and protection of agricultural interests *vis-à-vis* water conservation were not at the forefront of the new leadership's agenda.

### Floods and droughts

A majority of respondents were of the opinion that Pakistan's capacity to deal with floods and droughts had not improved in the past 10 years, with many interviewees citing the country's response to the 2013 floods as evidence of institutional unpreparedness. There were, however, several respondents who pointed to the establishment of the National Disaster Management Authority (NDMA), provincial Irrigation and Drainage Authorities and District Disaster Management Authorities (DDMAs) in the aftermath of the 2010 floods as evidence that government bodies had learnt critical lessons, though financial constraints limit their capacity.

Government officials held the view that there had been tangible improvements in Pakistan's capacity to deal with floods, and argued that the country was moving from a more response-oriented approach to a pre-emptive

approach. They cited the inauguration of the Integrated Flood Management Plan IV and the remodelling of barrages to support this assertion. However, they also felt that more early-warning systems were needed throughout the Indus basin, and there remained a critical gap between planning and implementation.

### Water pricing

Surface water pricing is ridiculously outdated, being that it has not been revised since 1972. Pakistan needs to remove the groundwater subsidy on tube well electricity. And for urban water supply, we don't have much of a water supply, so you can't really charge people for the air coming out of their taps.

*Anonymous*

An *abiana* [water tax] of Rs135 per year per acre is nothing but a joke. When compared to tubewell water, which costs Rs3,000 per acre per irrigation, the current rate of canal water is very low.

*Anonymous*

Water pricing in Pakistan is categorized according to irrigation, domestic and industrial tariffs. A significant proportion of the interviewed experts described Pakistan's policies on water pricing as satisfactory, with many urban respondents admitting that they would be willing to pay more if required to do so. Water pricing in Pakistan is presently categorized in three contexts – irrigation, domestic and industrial tariffs. When interviewed, Water and Sanitation Agency (WASA) officials explained that their concerted requests for permission to raise domestic water tariffs were repeatedly denied by provincial governments, often for political reasons.

Many respondents maintained that low irrigation tariffs were responsible for encouraging water wastage, but that these stemmed from political motivations to keep tariffs at a minimum. One respondent astutely observed that tariffs for the use of surface water (regulated by provincial governments) were much lower than if farmers chose to use groundwater, since irregular electricity supply meant relying on costly diesel power to operate water pumps.

At the same time, a few respondents were of the view that drinking water tariffs should be completely subsidized by the state, based on the belief that access to clean drinking water was a fundamental right and should be provided free; others conceded that some basic cost to cover operating overheads was permissible. It was seen that the commodification of drinking water was likely to emerge as a major political-economic issue in the future.

Respondents from Sindh, meanwhile, made reference to the growing challenge posed by unruly 'tanker mafias' in Karachi, that were seen to be stealing water from the Karachi Water and Sewerage Board (KWSB) by breaking into pipes and tapping leakages. As a result, citizens ended

up paying up to three times the standard amount to buy water from tankers. Respondents suggested that tanker mafias continued to flourish, particularly in those parts of the city that had witnessed a surge in violence in recent years.

Now these mafias have guns, it is hard to control them. And they survive because citizens keep buying from them.

*Anonymous*

### Climate change

A broad cross-section of experts suggested that Pakistan stands on the brink of an environmental disaster, as the country's seasonal monsoons have shifted away from traditional catchment areas towards Afghanistan. This trend, exacerbated by climate change, exponentially increases the likelihood of extraordinary rainfall patterns, cloudburst and flash floods. At another level, reduced storage capacity of the Mangla, Tarbela and Warsak dams as a result of siltation inhibits the government's response to climate change.

Respondents also felt that the significant loss of soil and groundwater particularly affected Balochistan. This view was confirmed by disaster management officials, who further explained that Pakistan had incurred an estimated US\$16 billion loss since 2010 as a result of flooding. Urgent sectoral reform and policy planning was required to 'climate-proof' the Indus basin. No urgency could be sensed on the part of policy-makers and implementers. Downsizing the Ministry for Climate Change to the status of Climate Change Division and slashing its budget indicated to some respondents that the issue is not a priority, although there was growing public awareness about climate-change-related phenomena.

### IRSA and inter-provincial sharing

The Indus River System Authority (IRSA) lacks the technical and managerial skill to regulate current water resources [between the provinces].

*Anonymous*

A sizeable proportion of respondents appreciated the role of the IRSA, pointing out that, at the very least, it represented a rare provincial political accord on water-sharing. Several experts commended the water-sharing formula stipulated in the 1991 Water Apportionment Accord, although a few noted that the formula was based on a presumed minimum annual availability that, for various reasons, had never been met in practice. One view held that the Apportionment Accord as a step taken by a previous PML-N government to establish provincial political consensus for the construction of the Kalabagh dam. Additionally, when asked which province had the best policies with regard to

water management, an overwhelming consensus identified Punjab as demonstrating the most coherent and progressive management policies. However, a few respondents felt that these could also be attributed to the widespread concentration of infrastructure, as well as to the abundance of water naturally available to the province.

On the downside, the main grounds for dissatisfaction among respondents with IRSA's role lay largely in the balance of provincial representation, and in the manner of the chairman's selection.

### Water and religion

Respondents were divided on whether religion could be used in successful public messaging for water usage and conservation. A segment felt that religious arguments could greatly assist policy-makers in a traditional society such as Pakistan's, and pointed to a rich body of *ahadith* that supports water conservation and environmental concerns. Others were sceptical about the effectiveness of such messaging, but felt that school and *madrassa* curriculums could be developed to support this. Stakeholders identified the value of involving local religious leaders and imams in such initiatives, suggesting that public welfare messages focusing on better water practices could be disseminated during Friday sermons.

### Gender

Mobility is a problem for women in Pakistan and water management in terms of drinking water does not adequately address that concern. That space is shrinking.

*Anonymous*

Survey respondents expressed near unanimity in the belief that existing water management practices in Pakistan did not take into account the needs of women and that the discourse needed to be gender-sensitized in both rural and urban contexts. However, only a small percentage of respondents could identify the ways in which water management disproportionately disadvantaged women: water collection was still seen as a female burden in rural households, made perilous by violent conflict in parts of the country. Where physical mobility for women is threatened or inhibited, households invariably suffer.

### Social equity and local communities

Farmland across rural Punjab has traditionally been a site for resource control, dominated by a feudal elite that monopolizes water flowing through canals and holds back water from smaller landholders. Respondents explained that land belonging to feudal landlords was situated upstream in Punjab, and that these landlords often 'flooded' their own

fields before releasing the remaining water. The needs of downstream landlords were thus routinely usurped, creating inequities. Respondents from Khyber Pakhtunkhwa felt that this was not the case in their province, where rural water distribution benefited from more equity-based landholding patterns.

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It was also felt that the interests and needs of communities were rarely met through existing water management practices in Pakistan. Some respondents argued that the availability of clean drinking water should be prioritized over irrigation and industrial needs. Communities along the Indus river have become marginalized, particularly in Punjab where the system of issuing fishing contracts remains in place. Additionally, large engineering projects often result in the direct or indirect displacement of local communities. One respondent observed that the lives and livelihoods of fisher folk and herders had been severely affected in remote districts of Punjab and Sindh because of contamination and falling water tables.

### Knowledge gaps

Predominantly, a hydrological engineering approach underpinned a significant number of responses given by senior experts. Only a handful of respondents touched on alternative discourses such as environmental flows and social equity in water distribution. The nexus between access to clean drinking water, health and development was not a dominant theme in responses. Few respondents identified the role of impure drinking water in Pakistan's poor performance in health and social indicators.

The relative priority given to certain areas of water management by the respondents, such as the construction of large-scale infrastructure projects (i.e. dams and barrages), reflected the dominant hydrological engineering discourse concerning water in Pakistan. Few respondents sought to question broader policy issues. For example, it was commonly accepted that irrigation consumed more than 90 per cent of water resources in Pakistan; that farming employed nearly half the country's workforce; and that agriculture contributed as much as 20 per cent to total GDP. Only a handful of respondents questioned whether Pakistan's economic engine could continue to depend on irrigation infrastructure harnessing the Indus basin alone.

The missing discourse therefore questions the GDP-to-water consumption trade-off, and asks whether alternative development models are available for Pakistan. Notably, hardly any respondents mentioned the recent completion of the Mangla Dam Raising Project and the resultant additional storage capacity for Pakistan.

### Innovative thinking and ways forward

Pakistan's irrigation system is the largest contiguous irrigation system in the world, and managing that is quite a feat. In spite of all its problems, it is still producing a large part of Pakistan's food supply. In spite of stress to the system, barrages have withstood floods, dams have withstood. The system largely works.

*Anonymous*

Until we know scientifically where we stand with river flows and rain inflows, we will never know which solutions to prioritize. It is like asking a doctor to give a prescription for a dying patient just by looking at him from four feet away.

*Anonymous*

Multiple strands of innovative thinking were highlighted in relation to water conservation and water management practices in Pakistan. There existed a general consensus that priming the system and addressing governance failures could vastly improve the distribution system. At the same time, several experts (most notably WASA's managing director) were of the view that a lack of education and awareness of water issues had contributed to a misinformed political debate.

Water researchers also agreed that a deficiency in the availability and reliability of water data was responsible for misconstrued realities on the ground. A lack of concerted and informed political engagement in relation to water issues also resulted in a gradual build-up of political tensions between provinces in the absence of an effective inter-provincial mechanism for conflict resolution. Although the Council of Common Interests (CCI) was the relevant body in this regard, respondents agreed that it seldom focused on resolving inter-provincial water issues. This was an area that merited reform.

Several experts made reference to the need for real-time data on water flows, and for the scientific updating of streamflow formulas in the Indus basin. A hydrological specialist pointed out that Pakistan did not have a single, nationally agreed method of measuring river flow. As a result, data recorded by WAPDA were thought to be questionable: 'No one agrees with each other's figures, and collectively as a nation we do not know how much water actually runs through our rivers.' One federal government representative further argued that greater elementary geomorphological research and awareness were needed to break the hold of what he described as 'stone and cement' water experts. A concerted harnessing of technology in

the form of satellite imaging, and the mainstreaming of scientific data into the public space, could also facilitate the flow of new, cutting-edge political discourse from a wider set of water information. Experts suggested that enhancing and priming IRSA's telemetry tools could help ascertain water flows more accurately and efficiently. A particularly interesting observation came from an environmental engineer, who said that the lack of available data on glacial melting was another glaring deficiency in existing research and information cells.

Respondents in the public water sector were significantly more aware of virtual water issues (i.e. the conversion of consumer items into the amount of water consumed in their production), and they emphasized the need to move to a 'more crop per drop' method of measuring and assessing agricultural productivity. Technical experts were also aware of the nature of virtual water; some questioned the sustainability of development as eating habits changed to reflect rising incomes and growing access to water-intensive foods (dairy, meat, fruit). Several respondents also questioned the rationale of growing water-intensive crops such as sugar in water-stressed areas, and suggested that cheaper sugar could easily be imported from Brazil or Mauritius. One respondent questioned why Pakistan was exporting rice (production of which was said to require 2,000 litres of water per kilogram). Agricultural researchers argued that flood irrigation had to be curbed, and that more innovative and scientific approaches – including drip irrigation, sprinkle irrigation and urban rooftop rainwater harvesting – should be developed and promoted in order to augment the storage and supply of water in Pakistan's cities and rural areas.

In relation to water pricing, Mehran Town, on the outskirts of Karachi, was cited as a township which bought water in bulk from the KWSB and supplied it to individual homes that were electronically metered. As a result, all water consumption was metered and recorded. Up to a certain point, water was supplied at cheap rates, but thereafter the cost increased steeply. This acted as a deterrent to wasting of water by users.

There was widespread agreement that pollution control had to be modelled along an ecosystem-based approach, with an emphasis on the preservation and protection of catchment areas. Respondents also agreed that industrial waste was the primary cause of water pollution in the Indus basin. There was conformity of opinion that industries needed to treat their waste before discharging it into water bodies. There was also agreement that individual industries should be taxed for polluting the Indus and its tributaries.

One view suggested that water management practices in the tribal areas had been badly ignored by mainstream

government policy since Pakistan's creation. For instance, the Gomal Zam dam project has just been inaugurated, even though construction work began in 1959. The construction of similar small dams in all the tribal areas could help harness seasonal rainwater and profoundly improve local perceptions and grassroots sentiment towards the government.

### Transboundary water management

Respondents to the survey debated the degree to which a 'basin-wide' approach could be utilized in addressing transboundary water issues in South Asia. They acknowledged that several countries did manage upper-lower riparian dynamics effectively, but the case of India and Pakistan was made more complex as the basin's rivers were divided rather than shared. There was categorical agreement that the entire basin must be looked at when devising any conceptual framework, but an accompanying realization that this might not always be easy to translate into practice.

It was argued that much more attention needed to be paid to the drastic reduction in available water in South Asia and to the exponential increase in demand, and that this should be realized through a grand 'South Asia Water Compact'. Several respondents were of the opinion that the partitioning of rivers had irreparably damaged river health: no real case could be made for cooperation at basin level as long as the IWT's structural binds remained in place. An alternative view expressed was that pursuing a basin-wide or regional approach would jeopardize Pakistan's interests in the short to medium term.

Some participants further recommended that existing water agreements between South Asian countries had to be scrupulously followed, and that dispute resolution mechanisms provided for under these should be made readily available. Where such agreements did not exist, a bilateral approach would be better suited to the resolution of disputes.

### The Indus Waters Treaty

A great majority of respondents expressed confidence in the IWT as offering a broader scope for cooperation between Pakistan and India. Respondents felt that the treaty could be creatively interpreted to safeguard Pakistan's interests, which had rapidly evolved as a result of new economic imperatives and demographic changes. Safeguarding livelihoods was critical in areas that depended on tributaries of the Indus. It was pointed out that the IWT had enabled a successful arbitration dynamic for transboundary water disputes: the politics of the Baglihar and Kishenganga

projects notwithstanding, both cases were cited as examples of a highly effective dispute resolution process which catered for the presence of a neutral expert and set precedents for future litigation.

Respondents observed that the treaty's deficits on climate change and ecological flows, and excessive focus on engineering and design, were a function of the scientific state of play at the time (it was ratified in 1960). It was argued that challenges related to climate change could be addressed in supplementary protocols to the IWT, but that the treaty itself should not be discarded. Any deficiencies of the IWT were compensated for by its success in bringing order to an otherwise vexed political relationship between India and Pakistan. In comparison with other outstanding issues, respondents felt that the IWT had mitigated water-related conflict at an early stage, but that the treaty's future cooperation clauses remained underutilized as a result of political differences between the two countries.

Articles VI–VIII of the IWT made provision for joint projects between India and Pakistan, but respondents felt that such projects could not be envisaged in the near future because of lingering political distrust. Many respondents emphasized that India was entitled to its share of water, including the building of dams, under the IWT, and the impression that India was 'stealing' Pakistan's share was not based on any empirical evidence. However, the rapid scale of upstream construction had arguably had an impact on cumulative flows; and several respondents expressed concern at 'unverifiable' flow data provided by India. A minority view held that India was engaging in 'water aggression' and was wilfully not adhering to the IWT in letter or spirit.

Only a fringe minority seemed aware of the possibility that groundwater extraction in northern India could affect Pakistan's aquifers. Most informants agreed that the issue of groundwater lay outside the purview of the IWT, which in itself was primarily a surface water treaty and regulated the construction of dams on the western rivers of the Indus basin. It was generally felt that groundwater issues related predominantly to agricultural practices, food security and climate change. Respondents interviewed agreed on the need for further research on the Pakistani aquifer.

On the question of whether Pakistan should trade water with India for non-water benefits, respondents largely answered in the negative, stating that water should not be traded for short-term gains – particularly for the supply for electricity. Others felt this was an agreeable notion, but that it was unlikely to materialize in the near future.

## Relations with Afghanistan

A large number of respondents stated that Pakistan and Afghanistan should have an agreement for transboundary water management. The government in Afghanistan was seen to be building capacity in this regard, and it was recommended that both Islamabad and Kabul should undertake measures to shore up confidence and prevent conflict ensuing with regard to the question of water-sharing. With Afghanistan's other security challenges looming large, it was generally felt that water would not be included on the agenda of bilateral talks for some time. However, many informants believed that a purposeful dialogue should be started between Pakistan and Afghanistan, and that the latter should be assisted in developing infrastructure along the Kabul river.

## Emerging conclusions

There was a great difference in opinion as to the causes of decreasing freshwater quantity in Pakistan. Technical experts in the survey maintained that, in the absence of data on water flow, the absolute amount of water in the Indus basin remained the same. However, there seemed to be widespread understanding among non-technical experts that Pakistan's water quantity had declined. This difference in perception can perhaps be understood in the context of *access* to water: while the absolute amount of water in the system may be the same, the rising population, over-pumping of groundwater and contamination of water by way of industrial and agricultural effluent have greatly reduced access to clean water.

There was seen to be a pressing need for accurate real-time data on water flows and aquifer storage and recovery, and for the scientific updating of streamflow formulas in the Indus basin. A glaring lack of reliable data was seen as the major reason for an ill-informed public debate and policy engagement on water issues. A uniform method of measuring river flows should be institutionalized, utilizing IRSA's telemetry tools to help ascertain water flows more accurately. Glacial melt should also be recorded, and greater elementary geomorphologic research and awareness need to be promoted to break the hold of 'stone and cement'

water experts on policy planning. A concert of satellite imaging technology and scientific data should be employed to facilitate better-informed public debate.

Some interviewees suggested that capturing rainwater could be beneficial to aquifer recharge in Lahore. However, WASA's attempts to obtain approval *vis-à-vis* changes in by-laws requiring rainwater harvesting practices had been repeatedly unsuccessful, revealing the lack of political attention given by the Punjab government to develop Lahore's water resource portfolio.

## **A glaring lack of reliable data was seen as the major reason for an ill-informed public debate and policy engagement on water issues.**

On the subject of water pricing, there was broad agreement among urban respondents that domestic water pricing was too low. However, few respondents offered an alternate pricing framework. Many wished to see a revision in domestic water tariffs, but this largely stemmed from the desire to increase revenue in order to cover operation and maintenance costs. Few responses spoke of the need to protect consumer rights, of minimum consumption or of the need to recover environmental costs associated with the supply of water and provision of sewerage.

Few respondents discussed Kashmir, other than referring to it as an obstacle to transboundary water-sharing with India. Dissenting views held that the people of Kashmir had not been signatories to the IWT, and that the distribution of water in Pakistan was between four federating units without recourse to the needs of the people of Azad Jammu and Kashmir (AJK); furthermore, the right of the Kashmiri people over the Indus waters was inalienable.

A large number of respondents, especially those in the private sector or in the media, were unfamiliar with some of the issues raised in the survey. The most common areas of unfamiliarity concerned prioritizing water use, the role of IRSA, and Pakistan-Afghanistan water issues. None of the individuals interviewed was aware of NASA's GRACE (Gravity Recovery and Climate Experiment) satellite time-lapse video of groundwater consumption in north India.



# Appendix 1: Methodology

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The discourse regarding water, and in particular transboundary water, is increasingly securitized in all the countries of the region, making water appear to be a source of tension, and potentially of conflict. Transboundary water issues are frequently explored separately from local water management. The project on which this report is based was intended to understand the interaction between attitudes towards water management and those towards cross-border water flows. Throughout South Asia different states, provinces, cities and countries blame a lack of water on actions taken upstream. There are clearly genuine concerns about lower riparian states' rights to water. But at the same time, some surveys suggest that in some cities as much as half of water is lost in transmission owing to inadequate or poorly maintained infrastructure. Better water management – as much as increased water volumes – would help to ameliorate shortages.

To explore these dynamics, this report drew on three overlapping data-sets. First, research institutes in Afghanistan, Bangladesh, India, Nepal and Pakistan conducted in-depth interviews with hundreds of senior officials and decision-makers working in government, universities, civil society organizations, the private sector, international organizations and media commentators connected to water issues, focusing on the Indus and the Ganges-Brahmaputra-Meghna transboundary river basins.<sup>22</sup> The interviews were formulated to gauge attitudes on a range of issues including water management, water policies and transboundary water issues. As far as possible, the interviews comprised open questions; where appropriate the questions were similar across countries. The interviews also included a number of country-specific questions focusing on issues pertaining to individual countries. The results were coded to enable analysis relating to divergence and convergence of views within and between particular groups.

Second, the attitudes and opinions forthcoming from the interviews were corroborated by an online survey of similar stakeholders. This survey was also used to reach out to individuals who were not available for interview.

Third, a number of studies were undertaken, through fieldwork and a literature review, to examine case studies of improved water utilization to understand better the conditions that enabled more effective water usage. This also helped to contextualize the attitudes displayed in the interviews. After quantitative analysis of the data to explore similarities and differences between different groups in each country on particular issues, the country reports were compiled, drawing on representative quotes from the interviews.

This rich data-set enabled a number of conclusions and recommendations to be drawn. The analysis uncovered the extent of divergent and convergent opinions between countries and among different types of stakeholders within countries. This allowed for varying types of analysis, setting out the baseline of attitudes towards a range of issues; understanding which types of stakeholders within countries would be most open to various innovative approaches towards water; and assessing the prevalence of myths pertaining to water among stakeholders. The survey also provided better understanding of the interests and incentives of different stakeholder groups in relation to water management and governance. The project researchers were keen to explore attitudes towards water holistically, examining both domestic water management issues and transboundary water issues, in particular to see whether lessons from one could be applied to the other.

Some methodological challenges were noted. In Afghanistan, respondents were, in general, happy to discuss all the elements of the research, with only a few reluctant to address particular issues such as relations with neighbouring countries. This was notable particularly with representatives of the government agencies, such as the urban water supply department officials in the cities. Criticism of the government, especially its efforts to improve water management, was expressed without reserve by many respondents who were not government employees. International consultants and advisers were very willing to point to failings in national systems of water management and shortfalls in water policy development mechanisms. In Afghanistan, the number of female respondents was very limited. While the survey was not representative of the communities affected by water issues, it was largely representative of the institutions and decision-makers working on water issues.

In most countries domestic water experts were keen to discuss transboundary issues. In India, however, a much larger number of respondents professed a lack of awareness of these issues. The number of respondents who said that did not have an opinion on treaties or current levels of transboundary cooperation was generally negligible and they were excluded from the data-set. However, in the case of India, the numbers were much higher (see Figure 5.2).

Across the region retired government officials were more open to discussion than serving officials. Many respondents were keen to ensure that their names and affiliations were kept confidential to enable them to talk openly and honestly. In the case of Pakistan, all of the quotes are anonymous.

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<sup>22</sup> In total 86 people were interviewed in Afghanistan, 76 in Bangladesh, 165 in India, 50 in Nepal and 90 in Pakistan.

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In Nepal some respondents, in particular from government, were unwilling to talk about treaties and agreements with India, while donors and private-sector respondents reflected a lack of knowledge regarding treaties with India.

In Pakistan representatives of opposition parties were reluctant to provide their views relating to sub-national or transboundary water issues while government officials, politicians and the private sector generally responded positively. Most of the interviews in Pakistan involved respondents from Punjab and Sindh, but greater use of the email survey was made to reach out to stakeholders from Khyber-Pakhtunkhwa, Baluchistan and the Federally Administered Tribal Areas.

The interview process in Pakistan was also affected by events. Before the general election of May 2013, many public-sector officials were transferred. Bureaucrats with years of experience were replaced by officials with none. Widespread flooding during the summer reduced access to key officials, while the on-going energy crisis seems certain to have influenced thinking on some of the issues raised.

# Appendix 2: Interviews

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In each country interviews were conducted with a range of people from civil society, politics, academia and the private sector. Acting or retired officials from the following institutions were interviewed. This list is indicative of the broad cross-section of people working on water-related issues who were consulted.

## Afghanistan

Adventist Development and Relief Agency  
Afghan National Disaster Management Agency  
Afghanaid  
Afghanistan Centre for Training and Development  
Afghanistan High Peace Council  
Afghanistan Urban Water Supply and Sewerage Corporation  
Afghanistan Youth Federation  
Aga Khan Development Network  
Agency for Technical Cooperation and Development  
Asian Development Bank  
Asplan Viak  
Commission for Organizing Civil Society and Political Parties  
Concern  
Da Afghanistan Breshna Sherkat  
Danish Committee for Aid to Afghan Refugees  
Future Generations  
Helvetas  
International Medical Corps  
International Organization for Migration  
International Rescue Committee  
Kabul University  
Ministry of Agriculture, Irrigation and Livestock  
Ministry of Counter-Narcotics  
Ministry of Energy and Water  
Ministry of Foreign Affairs  
Ministry of Mines  
Ministry of Rural Rehabilitation and Development  
National Environmental Protection Agency  
National Solidarity Programme  
Norwegian Church Aid  
Norwegian Refugee Council  
Organization of Human Welfare  
Oxfam  
Rehabilitation Association and Agriculture Development for Afghanistan  
Regional Environmental Centre for Central Asia  
Scientific-Information Center of the Interstate Coordination Water Commission of Central Asia, Uzbekistan  
SMEC International  
Swedish Committee for Afghanistan  
UN Environment Programme  
UN Office for the Coordination of Humanitarian Affairs  
UNICEF  
US State Department

Water Supply Department  
Welt Hunger Hilfe  
World Food Programme  
Zoi Environment Network

## Bangladesh

Asian Development Bank  
Bangladesh Agricultural Development Corporation  
Bangladesh Centre for Advanced Studies  
Bangladesh Enterprise Institute  
Bangladesh Environmental Lawyers Association  
Bangladesh Haor and Wetland Development Board  
Bangladesh Inland Water Transport Authority  
Bangladesh Institute of International and Strategic Studies  
Bangladesh University for Engineering and Technology  
Bangladesh Water Development Board  
Bangladesh Water Partnership  
BRAC University  
Brotee  
Centre for Environmental and Geographic Information  
Daily Prothom Alo  
*Daily Star*  
Department of Environment (Ministry of Environment and Forests)  
Department of Public Health Engineering (Ministry of Local Government)  
Dhaka Water Supply and Sewerage Authority  
Flood Hazard Research Centre  
Institute of Water Modelling  
International Union for Conservation of Nature  
Joint Rivers Commission  
Ministry of Foreign Affairs  
Ministry of Water Resources  
NGO Forum for Public Health  
Palli Karma-Sahayak Foundation  
Planning Commission  
Power Participation Research Centre  
Rain Forum  
River Research Institute  
Transparency International Bangladesh  
University of Dhaka  
University of Jahangirnagar  
Uttaran  
WaterAid  
Water Resources Planning Organization

## India

AECOM  
Alternative Futures  
Alternative Futures  
Asia Foundation  
Asian Paints

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|   |   |
|---|---|
| Central Ground Water Board                                | Consolidated Management Services Nepal                    |
| Central Water Commission (CWC)                            | Department of Agriculture                                 |
| Center for Policy Research                                | Department of Irrigation                                  |
| Delhi Science Forum                                       | Department of Water Induced Disaster Prevention           |
| Delhi Science Forum                                       | Department of Water Supply & Sewerage                     |
| Environmental Resources Management (ERM)                  | Environment and Public Health Organization                |
| Ford Foundation, India                                    | Federation of Drinking Water and Sanitation               |
| Hazard Centre   | Good Environment for Better Living                        |
| <i>The Hindu</i>  | Ground Water Resource Development Board                   |
| IIM Kolkata   | Hydro Solutions Pvt Ltd                                   |
| IIT Delhi   | Hydroelectricity Investment and Development Company       |
| IIT Guwahati  | Institute of Engineering                                  |
| India Water Foundation                                    | International Water Management Institute                  |
| Indian Association of Social Science Institutions (IASSI) | Irrigation & Water resources management project           |
| Indian Council of Agricultural Research                   | ISET Nepal  |
| Indian Environment Law Offices                            | Jalsrot Vikas Sanstha                                     |
| Indian Environment Law Offices                            | Japan International Cooperation Agency                    |
| Indian Express  | Kathmandu Upatekya Khanepani Ltd                          |
| Indian Institute of Public Administration                 | Koshi Water Management Cell                               |
| Indian Law Institute                                      | Melamchi Water Supply Development Board                   |
| Indian Law University                                     | Ministry of Energy  |
| Institute of Defence and Security Analyses                | Ministry of Irrigation                                    |
| Institute of Peace and Conflict Studies (IPCS)            | Ministry of Urban Development                             |
| INTACH (Indian National                                   | Ministry of Water Resources                               |
| Trust For Art And Cultural Heritage)                      | National Planning Commission                              |
| Jawahar Lal Nehru University                              | Nepal Water for Health                                    |
| King's College London                                     | Nepal Water Supply Corporation                            |
| Members of Parliament, Government of India                | Non Governmental Organization Forum for Urban Water       |
| Ministry of Environment and Forests                       | and Sanitation  |
| Ministry of Power   | One Planet Solution                                       |
| Ministry of Water Resources                               | PANOS South Asia  |
| National Advisory Council                                 | President's Secretariat                                   |
| National Ganga River Basin Authority (NGRBA)              | RVWRMP  |
| National Research Development Corporation (NRDC)          | Town Development Fund                                     |
| Observer Research Foundation                              | UN HABITAT  |
| Parmarth Samaj Sevi Sansthan                              | Water and Energy Commission Secretariat                   |
| Planning Commission, India                                | Water, Sanitation and Hygiene, Resource Centre Network    |
| Punjab Agriculture University                             | Nepal   |
| Rajyasabha TV   |   |
| River Research Institute                                  |   |
| Tarun Bhagat Sangh  |   |
| Telangana Vignyana Samithi                                |   |
| TERI University   |   |
| <i>Times of India</i>                                     |   |
| United Nations Framework Convention on Climate            |   |
| Change  |   |
| University of Delhi                                       |   |
| University of Sussex                                      |   |
| <b>Nepal</b>  |   |
| Asian Development Bank                                    |   |
| Association of Research and Management Services           |   |
| Centre for Integrated Urban Development                   |   |
|   | <b>Pakistan</b>   |
|   | Capital Development Authority (CDA)                       |
|   | Centre for International Strategic Studies (CISS)         |
|   | EcoEnergy Finance   |
|   | Farmers' Association of Pakistan (FAP)                    |
|   | FATA Research Centre                                      |
|   | Federal Water Management Cell (FWMC), Government of       |
|   | Pakistan  |
|   | Freshwater Action Network                                 |
|   | Gender Equity Programme (GEP)                             |
|   | Government College, University of Faisalabad              |
|   | Haggler Bailly Pakistan                                   |
|   | <i>The Herald</i>   |
|   | Hisaar Foundation for Water, Food and Livelihood Security |

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|---|---|
| Indus River System Authority (IRSA), Government of Pakistan   | Nawa-i-Waqt Group of Newspapers                                       |
| Indus Water Commission (IWC)                                  | Orangi Power Project (OPP)  |
| Institute for Strategic Studies and Research Analysis (ISSRA) | Pakistan Water Partnership (PWP)                                      |
| Institute of Regional Studies (IRS)                           | Pakistan–China Institute  |
| Institute of Rural Management (IRM)                           | Planning Commission, Government of Pakistan                           |
| Institute of Strategic Studies, Islamabad (ISSI)              | Punjab Irrigation Department  |
| International Water Management Institute                      | Punjab Water Council (PWC)  |
| Jinnah Institute  | Quaid-e-Azam University   |
| Lahore University of Management Sciences (LUMS)               | Rizvi Isa Afridi Angell (RIAA)  |
| Leadership for Environment and Development (LEAD)             | Strengthening Participatory Organization (SPO)                        |
| Lodhran Pilot Project (LPP)                                   | Sustainable Development Policy Institute (SDPI)                       |
| Ministry of Foreign Affairs, Government of Pakistan           | United States Agency for International Development (USAID)            |
| Ministry of Science and Technology, Government of Pakistan    | United States Institute of Peace (USIP)                               |
| National Defence University (NDU)                             | Water and Power Development Authority (WAPDA), Government of Pakistan |
| National Disaster Management Authority (NDMA)                 | Water and Sanitation Agency (WASA)                                    |
| National University of Science and Technology (NUST)          | Water Management Research Centre                                      |
|   | WWF Pakistan  |

# Appendix 3: Successful Approaches to Water Management – Implications for Transboundary Water

Despite the widespread challenges facing water management in South Asia, there are numerous examples of domestic water management in individual countries of the region that represent practical, cooperative ways of managing water. Such examples may offer ways forward to defuse tensions and provide a basis to shift transboundary water debates at the interstate level onto a more constructive footing. After all, it is the ability of its water resources to provide for human needs that is central to the national interests of each country, not the amount of water itself. The solutions to this are many and diverse.

For this reason, we surveyed several case studies of areas in which water management was widely viewed as having improved, focusing in particular on community-based examples such as rainwater harvesting. While many of these projects involved local solutions, often reverting to particular, traditional means of water management, some (relatively) generic lessons stood out.

The first was that **many successful projects involved approaching water in a holistic manner, connected to other issues such as health or livelihoods**. Those projects that focused purely on the provision of water frequently failed. Similarly, successful projects often took into account the social and economic impacts of water provision. One former forestry official in India offered a surprising comment on the provision of tap water to villages, which is almost universally seen as a positive step – notably preventing women having to spend hours walking each day to collect water:

The needs of women and communities are framed in the policies. Women collect water and therefore time is lost that could be used otherwise. However, sociological aspects also need to be taken into consideration. The time that women spent walking to wells was their major time for socializing with one another. In some cases the installation of tap water leads to the disintegration of communities. Also, when tap water is installed the communities do not have any incentive to conserve water. Before, women would only retrieve as much water as was necessary and use it very attentively. With tap water available and no training on water conservation a gross wastage of water results ... Another example is that of dengue, because the availability of tap water leads to standing water/puddles of water where the dengue mosquitoes nest.

*Retired forestry official, India*

The point is not that the provision of water is bad. For it to bring positive change requires a more holistic approach, focusing in this example on education in water conservation. Throughout South Asia there are numerous projects that do take this approach. Some successful schemes focus more broadly on ‘development’, with water being one of several integral components; others focus on the impact that the provision of water can have on health or livelihoods.

Yet the transboundary debate is framed in the opposite way, focusing purely on the provision of a volume of water and

not connecting water with any associated issue. Given the growing understanding of the nexus between food, energy and water – and given that each presents a significant problem for each of the five countries involved in this research – broadening transboundary water debates to link water with other sectors presents opportunities for more positive outcomes.

Building on this, the second observation from the case studies was that **many successful community-based projects focused on water consumption**. One of the most famous examples is that of rainwater-harvesting in Alwar, Rajasthan, resulting in the return of the Arvari river which had dried up following deforestation in the 1930s. Water availability there worsened with the onset of marble mining in the 1960s. The drought-stricken region was home to marginalized villagers with livelihoods reliant on migration to urban areas. After initially planning to provide education to local people, Rajendra Singh, founder of the NGO Tarun Bharat Sangh (TBS), was persuaded to begin building a rainwater-harvesting structure known locally as a *johad*. The first was built in 1986, and since then more than 400 others have been built in the 70 villages in the Arvari’s catchment area. From 1990 onwards, the river returned for longer each year.

The initial improvement brought new challenges. In 1996 the villagers of Hamirpura were told that the state government had given a contractor a licence to fish in the river. By law, rivers are government property, but the villagers felt ownership of this river that they had returned to life.

In 1999 TBS facilitated the formation of an Arvari *Sansad* (or Arvari parliament), an association of all the villages along the river’s course. This parliament adopted a constitution to manage the river, focusing on equity, justice and cooperation, and ecological conservation. The Arvari *Sansad* has regulated water use, and has introduced laws for both the use of the river for irrigation and the use of groundwater. It has also diversified agriculture, promoting the cultivation of less water-intensive crops and banning sugar cane and rice. Among other regulations:

- Fishing in the Arvari can be done only for personal consumption;
- Large-scale trade of food grains and vegetables is banned;
- Local production and consumption are emphasized;
- Villagers should help people from surrounding areas to build water-harvesting structures;
- Cattle from outside the region are not allowed to graze;
- Farmers are to practise rotational grazing;
- Industrial units are banned within the 450-sq km Arvari basin.

As well as the construction of *johads*, work has also been undertaken to stop hill run-off and soil erosion. Strong village-level organizations (*gram sabhas*), which tackle a range of issues through collective decision-making, have played a crucial role. Gaining trust took many years, but the sense of ownership towards the resource engendered by the Arvari *Sansad* has enabled inclusive participation. But there have been challenges. The Arvari *Sansad*'s rules have no legal authority. TBS has replicated its approach in a number of areas – such as Nimbi, near Jaipur. There, similarly, the construction of a reservoir resulted in a new source of fish. The fisheries department gave the fishing rights to a contractor; after a public outcry, however, the contract was suspended.

The Arvari river represents one of the best examples of holistic river management in South Asia. The implications for transboundary river management are readily apparent. In parallel, at least, with discussions about water flow volumes there should be discussion of water consumption.

The third observation was that successful projects **focus on the right objectives**. Some assessments of success appear to use the wrong criteria. So, for instance, success can be seen as ensuring that consumers pay for access to water, or in terms of having effective community participation. But these are means to an end, not the end in itself. Judgments of success are frequently made immediately following the project's initial execution. There is rarely follow-up to ensure that projects continue to succeed. Sometimes the key issue relates direct to water: for instance, whether a particular project has led to households receiving a supply of clean water over the long term. In other cases, the right objective would link water with some other issue.

Ensuring that the focus is on the correct outcome helps ensure that projects are successful. In the case of sanitation, for instance, the outcome should not be that sanitation facilities have been constructed. Instead, the outcome should be that open defecation is stopped. Those projects that focus on the former frequently end up with infrastructure in disrepair and disuse. Focusing on the latter outcome involves a more holistic approach, requiring public education in health and in the maintenance of the new facilities. Related to this is the problem of unsustainable supply chains. Simple solutions that can be maintained by the community are often preferable to more technologically advanced solutions that – if they break down – are likely to remain in disrepair.

While this may not be directly related to transboundary water disputes, an argument could be made that the 'outcome' of current transboundary debates is a volume of water. To take Bangladesh as an example, perhaps the outcome should not necessarily be that Bangladesh should receive a certain amount of water but that it is, for instance,

self-sufficient in food, that floods are contained, that the environment is protected, and so forth.

Fourth, in many cases in which projects have been scaled up, **the 'demonstration effect' is of great importance**. This is evident from both urban and rural projects. That any Indian city, for instance, can have a 24/7 water supply will increase the likelihood of replication in other cities. In rural areas, similarly, getting community support to renovate local water infrastructure such as ponds or tanks is easier in the second and third villages than in the first. Gaining community buy-in for the pilot project presented a challenge to many water projects in both rural and urban areas. Often local communities were sceptical of motivations, particularly in the case of government-led projects.

Conversely, a problem apparent throughout South Asia is a tendency to export ideas or processes that have worked in one location to another area where a different culture or political economy means that the success may not be replicated. While the demonstration effect of a pilot project is essential in those projects that will rely on local communities for future maintenance, even organizations that have expanded their work to cover a large area still require the replication of labour-intensive strategies to gain community support for each particular project.

Some cross-border water projects are in the pipeline between India and Nepal, but most have been mired in delays. The most obvious example of cross-border cooperation would be that between India and Bhutan. But while many interviewees in Nepal expressed their interest in understanding the success of that relationship and the potential lessons for Nepal, others were sceptical of its relevance as a model for Nepal, given Bhutan's closer political relationship with India.

Fifth, **upstream and downstream communities can create win-win situations**, although this approach is clearly absent from transboundary water debates. None the less, examples exist to show how innovative thinking can create such situations. Sukhomajri, near Chandigarh, became the model for community participation in development projects, and highlights the positive benefits that can occur between upstream and downstream users who intend to use water for different purposes. In this case, the upstream users needed water for irrigation; the downstream users wanted clean water for a lake. The dialogue involving the two sets of users, coupled with the provision of economic incentives, led to a constructive outcome for both.

In 1974 sedimentation was becoming an increasing problem for the Sukhna lake in Chandigarh. The major source of sedimentation was traced to the village of Sukhomajri

and its surroundings. Further research found that the 52 hectares of agricultural land around Sukhomajri were rain-fed, enabling single cropping. Landholdings were small and crop failures frequent, and villagers became dependent on animal husbandry. Goats and cows freely grazed the nearby hills; and years of overgrazing meant that hill slopes were denuded, escalating the issue of soil erosion. Persistent requests for villagers to cease grazing cattle and cutting vegetation were ignored.

Recognition of the need for a deeper engagement with the villagers revealed their aspiration for a supply of water. As a result, four earth dams were constructed between 1976 and 1985. When the benefits from the watershed started to accrue to the villagers, the Central Soil and Water Conservation Research and Training Institute (CSWCRTI) team which oversaw the project made a number of deals with them, the main one being that in return for the water they would stop grazing their animals. As well as constructing trenches and check dams, the team replanted overgrazed areas with trees and grass. The villagers were persuaded to use dead wood for fuel, rather than the new trees. Social fencing thus allowed villagers to reduce their dependence on unsustainable grazing practices, and agricultural productivity rose dramatically – wheat by 120 per cent – following the provision of water for irrigation, as did the milk yield.

In 1979 the Water Users Association, later the Hill Resource Management Society (HRMS), was registered. Local people took over the sale of grass (used in paper mills) from private contractors. This income, along with a share of revenue from timber, was reinvested by the HRMS in maintenance of the dam and its pipelines. Local farmers paid fees for water from the pond.

The whole process was not without challenges. These included a lack of communication between locals and forest departments, as well as the lack of legal authority for local people. But overall there was clearly a success. Previously, local land users who had been primarily concerned with the daily struggle for survival had not perceived soil and water conservation as being an immediate priority. After initial failed attempts to conserve water and de-silt water resources through mechanical and technical solutions, the focus shifted to providing immediate and direct economic benefits to local people to meet their basic needs. These benefits provided momentum for conservation efforts.

The notion of water as a common-pool resource became implicit in a number of other similar projects. This requires agreement to be reached regarding the sharing of forest produce, the allocation of irrigation water and other joint management activities.

The challenge or constraint is now, perhaps, the sustainability of land and water resources, given urbanization and the growth of Chandigarh. The state government of Haryana currently plans to build a township near Sukhomajri, potentially diverting to the new urban centre water that currently irrigates the fields of Sukhomajri. Increased water availability led to the introduction of a two-cropping system; greater use of fertilizers and pesticides has led to land degradation and affected groundwater quality. Input costs for agriculture are increasing, putting pressure on profit margins; this in turn leads to a focus on more water-intensive commercial crops, which can speed up land degradation.

Sixth, the examples of Sukhomajri and the Arvari river both demonstrate that **initial success does not prevent future difficulties**. Changes to the local political economy can create new areas of tension between communities. In areas with caste or religious tensions, spreading the benefits across communities is imperative. Local power relations can determine whether a successful project creates a virtuous circle – in which neighbouring communities demand replication – or a vicious circle in which they attempt to extract rent from a neighbouring community that is benefiting from a new resource. The fact that governments have legal rights over water resources such as rivers has frequently led to conflict between state institutions and local communities responsible for restoring or constructing infrastructure.

This highlights the need for agreements to be revisited in the light of changing political, economic or environmental developments. In relation to transboundary treatments or agreements numerous respondents across country criticized the lack of genuine arbitration clauses, the fact that they could not be upgraded and the defined time-frame. In Nepal the concern was that the period of some treaties with India was too long (one agreement lasting for 199 years). In Bangladesh, by contrast, concern was expressed that the period covered by the Ganges Water Treaty was too short (just 30 years). While this may reflect divergent concerns between upstream and downstream riparians, it may well be that there is no ideal time-frame, but building in some flexibility while providing some guarantees seems imperative.

Seventh, **political discourse and water management are disconnected**. Politicians politicize water to attract votes. This may involve attempting to create community solidarity by blaming an external community for lack of water, or it may involve attempting to win votes by offering free electricity. In India in particular, politicians across the country and from different parties promise free power to farmers, despite all evidence suggesting that this is unsustainable and will lead to a lowering of the water



table. But in the short term, free access to water allows for the cultivation of water-intensive cash crops that bring higher incomes. In the longer term, as groundwater levels fall, more power is required to pump water. Evidence of politicians blaming an absence of water on a neighbouring country – or, within the country, on a neighbouring state or province – is widespread across South Asia. The existence of this disconnect presents perhaps the greatest obstacle to better transboundary water relations in South Asia.

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