



CONTESTED WATERS

SUBNATIONAL SCALE WATER CONFLICT IN PAKISTAN

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INSTITUTE OF PEACE

ABOUT THE REPORT

Based on interviews with decision makers and communities at the provincial, municipal, and village watercourse levels, this report reviews the evidence for water-related conflict at local, provincial, and interprovincial scales in Pakistan. It shows how water—a precious, unique, and finite resource—is not only contested in itself but also drafted as a weapon in conflicts over caste, ethnicity, and political allegiance. It explores competition for water between upstream and downstream provinces, controversy over large dam projects, conflict between fishing and farming communities in a degraded water environment, and conflicts related to irrigation and flooding. It also suggests technical, institutional, and political changes that could help negotiate Pakistan's water-related conflicts and promote a more inclusive and sustainable development path.

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Cover photo: Sukkur Barrage, Sindh Province, Pakistan. (Photo by Giovanna Gioli, © 2015)

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Peaceworks No. 125. First published 2017.

ISBN: 978-1-60127-649-0

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PEACEWORKS • APRIL 2017 • NO. 125

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[Water is life, and life is embedded in politics and culture. It is essential that beyond water's simple material value, its politically and culturally mediated values are acknowledged in water management.]

Summary

- In Pakistan, conflict over water distribution between provinces (upper versus lower riparian) is driven by structural constraints inherent to upstream-downstream dynamics and by the specific geophysical characteristics of the Indus basin system.
- The controversy over large dams is less about water per se than about competing visions of development, and about the scale (national versus local and regional) at which politics are practiced and problems defined.
- Since the inception of the Indus basin irrigation system, what places get flooded and when has been a function of human decisions and power relations and not an inevitable act of nature.
- Early warning and flood-proofing initiatives should be directed to the most highly exposed and vulnerable populations, instead of undifferentiated administrative units, to prevent the hazard from turning into a disaster.
- At the community level, water is more an instrument of conflict than a driver of conflict—that is, it is used as a weapon in conflicts about political allegiances, family, caste, etc. The state often serves as an enabler for more powerful actors, through acts of omission and commission.
- Development in Pakistan needs to take into account livelihoods not related to agriculture. Ill-conceived development around Manchar Lake to benefit agriculture destroyed an entire system of livelihood and fostered conflict between agriculturists and fisherfolk.
- The commodification of water in Karachi and other urban areas precipitates conflict along class, ethnic, and caste lines. People unable to afford high prices for water through tankers or suction pumps often engage in violent conflict to access water.
- Addressing water conflict requires acknowledging water's politically and culturally mediated values and not just its economic value. Technocratic engineering engagement with water conflict is not enough; political engagement is also necessary.
- Water conflict is partly a manifestation of people's attempt to claim legitimacy for their experiences within local environments against the encroachment of national scale imperatives.

Introduction

Conflict over water is often deemed a foundational global threat in the post–Cold War era. Where states and societies once fought over territory, ideology, and resources, the thinking goes, they will increasingly engage in conflict over the most precious of resources—water. South Asia in general and Pakistan in particular are often said to be at risk from water-related conflict. There is a sense that water-related conflict is inevitable and will be driven either by climate change (where biophysical changes will make water more scarce) or by rapid increases in population (where water becomes more scarce as more people compete for it). This report will show that water conflict arising under either of these two scenarios is not inevitable. Instead, focusing on the experience in Pakistan, it will argue that there is little historical evidence for interstate water wars and that conflict over water tends to occur at the subnational scale.¹ The report will further argue that conflict over water at the subnational scale is socially and politically mediated, and that in Pakistan, it must be understood specifically at the local and interprovincial scales.

Water conflict is nested within processes operating across local, interprovincial, national, and at times international and global scales.² Signature large dam construction projects in Pakistan, for example, are framed by proponents as national projects that benefit the entire country, while opponents tend to raise provincial scale questions of equitable access to water and local scale questions concerning ecological integrity and livelihoods. In the same vein, access to domestic water may be an issue at the local scale of streets and neighborhoods, but it can also be framed as an issue at the provincial and national scales relevant to politics and governance, ethnic identity, and economic development, especially with reference to the commercial hub of Karachi.

Five case studies anchor the larger argument of the report. At the mesoscale is the case study of interprovincial water conflict (in the chapter entitled “Water Patriotism”). A second case study looks at conflicts arising from flood management in Pakistan (“Floods in Pakistan”). At the purely local scale are case studies of surface water- and groundwater-based irrigation conflicts in Punjab (“Irrigation Conflicts in Punjab”), the conflict between fisheries and agricultural interests in Sindh (“Farmer–Fisherfolk Conflict”), and, finally, conflicts arising over domestic water supply and (to a lesser extent) sanitation in Karachi (“Conflict over Domestic Water Supply”). As we elaborate upon each case study, we will show how the strands of the conflicts often link across geographical scales. For most people, local water conflicts are of more concern and relevance than international. The report aims to contribute to an understanding of the security implications of water availability and the reality of water conflicts at the subnational scale, drawing on Pakistan as a specific case.

The findings presented in this report are based upon a series of interviews conducted with water professionals, political leaders, community groups, activists, and other stakeholders in the water sector of Pakistan. The interviews complied with the King’s College London code of ethics governing research with human subjects. We obtained informed consent, maintained confidentiality with the subjects unless specifically released from that obligation by the subject, and avoided putting subjects in harm’s way. Some though not all subjects were anonymized for citation in this report, according to the permissions granted by them. Given the exploratory nature of the topic, the interviews were largely free-flowing; the researchers explained what they were working on and then let the respondents take the conversation where they wanted.

Water conflict is nested within processes operating across local, interprovincial, national, and at times international and global scales.

The researchers followed up on pertinent points, but the overall intent was to allow the respondents to highlight any aspects of the research problem that were not covered by prior research or knowledge.

Water and Conflict

Water is a nonsubstitutable and indispensable resource, and hence a highly contentious one. It presents three complex issues that are difficult to resolve: the competition between multiple users and uses of water resources, the balance between the multiple scales at which water is managed, and the mismatch between political-administrative borders and hydrological boundaries.³ Water research thus abounds with contributions on conflicts and cooperation, ranging from intersectoral domestic disputes over water use to interstate confrontations revolving around water. The availability, accessibility, and allocation of fresh water resources became increasingly important considerations in research and policy debates in the 1990s, when a new branch of security studies started to fill the intellectual and ideological void that opened up at the end of the Cold War.⁴

In the new geopolitical context, and as a result of increasing awareness of global environmental change (climate change, resource depletion, environmental destruction, etc.), one strand of political science shifted its attention to the role of natural resources and the link between environmental scarcity and violent conflict.⁵ In spite of substantial conceptual flaws, research on environmental security and resource conflicts proliferated in the 1990s. Given its fundamental value for all forms of human activity and economic prosperity, water took center stage in the unfolding academic and public debates about resource scarcity, and decision makers around the world began to speculate about the conflict potential of a finite resource facing decreasing supplies and increasing demands. The link between water and conflict was acknowledged to be primarily *political* (as opposed to military), but analyses were generally restricted to questions of water access and use at the international or national level and were hence linked to questions of national security.⁶ The prospect of “water wars”—armed conflicts between sovereign nation-states sharing a common freshwater source triggered by competition over scarce water resources—captured people’s imagination and became the subject of myriad books and articles at the time.

However, a large body of systematic comparative and statistical research has convincingly disproved the water wars hypothesis.⁷ It shows an absence of armed conflict over water resources, and effective institutional and legal arrangements (such as river basin organizations and water-sharing treaties) governing the distribution and use of transboundary river flows. Serious scholarship has accordingly shifted to studying the more subtle dimensions of transboundary water “interactions,” particularly the power asymmetries between riparian states that may result in unequal water allocations between them.⁸ In hegemonic political contexts, it is more often the soft power of persuasion implicitly backed up by superior military and economic power, rather than pure military or economic hard power, that allows the basin hegemon to determine the outcome of water negotiations in its favor.⁹ The effects of climate change on water resources have recently renewed interest in the conflict potential of water, and while major studies have not been able to establish a causal link between climate change, water resources, and violent conflict, some do point out that the absence of water wars in the past does not rule out their occurrence in a future characterized by significantly different climatic conditions and strained resources.¹⁰

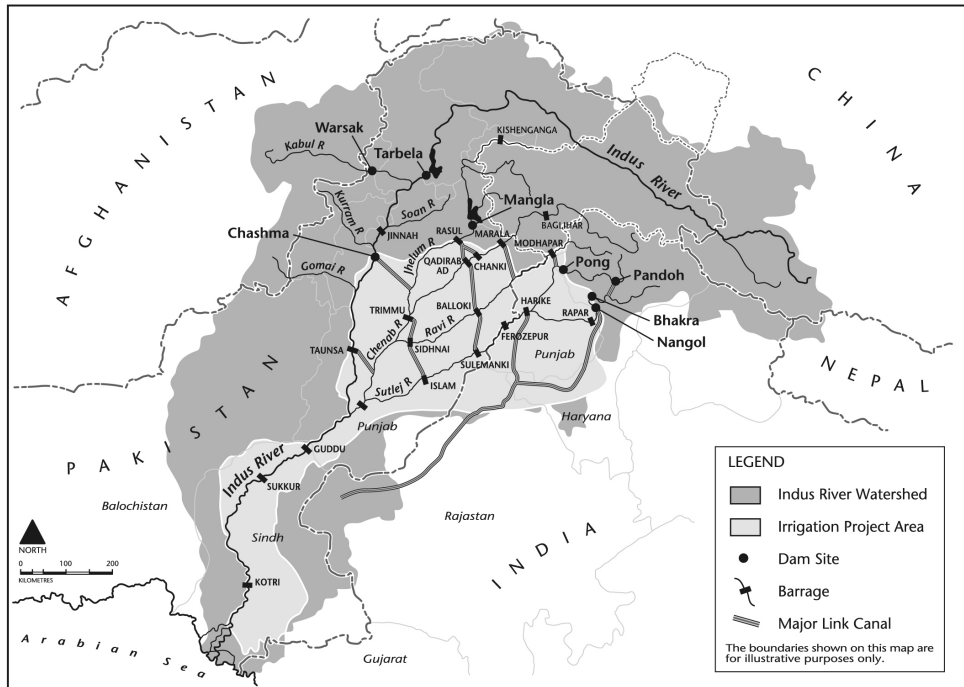
Insightful and significant though much of this research may be, it has been mostly state centered. Increasingly, however, intrastate dimensions of water-related conflict are being addressed in the context of climate change.¹¹ While international water treaties determine resource access and allocation between nations and hence necessarily affect the overall water availability within nations, aggregate measures at the national level generally obscure the differential distribution of water within nations and even communities. The structures and mechanisms that mediate water distribution at the subnational level are generally not contingent upon international treaties, but are shaped by internal power relations and the domestic political economy and legal-institutional frameworks.

The Hydrology of Pakistan's Indus Basin

The water system in present-day Pakistan has been modified profoundly by human action over the millennia. Pakistan is one of the most arid countries in the world and derives almost all of its water supply from a single source—the Indus River system (see figure 1). The Indus River basin covers a drainage area of approximately 1,137,819 km² between the Tibetan Plateau and the Arabian Sea, the largest portion of which is located in Pakistan (60 percent), with substantial upstream parts in India and minor ones in Afghanistan and China.¹² About 228,694 km² (21 percent) of the basin area is irrigated, of which 60.9 percent is located in Pakistan and 37.2 percent in India. The river system consists of the main stem of the Indus River proper and several tributaries, chief among which are the Kabul, Jhelum, Chenab, Ravi, Beas, and Sutlej Rivers (in descending order from northwest to southeast). Within Pakistan, the province of Khyber Pakhtunkhwa (KP) and the territories of Gilgit-Baltistan and Azad Kashmir are upper riparians, while Punjab Province is a middle riparian, and Balochistan and Sindh are lower riparians.

Glacier melt, snowmelt, and rainfall supply the rivers, whose combined annual water flows amount to 207 km³ and enable habitation and agriculture in large parts of the predominantly arid and semiarid basin. Precipitation ranges from 392 to 461 mm per year and is highly unevenly distributed both spatially and temporally; almost 80 percent of the rain falls during the summer monsoon season from July through September. In addition to these surface water resources, there are substantial groundwater resources stored in an extensive unconfined aquifer underlying the basin and covering an area of sixteen million hectares, six million of which are fresh groundwater and ten million of which are saline.¹³ About 64 percent of the land in the irrigated Indus basin has sweet groundwater fit for agricultural and domestic use. The remaining 36 percent, predominantly in the lower basin and in the interior *doabs* (interfluves) between the main rivers, has saline groundwater, although some pockets of saline groundwater are scattered across fresh groundwater zones. In downstream Sindh, more than 80 percent of the groundwater is saline, making the province almost completely dependent upon surface water supplies for irrigation and—in rural areas—for drinking water. In fresh groundwater zones, largely located in Punjab Province, groundwater has been the major source of irrigation since the advent of tube wells in the 1960s, providing 80–100 percent of crop water requirements in certain areas today.¹⁴

The estimated long-term surface water availability across the Indus River basin lies between 194 and 209 million acre-feet (MAF), of which 142 MAF are extracted in Pakistan.¹⁵ Pakistan's average renewable water availability is about 154 MAF, of which 45 MAF derive from groundwater.¹⁶

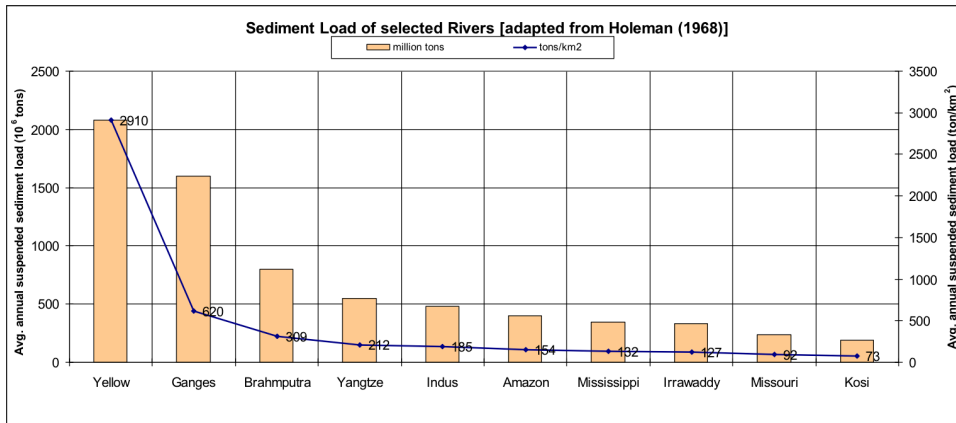
Figure 1. The Indus River Basin and Its Major Infrastructure

Source: Kings College London, Department of Geography, © 2017.

The Indus River is the largest river in the basin. It also has some of the highest silt loads in the world (figure 2), mostly because it drains one of the youngest mountain systems in the world, the Himalayas, Karakoram, and Hindu Kush ranges. The high silt loads in the Indus system contribute to (1) the rapid silting of any reservoirs on the rivers; (2) the aggradation of river channels in case of flow restrictions or river engineering, which accentuates high floods; (3) the need for precision engineering and maintenance of the canal system for constant slope in the canals to prevent erosion or aggradation of the channels; and (4) the provision of fertile alluvium to the plains through seasonal flooding that maintains the land's productivity. While the middle and lower reaches of the Indus River system are amenable to the type of surface irrigation developed there, the upper mountainous regions and highlands largely depend upon rain-fed agriculture. The lower basin, largely in Sindh Province, faces issues of drainage because of its very gentle slope; we will elaborate upon this issue in the case study of the fisheries versus farming interests ("Farmer-Fisherfolk Conflict").

The existing surface irrigation system is physically quite inflexible. The canals with constant slopes are designed such that they can be operated only within a limited envelope, typically within 10 percent above and below their official safe design capacity. Too much water could breach the canal, while too little water could choke the canal with silt deposits. The fine balance between erosion and deposition is possible only within that envelope. This physical limitation is compounded by farmers' increasing claims on the state with regard to their fixed-time water turns, resulting in intense pressure on water managers in the system to balance their demands and operate the system within limited parameters. These simple physical and institutional limitations perhaps more than anything else lead to the pattern of behavior on the part of

Figure 2. Comparative Silt Loads of Top Silt-Carrying Rivers of the World



Source: John N. Holeman, "The Sediment Yield of Major Rivers of the World," *Water Resources Research* 4, no. 4 (August 1968): 737–47.

water managers in the basin that we discuss in the chapters on floods and micro-scale irrigation conflict.

Outside of the Indus basin, largely in the deserts and highlands of Balochistan, populations tend to depend upon flood harvesting or spate irrigation. Spate irrigation depends upon channeling seasonal flash floods by check dams to get enough moisture in the land for one or two crops. The system has high inherent uncertainty, however, and is increasingly under threat from formalized land property regimes (which are replacing the flexible land ownership required for such a system) and from out-migration and the consequent labor shortage.¹⁷

The highlands of Balochistan are also characterized by their dependence upon the Pishin-Lora aquifer for agriculture. The aquifer was historically tapped only passively through the intricate *karez* irrigation system.¹⁸ However, not only has the aquifer been tapped at unsustainable rates since the advent of the electric tube well, but the intensive use of the aquifer is also generating new water conflicts.

Climate change is beginning to put additional stress on Indus basin water resources. The Indus River originates in the Himalayas, and up to 80 percent of the basin's total average river flows are fed by snowmelt and glacier melt in the Hindu-Kush-Karakoram mountain range. As a consequence, streamflows in the basin will vary with changes in summer temperatures (which affect glacier melt volume) and winter precipitation (which determines seasonal snowmelt runoff volume), and to a lesser degree with variability in monsoon rains in the plains.¹⁹ In spite of the notorious uncertainties in climate change assessments in general and predictions for the hydrological regime of the Indus basin specifically, the possible impacts of climate change on water resources and agricultural livelihoods are of paramount importance for Pakistan's political economy and water security.²⁰

Basics of Water Governance

Pakistan is a parliamentary democracy composed of four constitutionally federating provinces. The four provinces, ranked in terms of their population and economic strength, are Punjab, Sindh, KP, and Balochistan. Pakistan also includes the Federally Administered Tribal Areas, the federally administered territories of Gilgit-Baltistan (which were given the status of a

province with a provincial assembly in 2009, but which have no representation and no voting rights at the federal level), and the semiautonomous region of Azad Jammu and Kashmir, which comprises the Pakistani-administered part of the former princely state of Jammu and Kashmir. Water management was designated as a provincial subject in the currently operative constitution of 1973. But the federal government of Pakistan has maintained an influential role in water management through the Water and Power Development Authority (WAPDA), an autonomous government agency formed in 1958 to oversee the construction and operation of large-scale water storage and infrastructure projects of national interest. The federal government further maintains an active role through the Permanent Indus Commission, which administers the Indus Waters Treaty signed with India in 1960.²¹ The treaty allocated the flows of the three eastern tributaries of the Indus River—the Ravi, Sutlej and Beas—to India. The flows of the three western rivers were in turn allocated to Pakistan.²² The federal government is furthermore an arbiter for interprovincial water allocations under the Inter-Provincial Water Accord of 1991. The Islamabad-based Indus River System Authority (IRSA) administers any conflicts between the provinces that may arise out of the accord.

At the provincial level, the main agencies responsible for water management are the provincial irrigation departments. Each province also has a public health engineering department overseeing rural water supply as well as water and sanitation agencies overseeing urban supply. Karachi's main water agency is called the Karachi Water and Sewerage Board (KWSB), but it has the same line of reporting as the water and sanitation agencies in other major cities. In addition, the provincial fisheries departments oversee the inland freshwater and marine fisheries within twelve nautical miles of the coast. Fisheries within Pakistan's Exclusive Economic Zone (extending two hundred nautical miles from the coast) fall under the jurisdiction of the federal government. The provincial agricultural departments also play a role in water management through their on-farm water management units, which provide farmers with water management resources and technical assistance.

These formal water management and governance structures are now increasingly being matched at the federal and provincial level by a growing number of vocal civil society organizations. Examples include the Pakistan Fisherfolk Forum, which advocates for the mostly poor and highly vulnerable fisher communities in the country. The Fisherfolk Forum is joined by Karachi-based Shirkat Gah, which advocates for gender rights in southern Pakistan's mangrove and delta environments. The Farmer Association of Pakistan, an organization of generally more prosperous farmers that is mostly active in Punjab, is an advocate of large dam construction, especially the Kalabagh Dam. On the technocratic side, the Farmer Association is joined by the Pakistan Water Partnership, which is dominated by former WAPDA and provincial irrigation department officials, and advocates vigorously in favor of large dams and other water engineering projects. This cast of big players is also joined by the leftist Damaan Development Organization, a southern Punjab-based group that advocates for cultural and ecological integrity in new irrigation development projects in southern Punjab. Many of the international donor- or corporate-funded nongovernmental organizations—such as the Hisaar Foundation, Sustainable Development Policy Institute, LEAD Pakistan, World Wide Fund for Nature, and International Union for Conservation of Nature—are also inserting themselves into national water debates, largely on the side of demand management and conservation.

International agencies such as the World Bank and the Asian Development Bank have historically funded large infrastructure projects in Pakistan. However, over the past two decades they have also been supporting initiatives on institutional change, financial sustainability, and

participatory water management. It is largely thanks to the World Bank's pressure that many irrigation canals in Pakistan have been handed over to farmer organizations for administration, which is a move away from the historic bureaucratic management of the irrigation system. Other international actors, such as the International Food Policy Research Institute and the International Centre for Integrated Mountain Development, have also supported action research on sustainable water-based livelihoods, basic hydrometeorological systems, and climate change.

Structure of the Report

The remainder of the report addresses the politics of water at different geographical scales. In particular it contrasts hydro-politics at the national scale with regional and local scale politics articulated through conflict over water.

The next chapter ("Water Patriotism") focuses on interprovincial water conflict and controversies over large dam projects. It looks at the Kalabagh Dam conflict between Punjab and Sindh, as well as other water distribution conflicts between Punjab and Sindh, between Punjab and KP, and between Balochistan and Sindh.

The third chapter ("Floods in Pakistan") examines the history of conflict between Punjab and Sindh over flood management. We will argue that the rhetoric used in this interprovincial conflict over floods mirrors the nationalist rhetoric criticizing India for floods in Punjab. The chapter also addresses local level conflicts around flood management within both provinces.

In the fourth chapter ("Irrigation Conflicts in Punjab"), we discuss water conflict at the microscale of minor irrigation canals, village watercourses, and farm gates. The chapter reviews the geography and history of the Indus basin irrigation system, and examines the structural conditions—institutional and physical—that enable water conflict at the local level. We find that water is often an instrument of conflict in the Indus, rather than a driver of it.

The fifth chapter ("Farmer-Fisherfolk Conflict") moves beyond irrigation-related water conflicts between farming communities to focus on conflict between the highly vulnerable and marginalized inland fisher communities and the culturally and economically dominant farming communities in the lower Indus basin. The case study of Manchar Lake in Sindh illustrates how issues of equity, social justice, environmental quality, and development converge in fisherfolk's struggles to earn a livelihood and gain access to basic amenities such as drinking water.

The sixth chapter ("Conflict over Domestic Water Supply") looks at water conflict in the rapidly growing urban centers of Pakistan. The case study of the megalopolis of Karachi highlights two themes: the de facto privatization of domestic water supply, and the power politics around water that drive conflict over (and through) it. The key argument of the chapter is that all the fault lines of ethnicity, language, gender, and class intersect in conflicts over and through water in the largest city of Pakistan.

The report concludes by offering some key insights to emerge out of the survey of water and conflict undertaken across geographical scales in Pakistan. The conclusion emphasizes the complexity of the forces at play in water and conflict but also cautions against despair in the face of that complexity. Material shortages contribute to water conflicts, but they are fundamentally an outcome of human institutions and politics and not of some absolute natural scarcity. The conclusion therefore calls for an engagement with water conflict in political terms instead of only technocratic engineering terms.

Material shortages contribute to water conflicts, but they are fundamentally an outcome of human institutions and politics and not of some absolute natural scarcity.

Water Patriotism: The Case of Interprovincial Water Conflict

“All those against Kalabagh dam, I say are Traitors! Traitors! Traitors!”
 —President of the Lahore Chambers of Commerce and Industry,
 April 3, 2015, Lahore

It is impossible to have a rational debate on the Kalabagh Dam, or any large dam, in Pakistan. The debate has long been dominated by engineering hubris and doctrinaire nationalism. Proponents of the dam hold that “real” Pakistani Muslims (preferably Sunni, Punjabi, male) must be in favor of this most iconic of the large dam projects. If they are not, they are lacking in patriotism.

This chapter reviews the large-dam controversy as one aspect of the larger conflict over water between upper and lower riparian provinces. But it also moves beyond the long-running debates between Punjab and Sindh to touch upon ongoing controversies between other provinces on issues such as royalties for hydroelectricity and irrigation water allocation. We begin by outlining the physical context for the water policy debates, followed by the historical context of those debates, with a particular focus on the history of interprovincial politics. We discuss inter- and intraprovincial water distribution, along with ancillary water-related conflicts between provinces. We then look more closely at the Kalabagh Dam controversy as emblematic of interprovincial water politics and explore how water is tied to questions of identity, nationalism, and notions of development. We conclude with a discussion of possible future scenarios.

Physical Context for Interprovincial Water Debates

Beyond the general physiographic outline offered in the introduction, it is important to note that Pakistan’s population concentrations are primarily in the Indus basin, which is bounded by the Pir Panjal range and the Kashmir valley in the north, the highlands of KP in the northwest, the Suleiman range in the southwest, and the Ganges River basin and the great Indian desert of Rajasthan in the east. The semiarid Indus basin was historically home to settled riparian farming communities and then mostly agro-pastoralist communities in the interfluvies of the six rivers. Physiographically as well as culturally, the Indus forms the boundary between South Asia (or the Indian subcontinent) and central and western Asia—even though politically the provinces of KP and Balochistan are part of Pakistan, which is culturally, linguistically, and geographically a South Asian country.

The western-most Indus River bed has the highest elevation in the six-river system. After the water from the three eastern tributaries was awarded to India under the Indus Waters Treaty, the World Bank along with a consortium of Western donors funded the construction of link canals (shown in figure 1) to transfer the water from the three higher-elevation western rivers to the lower eastern rivers as they entered Pakistan; the goal was to compensate for the water used by India. As we will discuss later in the chapter, the operation of those link canals, and particularly the Chashma-Jehlum link canal, has become part of the controversy between Sindh and Punjab.

Another important aspect of the physical context is the varying strength of monsoon rains in Pakistan: they are strongest in the northeast and weaker in the south and west. Thus in the latter areas, populations depend more heavily on Indus River water than they do in the former.

Lastly, it should be borne in mind that the Indus River system has always had rich fisheries, particularly in its deltaic environment. Hundreds of thousands of people continue to depend upon the fisheries of the river for their protein intake. The high silt loads of the river have helped to form a complex deltaic environment; but as more water is diverted upstream for

irrigation, and with two of the rivers dammed, the silt supply to the delta has been reduced, resulting in substantial coastal erosion. Coastal erosion and salt water intrusion are expected to get worse under future climate change scenarios in which sea level rises, threatening the livelihoods of the coastal communities as well as important infrastructure in Pakistan's largest city, Karachi.

Interprovincial Relations in Pakistan

Interprovincial relations in Pakistan form an important context for understanding interprovincial water debates. Since Pakistan's independence in 1947, interprovincial relations have been marked by political, economic, and cultural contest. From the outset, the country emerged as a centralized state run by an unelected political elite and bureaucracy. The unrepresentative state institutions and the lack of mechanisms to articulate political demands—the first general elections did not take place until 1970—left provinces, and the ethnic groups living within them, disenfranchised. The result was an enabling environment for adversarial ethno-nationalist politics.

Explaining why power was concentrated in Pakistan's central government is beyond the scope of this report. However, it is important to mention that interprovincial mistrust and the grievances of provinces against the center and each other arose because the provinces were denied political agency. Punjab, Sindh, KP, and Balochistan retained their distinct political and cultural identities even during British colonial rule, but all four provinces were merged into the "One Unit" of West Pakistan in 1954, depriving them of their autonomous status and a voice within the federation of Pakistan that they enjoyed as of August 1947.²³

Central government leaders claimed the One Unit policy was needed to ensure that East Pakistan, home to 55 percent of the country's population, would not dominate in a decentralized federal system. However, the policy of a strong center did not work. The Bengali nationalist movement, which eventually led to the separation of Bengal from Pakistan in 1971, drew its legitimacy from the state's unjust economic policies and denial of cultural identity to Bengalis. The One Unit was dissolved in 1970, a little too late to avert the debacle in East Pakistan. It did, however, allow the smaller provinces a voice within the federation that had been denied to them as part of the One Unit of West Pakistan.

After the secession of Bangladesh in 1971, Punjab became the most populous province and came to dominate the politics of the country. Its influence was partly due to the fact that government bureaucracy and military leaders disproportionately came from the province. Today, the ethno-nationalist elements within Punjab and other provinces echo the Bengali bitterness and sense of grievance against the domineering Pakistani nationalist narrative:

We [Sindhis] have been a nation for a very, very long time, much before anybody had ever heard about Pakistan. We have been Sindhis for thousands of years, and we have been living as an independent nation for the longest...[Pakistan] is an unnatural country. In the world there are two countries made in the name of religions, Israel and Pakistan. In the world there is no conception of religion-based countries. Religion-based countries are unnatural, anachronistic, and unscientific. Why do we have 40 Islamic countries? Why aren't they together? (A Sindhi nationalist leader, April 23, 2015)

Comparable sentiments are echoed by ethnicities within Punjab as well, e.g., the Seraiki intellectuals in southern Punjab:

Have you ever met a person who was a Pakistani before 1947? Nations of Pakistan are a very relevant issue. Before Pakistan it was Sindh, Balochistan, Pakhtunkhwa, and so on. We were the people who were here before Pakistan. (Masroor Kareem, Seraiki nationalist, April 28, 2015)

Sindhi and Pashtun ethno-nationalisms started gaining currency because the groups felt a sense of powerlessness and deprivation. G. M. Syed, an iconic Sindhi political leader who was part of the Muslim League and who supported the Pakistan Movement, became disillusioned with Pakistan and started voicing secessionist political views as early as the 1950s. He argued that the Pakistani state had become a Punjabi state whose interests trumped the rights of the other provinces.²⁴

In Balochistan the situation is more extreme. Since 1947, the province has witnessed five secessionist nationalist movements and insurgencies and as many military operations. Some political groups in Balochistan, where the anti-Punjab sentiment runs deep, have never accepted Pakistan; they maintain that Kalat state, an independent Baloch state that had an independent pact with the British Crown in London and not in Delhi, was forcibly annexed by Pakistan.

The founding party of Pakistan, the All India Muslim League—later the Pakistan Muslim League (PML)—was appropriated by the politico-military elites to become a party of the establishment and the political right. That legacy continues with all the factions of the PML. The PML's core support is in Punjab Province, with regional factions catering to conservative or opportunist constituencies in all four provinces. The Pakistan People's Party, the country's left-of-center party, initially had its core support in Punjab, but it has gradually ceded much of its political ground to PML-N (the Nawaz group led by the sitting prime minister Mian Muhammad Nawaz Sharif), and after the 2013 elections it was left as a party of rural Sindh. Besides these two mainstream parties, there is now the right-wing Pakistan Tehrik-e-Insaf, which appeals to the middle class in mostly urban areas of Punjab, KP, and Sindh. While the Pakistan People's Party has maintained a studied ambivalence on interprovincial water issues, the PML has been a vocal proponent of Punjab's views. The Pakistan Tehrik-e-Insaf has also remained ambivalent, but conversations with its representatives suggest that it is keen to undertake large water development projects.

Almost all the ethno-nationalist parties—e.g., Awami National Party, Jeah Sindh Qaumi Mahaz, Pakistan Taraqqi Pasand Party, Balochistan National Party, and Pakhtunkhwa Awami Milli Party—are on the left of the political spectrum and against large dam projects and in favor of the positions of the smaller provinces. The right-wing parties—e.g., the Jamaat-e-Islami and Jamiat-e-Ulema-e-Pakistan—generally support the central government and Punjabi arguments in favor of large dams. The Mutahida Qaumi Movement, the center-left party of former migrants from India that dominates urban Sindh, is against large dam projects out of solidarity with the province, though its position could change if its relationship with the larger Sindhi polity undergoes a major change.

In the absence of democratic and federal institutional frameworks, interprovincial conflicts and ethno-nationalism have been left to metastasize. The political parties mentioned here are the medium through which many interprovincial tensions are articulated. Passage of the eighteenth amendment, which gives more autonomy and resources to provinces and which represents a big step toward substantive federalism and democracy, indicates that a change is under way.²⁵ But the mistrust between the provinces is deep-seated and still unaddressed.

In the absence of democratic and federal institutional frameworks, interprovincial conflicts and ethno-nationalism have been left to metastasize.

Historical Antecedents of Interprovincial Water Conflict

Conflict between the downstream province of Sindh and the upstream province of Punjab over water diversions from the Indus River system is rooted in the irrigation system developed by the British colonial authorities in the late nineteenth and early twentieth centuries. As the irrigation

system expanded, primarily in the Punjab, there was growing unease in the lower basin over diminished flows into Sindh, which until 1936 was part of the Bombay Presidency. As it was separated from the larger presidency, Sindh found its own voice against irrigation diversions.²⁶ In 1945, prior to independence, Sindh and Punjab signed an accord that gave 75 percent of the water of the main stem Indus River to Sindh and the remaining 25 percent to Punjab. For the eastern tributaries of the Indus River, 94 percent of the water was awarded to Punjab and 6 percent to Sindh. The formula remained in force until independence in 1947, after which the water allocations between the provinces were largely determined by the federal government on an ad hoc basis. The government's allocations were perceived by Sindh to have favored Punjab.

Following the signing of the Indus Waters Treaty in 1960, Sindhi leaders argued that Punjab had bartered away its water to India and was now diverting water from Sindh's share. Under the treaty,

Pakistan sold three of its rivers to India and they got a price for it...Punjab in order to make up for the shortfall of water made link canals from the Sindhu (Indus) River without the consent of Sindh—they started stealing Sindh's water. And then they took loans from international agencies to build Tarbela Dam. And that water went to Punjab's benefit as well. (Niaz Kalani, vice president of Jeah Sindh Qaumi Movement, April 23, 2015)

Sindhi leaders saw the construction of the link canals—particularly the Chashma-Jehlum link canal—as evidence of Punjab's intent to appropriate what they perceived to be Sindh's water.

In addition to the 1945 accord and the Indus Waters Treaty, the third important agreement was the 1991 Inter-Provincial Water Accord, which resulted in the formation of the IRSA for implementing the accord. The accord provides for a minimum of ten MAF of water to escape downstream annually into the delta, even though historically on average about thirty-five MAF of water escapes into the delta.²⁷ When water is available beyond this minimum allocation, the accord apportions the surplus water between the provinces thus: 37 percent for Punjab, 37 percent for Sindh, 14 percent for KP, and 12 percent for Balochistan. Table 1 summarizes the apportionment of water under the accord.

Today many Sindhi nationalists object to the 1991 accord, primarily because it was signed by Jam Sadiq Ali, then chief minister of Sindh, whose government was backed by the central government and country's intelligence agencies as a bulwark against the return of the Pakistan

Table 1. Agreed Apportionment of Water According to the Inter-Provincial Water Accord of 1991 (MAF)

Province	Kharif (summer cropping season)	Rabi (winter cropping season)	Total
Punjab	37.07	18.87	55.94
Sindh ^a	33.94	14.82	48.76
Khyber Pakhtunkhwa ^b	3.48	2.30	5.78
Balochistan	2.85	1.02	3.87
Total^c	77.34	37.01	114.35

Source: Indus River System Authority.

a. Figures include already sanctioned urban and industrial uses of Metropolitan Karachi.

b. Figures refer to the provincial allocation excluding the ungauged civil canals.

c. Totals do not include ungauged civil canals upstream of rim stations in KP.

People's Party in the province. In the words of Ayaz Latif Palijo, president of Awami Tehreek, Pakistan (a Sindhi nationalist political party):

We disown the 1991 accord because it was signed by Jam Sadiq Ali, who did not have the popular mandate. It was forcibly signed. Even then it is not being followed. The 1945 accord should be the basis of future negotiations between Sindh and Punjab, and...Sindh should be compensated for water stolen in the interim. (April 23, 2015)

The Sindhi nationalists often linked the 1991 accord to the decision to grant the three eastern rivers to India under the international Indus Waters Treaty. In the minds of the Sindhi political leadership, the interprovincial accord developed out of the macro-scale international treaty with India. The Jeah Sindh Qaumi Mahaz party, for example, views the 1991 accord as illegitimate and rejects it:

We believe that the basis of the negotiation should be the 1945 treaty. It is their [the Pakistan central government's] fault that they signed off their rivers to India, why should we pay for their mistakes because of which the 1945 accord cannot be resurrected? (A Sindhi nationalist leader, April 23, 2015)

This view of the 1991 accord as illegitimate was held by many Sindhi nationalists, but among the mainstream there was an acceptance of its reality and a desire for it to succeed. Still, its perceived violation by Punjab was considered evidence of Punjab's bad faith vis-à-vis Sindh. Sindhis have two main objections to the implementation of the 1991 water accord: (1) Punjab satisfies its own water demand, particularly during the sowing season when more water is needed, before releasing water for Sindh, and (2) the link canals (particularly Chashma-Jehlum and Trimmu-Panjnad) are supposed to be operated only with the consent of the chief minister of Sindh but are in fact operated somewhat arbitrarily on orders of the Punjabi-dominated IRSA.

There is evidence to suggest that the first objection is true, both in terms of quantities of water delivered and more importantly in terms of timing:

Sometimes we have ways of taking more water than our allocations in Punjab because they will waste water and it will all go to the sea. So at night time or otherwise, we will take more water. For example, if 28,000 cubic feet per second (CFS) is coming through and we have to pass on 25,000...we say we only have 22,000 coming. But we do that too with the knowledge of the Sindhi executive engineer posted at the barrage.²⁸ We just ask him not to come out of his quarters at the time of the diversion—and he doesn't. (Superintending engineer, Punjab Irrigation Department, April 27, 2015)

The accord specifically stipulates that provinces' water demand be based upon the preceding ten days' running average. The surpluses and shortages are to be shared on a pro rata basis with reference to the absolute proportional share of the provinces.²⁹

But an important statistical trick is at play here. Punjab, while ignoring the ten-day allocation principle, often protests that it ends up fulfilling Sindh's annual quota. This is true if one looks at annual averages, but it is not necessarily true in any given year. As one engineer from the Sindh Irrigation Department explained:

If Punjab insists that it on average delivers the requisite volume of water, it would be correct. But in the past fifteen years for twelve of those years it would deliver a lot less than the average flow. But when you add in the flood flows from say 2010 and 2011 you will of course get the requisite average for those fifteen years [and] maybe even more. So I think we [in Sindh] are really hurting ourselves by sticking to the average-based policy in case of water. (Executive engineer, Sindh Irrigation Department, March 26, 2015)

Sindh's situation is further elaborated in table 2, which lists the annual flows of water downstream of Kotri Barrage, the last diversion structure on the Indus before it enters the Arabian Sea. Some years the flow is lower than simple natural interannual variability could explain, giving some credence to Sindh's complaints.

Table 2. Flows Downstream of Kotri Barrage, 2001–11

Year	Flows (MAF)
2000–01	0.745
2001–02	1.924
2002–03	2.152
2003–04	20.165
2004–05	0.286
2005–06	25.331
2006–07	21.722
2007–08	15.747
2008–09	5.824
2009–10	4.066
2010–11	54.520
Average	13.900

Source: PILDAT, “Interprovincial Water Issues in Pakistan,” 2011, www.pildat.org/publications/publication/WaterR/InterProvincialWaterIssuesinPakistan-BackgroundPaper.pdf.

At issue is not just the timing until the water reaches Sindh, but also the interseasonal water flows downstream of Kotri. Outside of the monsoon season, there are virtually no flows downstream of Kotri Barrage.

The dispute between Punjab and Sindh over timing and average flows is replicated in a dispute between Sindh and Balochistan. Sindhi officials admit that they put their own needs first in diverting water:

In my division we frequently have fifty Baloch sardars [tribal leaders] show up with 200 armed men each, and shut down every regulator along the Kirthar Canal per force, to more than satisfy Balochistan’s demand for water. Here I show you the communication I have with the Balochistan executive engineer on water. He is getting more than his share of the flow into his jurisdiction—but you see I am pulling the same trick as Punjab: I am delivering more water in February when I don’t need it (I probably will hold back if there is scarcity) so in the long run Sindh is in the clear. (Executive engineer, Sindh Irrigation Department, March 26, 2015)

According to the 1991 accord, Sindh and Punjab are supposed to bear shortages to provide for the relatively minor shares of Balochistan and KP (table 1). But even those minor shares can mean a significant problem at the local level when there is high water demand. Water has high demand during the sowing season, and that is when most water conflicts arise. In fact, in 2009 armed tribal farmers along with the Balochistan Irrigation Department chief engineer took over the offices of the Sukkur Barrage executive engineer’s office. The chief engineer was extended the courtesy of operating the Sukkur Barrage to see for himself how he might be able to supply the requisite water at sowing time so that it reached the tail ends of the Kirthar Canal in Balochistan. The Kirthar Canal branches off from the North West Canal, which starts from Sukkur Barrage. As the chief engineer of the Balochistan Irrigation Department noted in a letter, he was convinced that the discharge at Sukkur Barrage had to be about 130,000 CFS in order to ensure that the North West Canal could supply the tail end of the Kirthar Canal. The Sukkur Barrage executive engineer, however, had a lower estimate; in his view, at least one hundred thousand CFS was needed to be able to satisfy Balochistan’s demand.

KP is also active in the interprovincial water debate in Pakistan. KP is an upper riparian, rich in water resources and power generation potential. Its main grievance with the federation is that it is not paid the royalties due to it from Tarbela Dam and other electricity generation projects that supply power to the Punjab. The following statement by a KP senator encapsulates the position of KP's leadership, and possibly that of the public as well, on getting more compensation for the electricity generated in the province:

I am from Swabi and there were people who were displaced from Tarbela, but they still haven't been compensated. Electricity is being supplied all over the country, but then the same electricity when supplied to KP is supplied for twice the price. When Punjab sells agricultural products to us, it charges us the market price. But when it comes to electricity everybody is charged the same price. The government when it sells to KP is selling at twice the cost price. So we are saying, where are the profits and when do we see the money? (Senator Sitara Ayaz of KP, July 31, 2015)

At the time of the National Finance Commission Award negotiations (which determined the allocation of federal tax receipts between the provinces), KP would not join the discussions until the federal government reimbursed it for the royalties it had claimed from hydroelectricity. The only ways KP can realize value from its water share under the 1991 accord are by developing its irrigation network on limited viable land, or by selling water or realizing royalties from electricity generation.

Interprovincial water allocation is a perpetual source of conflict between the water bureaucracies of the provinces. The upper riparians, like Punjab, do what they can to fulfill their immediate needs before addressing the needs of the lower riparian Sindh. Comparable but less extreme are the actions of Sindh relative to Balochistan. As for KP and Punjab, that is a case of the poorer upper riparian asking for compensation for providing water-related services. The various arguments gain considerable political traction among the politicians, but the problems remain more structural than a function of interprovincial ill will; they are tied to a system that needs to account for local farmers' water demand in the first instance and that is limited both by the system's physical attributes and by the conceptual models and frameworks used in water management (e.g., average monthly or annual flows). Even an upper riparian like KP tends to insert itself into the water discussion by its claim to unpaid royalties for the Tarbela Dam and for the electricity it generates for the rest of the country.

Interprovincial water allocation is a perpetual source of conflict between the water bureaucracies of the provinces.

Kalabagh or Death: Competing Narratives of Interprovincial Water Conflict in Pakistan

Over the more than fifty years of its existence on paper, the Kalabagh Dam has become an emblematic project through which all sorts of notions—the meaning of the Pakistani state, development, ethno-nationalism, the rights of the smaller ethnicities in Pakistan—are mediated. Discussion about this unbuilt dam is the most emotive part of the interprovincial water conflict in Pakistan, with support for its construction driven more by engineering hubris and perhaps ethno-nationalist pride than anything else. The Kalabagh Dam has emerged as a lightning rod issue in interprovincial water debates. When it was originally proposed by the World Bank, Pakistan chose to prioritize construction of the Tarbela Dam instead. Then, in the late 1970s and 1980s, international finance institutions' priorities shifted away from megadam financing and the Kalabagh Dam project was stalled. Another possible reason for its long gestation period may have to do with the dissolution of the One Unit in 1970, whereby Sindh regained its voice as a federating unit and started to vigorously oppose the project.

Punjab contended in 1994 that since Kalabagh Dam had not been constructed, it was not possible for Punjab to fulfill its water-sharing obligations to Sindh. This decision was annulled

by the federal government's Law Division in 2002, although as previously noted, Sindhi officials still accuse Punjab of not honoring the water-sharing agreement. Punjab's argument is that the additional storage provided by the Kalabagh Dam would give it the flexibility to fulfill its own as well as Sindh's water demand, but that in the absence of the dam, it has the right to stick to the water withdrawal patterns that prevailed after the construction of the Tarbela Dam. Sindh, on the other hand, interprets provisions in the Inter-Provincial Water Accord of 1991 regarding the construction of additional storage in the Indus basin to mean local level projects and not a national level megaproject like the Kalabagh Dam.

Kalabagh is not the only dam planned in Pakistan. There are others, such as the Bhasha, Dasu, and Katzarah Dams upstream of Tarbela Dam, to which all the federating units have agreed. The foundation stone for Bhasha Dam in Diamer District of Gilgit-Baltistan was laid in 2008, but no substantial progress has been made on its construction. Part of the problem is arranging financing; the dam is located in a politically disputed territory that also happens to be in one of the most seismically active zones in the world. Nevertheless, it is the Kalabagh Dam that has captured the imaginations of the Punjabi and Sindhi leadership as well as those of the public.

Some proponents of the dam's construction—particularly among Punjabi elites and right-wing political parties—attribute opposition to Indian conspiracies to prevent Pakistan from developing or perfecting its water rights. In the view of Pakistan's water engineers and much of the Punjabi populace, the Kalabagh Dam is indispensable for development. This view was articulated by Shams-ul-Mulk, former chairman of the WAPDA and chief minister of KP:

If you look at the world, there are three main powers, India, China, and America. America has built 6,500 dams, China has built 22,000 dams in the past 50 years, India has constructed 4,500 dams so far and 650 are under construction. There is no need to add anything to the above, the data speaks for itself. (Shams-ul-Mulk, December 9, 2015)

In this assessment, there is only one developmental trajectory that Pakistan—or any other country for that matter—can follow: that of India, China, and the United States; and the way to fulfill that destiny is through dams, starting with the Kalabagh Dam. Like most educated Pakistanis, Mr. Mulk has an absolute belief in modernist, Western-style development. The Kalabagh Dam is seen as the key to realizing that type of development.

While the emotions surrounding the Kalabagh Dam in Punjab might border on the hysterical, they are no more rational or cool in Sindh. On the other hand, the Sindhi nationalist leadership is more aware of the technical details of Pakistan's water situation than its Punjabi counterparts. This awareness may be a function of being the lower riparian and totally dependent upon surface water supplies because of mostly saline groundwater. The Sindhi nationalist movement, much like the other ethno-nationalist political parties in other provinces and the Seraiki belt, is largely left-wing, and issues of identity, ecology, and equity resonate with them. In contrast, the right-wing Pakistan Muslim League's three-decade-long dominance in Punjab has ensured a modernist, megaproject-centered developmental ethos, which provides little space for the local scale issues that resonate with the ethno-nationalists. At the national level, positions on Kalabagh Dam are neatly split along the right- and left-wing ideological divide.

I am not an expert in the field but we need both big dams and smaller dams with "run of the river" projects [those that don't require any storage and rely upon diversion from the main stem river to create a water elevation head to generate electricity] wherever feasible. Chinese and Indian examples are instructive...Storage has been blocked by controversy over Kalabagh Dam. It was a very desirable project. Unfortunately the political leadership in the country including WAPDA did not act at the right time and in the right manner. I am not hunting for conspiracy theories, but I would not rule out [a] foreign finger in creating antipathy against the Kalabagh Dam...I do not agree with

[the] Sindhi narrative of distrust. There is some truth in their argument, but I think it is very tainted...Sindh belongs to everybody even if it is named after the lower riparian. We need a model for resolving these issues. Sindhi people believe that it is at their cost and there is some truth in it. Balochistan, though not part of the Indus system, is also a stakeholder. It too should be involved in decision making. (Leader of the right wing Jamaat-e-Islami party, July 13, 2015)

The narrative of the left-wing ethno-nationalists in Sindh is illustrated by the following quotation:

Efficient management of water is the fundamental question in Pakistan. Tell us what is [the] point of building dams? Do you want to grow food? Electricity? Or do you want to oppress Sindh and control their water for eternity? If you want to generate electricity, what have you done since Bhutto to generate electricity? Why don't you go for other options? Do all countries go for hydro? Why not have "run of the river"? Is anybody thinking of the country, reducing water wastage, doing laser leveling—and why not do that all over Sindh? Why not have efficient use? Since the British, the canals have not been improved. (Qadir Magsi, Chairman of the Sindh Taraqi Pasand Party, April 23, 2015)

Regarding the Kalabagh Dam, the fundamental issue is the lack of trust between Sindh and Punjab; that much was admitted by all the political parties on the right and left of the political spectrum. Punjab's behavior does not inspire confidence in the Sindhi people, who object to the diversion of water to irrigate lands in southern KP and Punjab. The Punjabi position tends to overlook those critical features and emphasizes the energy potential of the dam. In the words of a Sindhi engineer:

Punjabi friends...say...things about [the Kalabagh Dam] that are simply irrational and downright provocative. They say that [if the dam had been built] there would not have been destruction in Badin and Tharparkar [two districts in southern Sindh that suffered extensive rain damage in 2011]...They say that they are only building it for Sindh. Why don't they just be straight, that it is for the benefit of Punjab, and Sindh may benefit too"...Who are they trying to fool? At least I could buy that. Why won't they build the ones that they have already authorized? Why won't they touch Basha, which has already been authorized for ten years? They have just become obsessed with KBD...If they [the Punjabi water bureaucracy] had not lied, it would have been built in 1985. In Murray Darling [in Australia] they have 1,000-day storage, try doing [that] in the Indus [referring to the size of the river and the infeasibility of having infrastructure big enough to store 1,000 days of Indus flow]...They are doing a massive modeling exercise for the Indus and the consultants' qualification for doing the modeling is that they did it in the Murray-Darling basin! They just don't know anything about the particularities of the Indus River. (A Sindhi federal official, September 11, 2015)

It is not just Sindh that vehemently opposes the Kalabagh Dam. The provinces of KP and Balochistan do so also, especially the provinces' ethno-nationalist elements. KP's objection is based upon the prospective submergence of rich farmland in its Mardan, Newshehra, and Swabi Districts and possible saltwater intrusion into the groundwater of the agriculturally rich Pashtun lands. Balochistan's objection is out of solidarity with the Sindhi nationalists:

With regard to Kalabagh Dam, Balochistan has such a small share of the water, that it is not really an issue for Balochistan. We go along with the Sindhi nationalists out of ideological solidarity. Nobody can refuse that not building newer dams will cause a water crisis. Right now the lack of trust is the issue, and we have not been able to build the trust. Sindhis believe that if you build the dam you will take away their water. Who will build the trust and which political party will do it, is the question. The major issue is confidence building between Sindh and Punjab. (Hasil Bizenjo, president of the National Party, August 4, 2015)

Beyond the core issue of trust between the provinces is another issue, competing visions of what the Pakistani polity should look like. One vision believes in modernist development at the national scale and sees Punjab's interest as Pakistan's interest, and that of Sindh and KP

as parochial. The other vision articulated by the left wing and ethno-nationalists is centered around prioritizing the local and regional and focuses on equity, justice, and inclusion.

I tweeted once that the three smaller provinces should get their fair share of the economic corridor. I was put down by people when everybody said “Mr. Palijo, you should think of Pakistan first and not of provinces.” That is the attitude that I will face in the Supreme Court [if I were to try to litigate Sindh’s water grievances against Punjab]. (Ayaz Latif Palijo, president of Awami Tehreek, Pakistan, April 23, 2015)

In this section we have not sought to pronounce judgment on the economic, engineering, or hydrological case for or against Kalabagh Dam, but rather to capture the contours of the debate—a debate that makes for depressing reading. It is now ruled by emotions; and the dam, which should be a means to an end, has become an end in itself.

Conclusion: Recommendations for Mitigating Interprovincial Water Conflict

The most likely scenario in the case of interprovincial conflicts is for present trends to continue. But provinces’ deep mistrust of one another is likely to eat away at the foundations of the federation. To help the interprovincial water conflicts move toward more amicable outcomes that also work to the advantage of the poorest Pakistanis, we suggest here a few technological and institutional interventions and some mostly political steps.

One technological solution that may help build interprovincial trust and transparency within the system involves installing a telemetric system on the Indus basin rivers and canals and making the data from those stations available electronically to the public and decision makers. Such a system was indeed installed in Punjab in 2009, but interviews for this study indicated it was not operating or being used.³⁰ In fact, one of the most senior people in the Punjab Irrigation Department insisted to us that human gauge readers are more efficient and accurate than the telemetry system. Telemetry is a sensitive topic in Pakistan, where the engineers insist that the electronic sensors measure only the water level, while the real disagreements are on the coefficients used by the different institutions to turn those water level readings into volumetric flow numbers.³¹ The volumetric conversion is a function of the relationship between water level, velocity, and channel geometry. The velocity and channel geometry change along the water channels spatially and seasonally, because of slope, flow, deposition, and erosion, and hence many of the empirically derived relationships represented in the coefficients do not remain constant, nor should they. The point is to check and update them periodically and publish them. Transparency in the system could help inform debate: where data are readily available to all, it becomes harder to accuse opponents of lying. Recriminations in response to transparent behavior are preferable for conflict resolution to mistrust based upon opacity and secrecy.

Institutionally, IRSA could potentially be a very good forum for the resolution of interprovincial water conflicts. Currently, the atmosphere of IRSA is largely adversarial; almost every decision about water allocation is called to a vote because no provincial representative wants to be seen as weak on his or her province’s position. Perhaps making IRSA more accessible to the press and its proceedings more transparent would help the public see that an effective forum for conflict resolution exists. The adversarial voting system may not be entirely edifying for advocates of interprovincial harmony, but public debate could help provinces gain a better understanding of one another’s positions.

Pakistan’s water sector is almost entirely manned by civil engineers who are trained to deal with infrastructure development and management. There are almost no hydrologists, geomorphologists, or water resource management specialists from a social science background among

the Pakistani water managers. A few civil society–based experts are also experientially trained rather than formally trained in water resource issues. The United States Agency for International Development is at the moment supporting a center of excellence in water resources management at the Mehran University of Science and Technology in Hyderabad, Sindh. It is too early to tell the outcome of that initiative, but at the moment the emphasis also seems to be more on natural and engineering sciences than on social sciences. Perhaps designing curricula at the college level specifically on water resources and incorporating these courses more widely within different disciplines and universities would be a more fruitful way to train water managers in the future. In the same vein, changes in the service criteria for provincial irrigation departments, WAPDA, and other agencies would be a step in the right direction to ensure that water managers trained from different disciplinary perspectives can find gainful employment.

There is practically no culture of pure science research on water resources in Pakistan. Such a culture has to be developed, and possibly the center of excellence (and the money made available to it) will help sow the seeds for this in Pakistani higher education. Such basic science research could also help correct many of the ill-informed positions about the physical consequences of dam building, channel diversion, and river engineering.

Beyond the above technological and institutional interventions, it will also be important to initiate public dialogue between the intellectuals, civil society groups, and water experts of all four provinces. Hopefully, reasoned debate on the issue will help to open up the rigid and largely ossified positions of all the provinces in the federation.

Lastly, it is possible to view the interprovincial water conflict as a political conflict masquerading as water conflict—that is, as fundamentally about competing visions of what type of polity and state Pakistan should be. Should it be a centralized developmental state? Or should it be a federated state where different ethnic differences and interests are deemed legitimate and not made subservient to visions of a unitary polity? Making those implicit politics around water explicit could possibly help engender a more reflexive view on the part of water managers regarding their positions on interprovincial water issues.

Floods in Pakistan: Contested Hazards and Blessings

Floods are blind and cannot see. But along the way society and history have conspired to become their eyes. The lived experience of floods is not random, but is rather characterized by deep fissures along ethnic, class, age, and gender lines.³² In a highly regulated hydrological system like Pakistan's, the human influence on floods is doubly important. As we will discuss in the next section, the Indus basin system has been engineered such that there is almost nothing natural left about the timing, location, and intensity of the floods occurring there. During the massive 2010 floods, many in the Pakistani media may have discovered the politically contested decisions to flood one or another region along the rivers, but the political influence on irrigation and flood management is as old as the system itself, as we explain below. This chapter also deals with the rhetoric on floods, which changes as one moves down the basin. It compares flood management in Sindh and Punjab, and finally offers some recommendations for adjusting to the cycles of floods in the basin and protecting those who are most vulnerable to the hazard.

The Historico-Physical Geography of Floods in Pakistan

The deposition of silt by the Indus River has formed one of the most fertile alluvial plains on the planet, enabling the establishment of one of the oldest civilizations in the world. The flood cycle was and still is integral to maintaining the fertility of the alluvial plain. Rivers are dynamic

systems that constantly change their courses, bringing cycles of deposition and erosion. On the one hand, they provide the bounty of water and fertilizing alluvium for the soil. But on the other hand, their dynamism can be inconvenient if one wants to put an irrigation system on it. One cannot build a barrage at a particular point in the river, only to have the river then change its course and move away from that location. In the nineteenth century, as the Indus basin moved from a flexible, communal property regime toward a static, individual landed property regime, it became doubly imperative to protect individual properties from getting submerged or eroded by moving rivers. Consequently, the Indus basin rivers had to be controlled and hemmed in between levees to make sure that they continued to flow within channels that were convenient for their human managers, though not necessarily for their natural regimes.

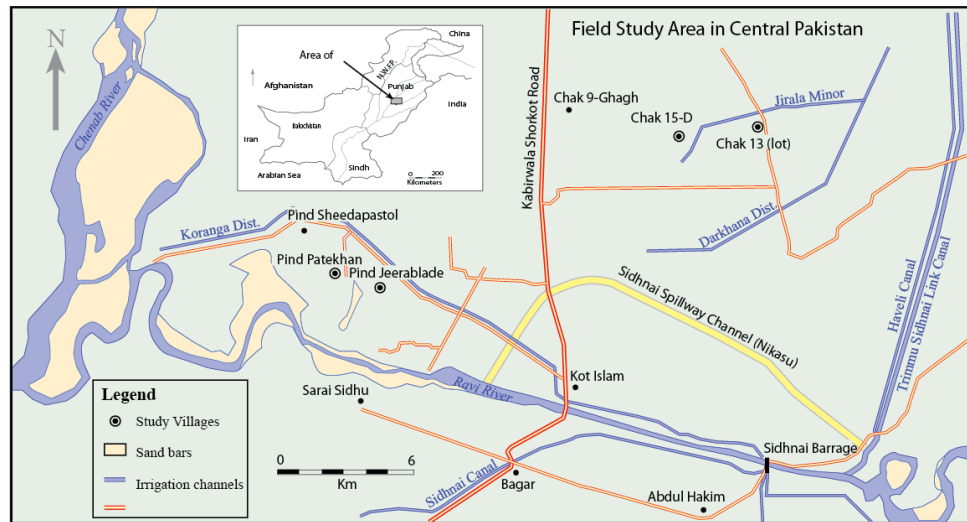
In the gently sloping plains of the Punjab and Sindh, primordial rivers spread out their floods over large areas. For most of human history, societies not only adjusted to match those cycles, but in fact depended upon them for their livelihoods. However, as the nineteenth-century canal colonies were established, floods turned from a blessing into a hazard. Then, as the rivers were constrained to flow within specific channels and as more and more water was diverted away from them, the rivers lost their capacity to transport their sediment load and spread it over wide areas. Instead, they started depositing sediment loads within their riverbeds—thereby markedly reducing channel capacity. This development was the result of a Faustian bargain, whereby the human societies exchanged the dynamism of the river, with its frequent low- to moderate-intensity floods, for higher productivity, static agricultural holdings, and low-frequency but high-intensity floods.³³

There are two flood seasons in Pakistan: a minor one following the snowmelt on the upper reaches of the rivers in April and May, and a major one from July through September caused by monsoon precipitation. The eastern tributaries of the Indus are mainly affected by monsoon floods, so historically, by the time those flood peaks entered the main stem Indus River downstream of Panjnad, they were easily absorbed by the much larger river channel of the Indus. However, climate change may end that situation in the future. The 2010 flood was a result of unusual monsoon rains in the Kabul and Indus River valleys.³⁴ Before 2010, the last major flood in the main stem Indus River was a glacial lake outburst flood back in 1929.

The historical attitude toward flood hazard in Pakistan was primarily one of risk acceptance until the massive 1973 flood event.³⁵ Since then, a more proactive approach toward flood control has emerged among Pakistan's water managers. The Federal Flood Commission was formed in 1977 to provide technical assistance to the provinces in implementing flood control projects. The commission's approach has focused mainly on engineering interventions and subsequent relief activities by the Pakistani Armed Forces and provincial relief commissioners. River engineering is essential for maintaining irrigation infrastructure, and protecting that infrastructure is the top priority of flood management in Pakistan. All the dams and barrages on the rivers have a safe design capacity, often based upon the historical data available at the time of their construction—which were quite limited compared to the data available now.³⁶ When the safe design capacity of the barrages is exceeded, the upstream levees are deliberately breached to relieve the pressure on the barrages. Where those levees will be breached has generally been decided at the time of the barrage's construction, and the inundation zones are selected—and well known—in advance.

Almost invariably, the levee breaches upstream from dams are on the right bank of the river. In fact, there are twenty-three such designated barrages and inundation sites in Pakistan. Figure 3 is a map of one such inundation site upstream from the Sidhnai Barrage on the Ravi

In the nineteenth century, as the Indus basin moved from a flexible, communal property regime toward a static, individual landed property regime, it became doubly imperative to protect individual properties from getting submerged or eroded by moving rivers.

Figure 3. Inundation Zone on the Right Bank of the Ravi River

Source: Daanish Mustafa, © 2017.

River. The assumption behind keeping all the inundation zones on the right bank of the rivers is that with the Coriolis effect,³⁷ water on the right bank will be deflected back into the main channel, whereas on the left bank water will keep flowing indefinitely away from the channels. Although the assumption is theoretically correct, the inundation zones also have levees, roads, road berms, railway lines, and canals cross-cutting through them and serving as barriers to the water's natural flow. The consequence is that once the water has left the main channel, it gets stuck between all the human-made barriers and sometimes does not recede for months, with the local population camped on the roads and high grounds and suffering from water-borne diseases. In our view, then, it is not inundation but the drainage of floodwaters that poses the main physical challenge in the Indus basin. Good drainage can mitigate the suffering of the flood victims, who typically are still enduring hardships long after the TV cameras are gone.

The issue of flood drainage becomes particularly acute in Sindh. Sindh's good fortune thus far has been that the headwaters of the main stem Indus River do not fall under the summer monsoon influence.³⁸ But with an increasing probability of downstream Sindh being affected by the floods of the Indus, the province's gentle slopes and many depressions are at greater risk of turning into lakes during major Indus inundation events. These depressions can be a source of storage for floodwaters in the Indus (in "Farmer-Fisherfolk Conflict" we discuss one such depression, Manchar Lake). With the development of the irrigation system, however, obstructions to the drainage of flood waters have become a greater problem in Sindh than in Punjab. The lakes that used to be sources of freshwater recharge, fisheries, and livelihoods for thousands of people are now used for holding saline drainage water, which is channeled to them by internationally funded (mostly World Bank) drainage projects in their vicinities.

Flooding in Pakistan is not confined to the Indus River basin. There is also a locally significant flash flood hazard in the Kirthar and Sulaiman ranges and in the highlands of southern Punjab, Sindh, and Balochistan. Those floods can cause disastrous damage to local communities, and there has been discussion of harnessing and storing the water from flash floods in check dams in these arid areas. The utility and value of this approach is doubtful, however; the mud, boulder, and sediment load in these flash floods is so large that any check dams are likely to be overwhelmed within a few seasons. We will not delve too deeply into this type of flood

in this chapter, but mention it here as a significant hazard in the dry highlands of southern and southwestern Pakistan.

Patterns of Flood Rhetoric in Downstream and Upstream Riparians

In Pakistan domestic floods take on an international geopolitical color thanks to the rhetoric used by the right-wing Urdu-language media, which blames floods on Indian water managers' deliberate release of water into Pakistan during the flood season. For example, the daily *Narwa-e-Waqt*, a conservative Urdu newspaper in Pakistan, uses the term *abee jarbiyyat* (water aggression) in its editorials to describe this alleged policy. Others in Pakistan have used the term "water bomb" to describe how India manipulates water flows to settle scores with Pakistan. More often than not, papers such as *Narwa-e-Waqt* are repeating this rhetoric based on their generic anti-India posture, which involves depicting the neighboring country as an enemy seeking to destroy Pakistan.

India has refused to share with Pakistan the data of water level in rivers, increasing the chances of floods again during this monsoon season, which may lead to deaths of hundreds of people and destruction of infrastructure of billions of rupees. The Indus Commissioner has informed the government that India is refusing to share the data... During the last year, India suddenly discharged water in Chenab and Ravi, which led to deaths of 367 people in Punjab, damaged 100,000 houses and [displaced] 700,000 people...³⁹

This rhetoric has substantial traction within Punjab Province. Some lower-level Punjabi irrigation officials interviewed for this study expressed the same opinion. Right-wing political parties and militant organizations have also leveraged bilateral water issues with India, particularly controversies about dams and floods, to peddle their own anti-India agenda. A media report quotes Hafiz Saeed, the head of Jamaat-ud-Dawa, as saying, "India irrigates its deserts and dumps extra water on Pakistan without any warning...If we don't stop India now, Pakistan will continue to face this danger."⁴⁰

Even in the more "moderate" English-language press, news reports often hint at India's malevolence:

Chairman National Disaster Management Authority (NDMA) Major Gen Muhammad Saeed Aleem told reporters at the conclusion of a two-day national conference held to review monsoon preparedness: "We have asked Pakistan Commission for Indus Water to take up the matter [of India's release of water into Pakistan] with India". He said that in the past the country had suffered huge loss because of the release of dam water by India without any warning. However, the upper state (India) is bound under the Indus Water Treaty to provide information before making such a move.⁴¹

According to the Indus Waters Treaty, India is bound to provide water release data to Pakistan as a matter of routine. Whether the data are disseminated to appropriate institutions within Pakistan is another matter. The Permanent Indus Commission insists that the data are conveyed to institutions, irrigation departments, WAPDA, etc. in a timely fashion, though there is no independent way of confirming that.

This tendency in Pakistani Punjab to blame the upper riparian for floods or failure to share water is repeated at the local level and to a lesser extent at the interprovincial level. Just as Pakistan blames India, so (as documented in the preceding chapter) does Sindh blame Punjab, though only when it comes to water distribution; we did not find any evidence that Sindh blames Punjab for floods. The Sindhi populace does blame Punjab, and with some truth, for polluting its water and directing its industrial and agricultural waste to Sindh, as we will discuss in a later chapter ("Farmer-Fisherfolk Conflict"). At the local level, however, the conflict

between upstream and downstream riparians does tend to mirror the blame dynamic between Punjab and India. It is to that conflict and the politics of floods that we now turn.

Contrasting Flood Conflicts in Sindh and Punjab

As mentioned above, all barrages and other infrastructure for water diversion and storage have a safe design capacity. Table 3 lists the safe design capacity of the barrages on the Indus system. During flood season in the Punjab, the breaching sections of the levees are handed over to the Pakistan Army Engineers. The irrigation officers in the Punjab Irrigation Department have the authority to order a breaching operation as soon as the safe design capacity of the infrastructure is exceeded. In the past, the officers were authorized to make that decision alone, but now there is a departmental panel that collectively decides the issue. However, there is some evidence to suggest that, in reality, senior officers can still take the decision on the spot.⁴² The decision is subject to considerable outside pressure; the upstream farmers want the breaching section operated to relieve pressure on their lands, while downstream farmers, particularly those on the right bank, seek to prevent the operation of the breaching section to prevent flooding of their lands.

The Punjab Irrigation Department knows as well as the local residents that the safe design capacity number is a conservative one. Most structures can withstand higher flows than the ones published and officially listed. It is in the envelope between the lower and the absolute

Table 3. Control Station Design Discharge Capacities

River	Station	Design capacity (CFS)
Indus	Tarbela	1,500,000
	Kalabagh	590,000
	Chashma	950,000
	Taunsa	1,100,000
	Guddu	1,200,000
	Sukkur	900,000
	Kotri	875,000
Kabul	Nowshera	n.a.
Jhelum	Mangla	1,060,000
	Rasul	850,000
Chenab	Marala	1,100,000
	Khanki	800,000
	Qadirabad	807,000
	Trimmu	645,000
	Panjnad	700,000
Ravi	Balloki	225,000
	Sidhnai	150,000
Sutlej	Sulemanki	325,000
	Islam	300,000

Source: Sindh Irrigation Department.

n.a. = not available.

maximum limit of the safety envelope that negotiations and pressuring techniques become a factor. Historically, if the irrigation officer perceived any threat to the actual integrity of a structure, he gave the authority to Pakistan Army Engineers to lower the explosive charges into their designated places along the levees and breach them, no matter the pressure from farmers and others not to breach. To date, no irrigation department in Pakistan has ever lost a structure in floods, despite the emotionally charged debates that take place. These debates take place as long as there is uncertainty about upstream conditions, weather forecasts, and the structural safety of the structure, but not after the safety envelope is exceeded.

Once a section is breached, the general public invariably blames it upon the machinations of a powerful landowner or political leader. There is some justification for this reflex, since powerful interests indeed influence the timing of the breaching section operation. But there is no concrete evidence to suggest that local landowners are capable of carrying out the operation on their own. No landowner stores enough explosives to unilaterally blow up a levee on a main stem river of the Indus basin. Tools or bulldozers are patently insufficient, given the size of the levees. Still, powerful interests such as politicians can exert a heavy influence, as the following anecdote related by a senior officer of the Punjab Irrigation Department illustrates:

My service was in [the] Dera Ghazi Khan area. It is very hard to say no to politicians. In that district there are a bundle of politicians and they can straightaway talk to the secretary or the chief engineers...The politician wanted to breach the canal at some point, to relieve the pressure of the hill torrent flood. The politician wanted me to breach at RD55, but I wanted to breach at RD66 [to prevent excessive damage to the canal]. I kept stalling him because I was convinced that the canal will automatically breach at the spot that I was suggesting. Eventually the canal did breach at the spot that I had suggested, and I just said that it is not my fault that God breached the canal at the spot that you did not want. (Senior irrigation officer, Punjab Irrigation Department, April 4, 2015)

During the 2014 floods, an event occurred that illustrates the politics of breaching operations. When a breaching section was operated upstream of Taunsa Barrage and the Muzaffargarh Canal, the released water flowed toward the city of Muzaffargarh. In the words of a senior irrigation officer:

The water was likely to enter...Muzaffargarh city. There is a bypass in front of the city, and there were culverts in that bypass. We plugged the culverts [to save the city]. The upstream people wanted the culverts unplugged [so that the water inundating their lands could drain away], while the downstream city people wanted them plugged. We closed the culverts to save the city. (Senior irrigation officer, Punjab Irrigation Department, April 4, 2015)

In this case, a local member of the National Assembly of Pakistan was arrested for manhandling local irrigation officers when they refused to unplug the culverts; he had wanted them unplugged to protect the people in his constituency upstream. These types of conflicts occur all across the Indus River system, and particularly in the Punjab.

An additional source of conflict arises out of the conflicting imperatives for dam operators. A dam manager needs a full reservoir for irrigation and power generation, and an empty one for flood management. Current standard operating procedures for dams in Pakistan require chief engineers of all water storage facilities to have their reservoirs filled on August 20—the middle of the flood season. Inevitably, when floods exceeding the capacity of the dams reach the reservoirs, these have to be rapidly emptied to protect the dams, making bad floods worse. Catastrophic floods occurred in 1992, when Mangla Dam was threatened in late September and had to be emptied in a hurry to save it. To address problems of this type, flood management needs to be more fully integrated and prioritized in dam operations in Pakistan.

In Sindh, the situation is slightly different. Floods have been so infrequent there that the irrigation department never anticipated having to breach levees to protect the irrigation infrastructure, and hence never specifically designated breaching sections upstream of the three barrages in the province. In the Sukkur Barrage area, for example, the Tori Bund upstream of the barrage was breached only once, in 1976, at the behest of no less an authority than Zulfikar Ali Bhutto, then prime minister of Pakistan. The authority for breaching a bund in Sindh rests with the chief minister, but none has ever exercised this power. In 2010, the bund was breached naturally, and vast swathes of territory on the right bank of the Indus, following the course of the Main Nara Valley Drain, were flooded as a result. Drainage took several months, and the land remained inundated for a very long time.

The mythology surrounding the breaching of levees invariably blames powerful politicians suspected of protecting their own.

The mythology surrounding the breaching of levees invariably blames powerful politicians suspected of protecting their own. There are unconfirmed reports of canal breaches by powerful locals, but whether these are true or not is beside the point. The point is that the opaque workings of irrigation departments, coupled with deep public mistrust of the government and the powerful, lead the public to believe all sorts of theories about why breaches happen.

In the long run, breaches are ecologically and even economically beneficial. All of Sindh had record harvests in the years following the 2010 floods because soil fertility had been restored and groundwater recharged. The absence of designated breaching sections in Sindh is alarming, however. Without clear operating procedures for the barrage operators, any infrastructural failure would be catastrophic.

The flood hazard in Sindh and Punjab is further accentuated by arbitrarily built spurs and dams within the riverbed that protect certain areas of land, often those belonging to influential people. All that spurs typically do is transfer the pressure of floods from one point to another through a perpetual cascade of worsening flood hazard along the banks of a river. These spurs are another example of how conflict over floods plays out through competing influences on public institutions and the related expenditure of public money to protect one powerful interest at the expense of another.

Conclusion: Recommendations for a Safer Way Forward with Floods

One of the first steps toward resolving conflicts over flood management is greater openness and transparency in Pakistan's flood management institutions. These institutions, which include the Pakistan Meteorological Department, Federal Flood Commission, WAPDA, and provincial irrigation departments, are enthralled by the engineering/technocratic paradigm of flood management. Their jargon-laden flood warnings and explanations are for the most part incomprehensible to the general public and even to the more educated. For example, the assistant commissioner in Badin (in lower Sindh) reported that in 2011 he received a fax warning from the Pakistan Meteorological Department; it stated that there was a certain percentage probability of certain millimeters of rain falling in Badin over the next forty-eight hours. He had absolutely no idea what to make of that information, and hence did not do much beyond alerting his staff that something extreme was going to happen—without being sure what. The year 2011 saw one of the most devastating flood events in the district of Badin. Flood managers have to be trained to translate their flood warnings and management plans so that they can be understood by the public and water managers alike. The media and the public also have to be educated in how the system works; a better understanding of management's actions should result in fewer unfounded conspiracy theories surrounding floods.

It is important to recognize that people will always lobby the authorities to protect their lands from inundation, as is their democratic right, even if they do it through the medium of patronage politics. All the same, a second step for improving flood safety is to create forums that both allow the public to articulate their concerns and educate them about the constraints facing the flood managers. The public has to understand that dams can have many benefits (and costs), but that in the context of the Indus basin, flood protection is not one of them. Few dams in the world, even if kept empty, could withstand the types of flood peaks that occur in the Indus basin. This knowledge could help to rationalize the highly polarized debates about dams that occur in Pakistan.

Third, the designated inundation zones need to be prioritized for flood proofing, protection, rehabilitation, and education- and warning-related initiatives. Particular focus should be on social vulnerability assessments to get some sense of who is most vulnerable to flooding and how the government might offer them protection and rehabilitation in the aftermath of floods. Such inundation zones should be a special priority for early warning and evacuation advice, which also needs to be gender-sensitive.

Fourth, postflood drainage of inundation zones should be a priority. Efforts should be made to help people return to their homes and resume their economic activity. The provision of pumps and modification of infrastructure to facilitate drainage should be priority investments.

Fifth, flood protection spurs should be banned except where they protect public infrastructure, such as hospitals, schools, grid stations, and cultural monuments. At the moment, they simply shift the hazard from one place to another, closely following the geography of power in society.

Sixth, the safe design capacities of the infrastructure should be reviewed specifically in light of the predicted effects of global climate change. Upgrading barrages and dams will be massive investments—but resources could be found for them if they are made a priority. In the same vein, WAPDA and the provincial irrigation departments should update their thresholds of low, medium, and high floods, given the longer time-series data available to them today. The present thresholds are simply unrealistic and apparently haven't been updated in decades.

Lastly, it is crucial to recognize that conflict over floods is deeply intertwined with issues of public trust and the relationship of the populace with the state. While the state seems to be enthralled by expensive infrastructure solutions, low-cost technical and financial assistance for flood proofing the properties of the poor could pay dividends by preventing the loss of productivity and disruptions to people's livelihoods in the event of floods. Such steps will concomitantly help enhance trust between the state and the people.

Floods are a blessing and can be a curse. The fact that they are experienced primarily as a hazard is a choice that society has made. Society could also make a different choice, but for that to happen the voices of all must be heard, not just those of the loudest and most powerful. Rational interventions in the flood management field could lessen the prospects for conflict and ill will around the hazard, and possibly even foster a more cooperative ethos toward managing and living with floods.

Particular focus should be on social vulnerability assessments to get some sense of who is most vulnerable to flooding and how the government might offer them protection and rehabilitation in the aftermath of floods.

Irrigation Conflicts in Punjab: Water Contestation at Microscale

Conflicts involving individual farmers or entire farming communities over access to and allocation of irrigation water are common in rural Pakistan, yet in spite—or because—of their prevalence and local specificity, they receive less attention by the country's water managers and the public than contestations over water at other scales. This chapter will address this often

neglected manifestation of water conflict. It will first present an overview of the physical dimension of Pakistan's irrigation infrastructure and the historical-institutional frameworks that determine access to and delivery of water resources in the country's canal command areas (that is, those areas irrigated by canal water). It will then discuss conflicts over irrigation water at the microscale as they relate to the irrigation system's physical and institutional features.

The Irrigation Infrastructure in Pakistan's Indus Basin

The irrigation system in Pakistan in its present form (both its infrastructure and institutions) was established during the colonial era and is the product of one of the largest hydraulic interventions in human history. The traditional irrigation system of seasonal or inundation canals that had characterized much of the Indus basin since the advent of agriculture was replaced over the second half of the nineteenth century by perennial irrigation and the construction of weirs,⁴³ barrages, and permanent headworks across the rivers. The most immediate impact of implementing modern colonial irrigation strategies was the marginalization and ultimate decline of traditional water harvesting systems.⁴⁴ A case in point is the demise of the traditional *sailaba* agriculture, which was practiced on land irrigated by seasonal inundation and which was ultimately curtailed by perennial irrigation canals.⁴⁵

Traditional irrigation infrastructure—mainly inundation canals of modest proportions that were based on river flood cycles for their water intake—was less pervasive and more carefully integrated into the local environment than the perennial weir- and barrage-controlled irrigation systems that were to follow. A central feature of precolonial canals was their inclusion of natural drainage channels, an approach that was also evident in early British constructions. However, later projects by the colonial administration reflect increasing aspirations to dominate nature. It was the failure to properly align the new irrigation system with the natural drainage of the land and a general lack of attention to geographical variation that soon led to a number of hydrological and environmental problems, including salinity, the accumulation of silt, and the obstruction of earlier drainage channels through the construction of embankments. These continually undermined the success of the modern irrigation system in the Punjab and still pose major challenges today.⁴⁶

The transformations in the irrigation sector cannot be detached from the massive social engineering project that was unfolding at the same time. British colonial policies were designed to boost settled agriculture and entailed the establishment of the so-called canal colonies in central and southwest Punjab and the development of the largest contiguous irrigation system in the world. These policies profoundly transformed the sociocultural and economic make-up of the entire region.⁴⁷ More than one million people migrated to the nine canal colonies between 1885 and 1947, making the region one of the most densely populated and agriculturally productive in the world. The colonial engineers established a gravity-based hierarchical system of canals in which main canals take off from diversion points on the rivers and then branch out into distributary and minor canals. The water outlets for individual parcels of farmland are from the village watercourses, which emanate from either the distributary or minor canals, but never directly from the main canals. In such a gravity-based system, the supply of irrigation water to a parcel of land is determined by its location along a watercourse and by the location of the village watercourse inlet (*moga*) along the canal. Farmers at the tail end of distributary and minor canals—as well as village watercourses—are consequently worst off in terms of water access.

The irrigation system was designed to deliver the minimum amount of water needed to sustain sufficient agricultural production for the prevention of famines and for settlement of

the Crown Waste Lands, with maximum 64 percent cropping intensity per year.⁴⁸ This approach was enshrined in law by the seminal Canal and Drainage Act of 1873, which also regulates most other aspects pertaining to irrigation in Punjab to this day. However, the actual cropping intensities of agricultural land have been increasing since at least the Green Revolution of the 1960s and 1970s, and commonly range from 150 to 200 percent today.⁴⁹ Water withdrawals and usage also increased due to the increase in cropped and irrigated areas during the 1960s and 1970s and to the increased cultivation of more water-intensive cash crops such as cotton, rice, and sugarcane. This increase of cropping intensities was made possible by tapping the massive groundwater reserves—which are especially abundant in Punjab—through new tube well technology and rural electrification.

Groundwater now supplements canal irrigation across virtually all canal command areas in Punjab and accounts for 29 percent (52 km³) of the total average annual water withdrawals in all of Pakistan (180 km³), compared to surface water withdrawals, which amount to 71 percent (128 km³).⁵⁰ However, especially at the tail ends of canals and watercourses, which generally receive insufficient canal water supplies, farmers often rely almost exclusively on tube wells to meet their irrigation needs. In certain canal command areas, groundwater thus meets 80–100 percent of the total crop water requirements.⁵¹ There are an estimated one million tube wells in Punjab alone, the construction and operation of which are still completely unregulated, despite mounting concerns about the detrimental environmental effects of excessive groundwater exploitation.

The Historical-Institutional Context of Irrigation Management in Pakistan

It was not only the physical infrastructure of canal irrigation that changed fundamentally under colonial rule, but also its social organization, as irrigation endeavors were progressively subjected to the modernist principles of efficiency and economy. The institutional structure designed to manage the system established clear responsibilities and duties from the provincial level down to individual canal sections, an approach that closely matched the hierarchical pattern of the physical irrigation system.⁵² Traditional water distribution systems such as *warabandi* (a fixed-time rotational water distribution method) were expanded and adapted by colonial irrigation engineers to fit into the structure of more extensive and intricate irrigation networks. At the same time, the emergent “imperial science” that came to dominate colonial irrigation engineering emphasized careful attention to “universal” hydraulic principles and mathematical measurements of slope at the expense of attention to locally specific irrigation conditions.⁵³

Similarly pervasive were the land reforms that the colonial Punjab Irrigation Department launched at the dawn of the twentieth century. These entailed a process known as *chakbandi*: the remodeling of water channels and the definition of fixed areas (*chaks*) assigned to each canal outlet. These policies were designed to give engineers greater control over both the management of silt in the channels and the distribution of water. One effect of this rearrangement was that, in practice, irrigation engineers delivered water not directly to individuals, but rather to the quantities of land (*chaks*) that were attached to each outlet.⁵⁴ This reinforced the link between land and water that is a central feature of the Indus basin irrigation system, where access to irrigation water cannot be separated from access to land. Indeed, water rights in the basin are so intricately linked to land ownership that they cannot be bought and sold separately from the land. The size of the landholdings thus became an important function of water allocation under British rule, which benefited large landowners at the detriment of small landholders. A consequence of this development was that the inequitable distribution of land ultimately precluded an equitable distribution of water in the Punjab.⁵⁵ These historical contingencies

There are an estimated one million tube wells in Punjab alone, the construction and operation of which are still completely unregulated, despite mounting concerns about the detrimental environmental effects of excessive groundwater exploitation.

continue to have a major impact on the socially mediated access to water in contemporary Pakistan, especially in the semifeudal rural areas of Sindh and southern Punjab.

From the outset, the establishment of the modern irrigation system and the agricultural colonization of the Punjab served the political objective of consolidating state power and stabilizing order in the newly acquired territories of the British Empire. Modern irrigation linked the power of the local “community” with the power of the state.⁵⁶ British policies effectively consolidated the power of rural elites and concretized social hierarchies and class divisions more generally. The landholding agrarian classes provided useful services to the colonial state and exerted disproportionate local control in the new system. This was partly due to the colonial practice of allocating peasant grants only to “hereditary agriculturists”—i.e., those who belonged to landowning peasant castes. This practice kept the lower strata of society from benefiting from agricultural expansion.⁵⁷

This preference for landed notables has had a lasting impact on Pakistan’s social structure and continues to define the social reality of access to water in the rural parts of the country. The concentration of economic power was further amplified by the Green Revolution and the increase in agricultural production, both horizontally across regions and vertically across class structures. Large and rich farmers who were able to afford the capital-intensive new technologies benefited disproportionately from them, whereas small and poor farmers could not compete with these technological advances and soon incurred substantial losses in output and income. As a result of these changes, the number of tenant farms was cut in half between 1960 and 1990, and the share of the landless rural population working as wage labor in Pakistan swelled to about 40 percent.⁵⁸ At the same time, these landless agrarian laborers faced increasing livelihood insecurity from the concurrent mechanization of agriculture, which contributed to a massive exodus of people from the Pakistani countryside to the cities.

Water conflicts in Pakistan are frequently linked to agriculture, which uses more than 95 percent of the country’s annually available water resources for irrigation.⁵⁹ Pakistan’s dependence on irrigated agriculture merits its classification as a “hydraulic economy,” in which agriculture directly provides 45 percent of the population with livelihoods and accounts for 21 percent of the country’s gross domestic product and 60 percent of its total exports.⁶⁰ However, Pakistan’s poor management and unequal distribution of water resources lead to only 45 percent of cultivable land being under cultivation at any given time, which means that the country uses almost the totality of its available water resources to support one of the lowest productivities per unit of water in the world.⁶¹ If Pakistan wants to ensure both the food and water security of its rapidly growing population and the health of its river ecosystems, it will have to end this waste and adopt more efficient and sustainable irrigation and farming practices. The various stakeholders in Pakistan’s water sector have begun to promote water-saving technologies that will curtail water waste in the short term, but the exacerbating water constraints will require a more fundamental structural change in irrigation management and agricultural production (particularly with regard to the crops being cultivated). We elaborate upon the existing structural conditions in the section below.

The Structural Conditions of Water Conflicts in Pakistan’s Canal Commands

Demand for water has increased substantially with the expansion of cropped areas and the increase of cropping intensities over the previous decades, even as the country’s canals are still operated based on colonial laws such as the Canal and Drainage Act of 1873. The ensuing

mismatch between water supply and demand drives many farmers to help themselves to meet their irrigation needs, either by extracting groundwater (which is neither carried out nor regulated by the provincial governments)—or by stealing canal water, a practice that is frequently at the root of microscale water conflicts.

Data from the Sahiwal Canal Division in central Punjab for the years 2012 to 2014 indicate substantial variation in the number of water theft cases in the division's distributary canals, both interseasonally and interannually. The interseasonal variation is due to the reduced demand for irrigation water—and hence the lesser need or incentive to steal canal water—during the *rabi* season from October to April. The distributaries that continually have the highest numbers of theft cases during this period (the 5L and 4R distributaries) are not particularly long, but both are located in relative proximity to the administrative center of Sahiwal.

It is notable that virtually no detected and reported water theft cases led to the registration of a First Information Report with the police, which is the precondition for a formal criminal investigation in Pakistan. Likewise, not a single water theft–related arrest was made during this period in the whole of Sahiwal Canal Division. It is also noteworthy that only a fraction of the fines levied by the irrigation officials for the reported violations were actually collected. Most cases of moga tampering (*tarwan*)⁶² and out-of-turn water taking (*warashikni*), which are the most common forms of water theft falling under the Canal and Drainage Act, are dealt with and decided by officials of the Punjab Irrigation Department, especially the executive engineer or the district coordination officer, who hold comparatively strong magisterial powers. This means that cases of water theft are generally dealt with by the department without involving the police or the judiciary. Recent administrative reforms have, in fact, further devolved the responsibility to resolve water conflicts to participatory water management institutions, notably the *khal panchayats* at the watercourse level and farmers' organizations at the distributary canal level.⁶³

A farmer at the tail end of the 9L distributary canal in the Sahiwal Canal Division wryly summarizes farmers' reluctance to involve the authorities in the resolution of water disputes:

I'm a poor farmer. I approach the chairman of the khal panchayat [in cases of water theft]. Some issues are resolved, but not all. If the value of the stolen water is PKR 500, the bribe to the police would still be PKR 1,000, so I'd rather keep silent. I would also have to buy the *lamberdar* [head of village] dinner to get him to act, which would easily cost me another PKR 500. (Farmer in Sahiwal Division, July 24, 2015)

The institutional framework that governs water management at the microscale has somewhat changed in the past two decades. The *khal panchayats* and farmers' organizations established as part of the larger effort to decentralize Pakistan's water sector since the 1990s are also the primary authorities responsible for resolving water conflicts at the watercourse and distributary canal level, respectively. However, field interviews indicate that these institutions do not yet fully serve their purpose and that they are afflicted by many of the ills that plague Pakistani bureaucracy more generally, such as a vulnerability to political interference and corruption. A water expert interviewed in Lahore asserts that the farmers' organizations introduced in newly established area water boards under the Punjab Irrigation and Drainage Authority were essentially "set up to fail": they have been assigned bothersome tasks that the Irrigation Department doesn't want, but they cannot cover areas previously not covered by the department (such as groundwater governance, which has become a crucial issue), and have hardly enough resources to run their operations.⁶⁴ The costs of collecting the canal water tax (*abiana*) from farmers often exceed the actual revenues from the tax.⁶⁵ This imperfect implementation of participatory water reforms reflects deeper structural problems that persist

Field interviews in central Punjab confirm that the prevalence and intensity of water conflicts inversely correlates with the closeness of social ties between individuals and families in a community.

within the Pakistani water bureaucracy, which agreed to devolve powers less out of a conviction of its appropriateness, than in an attempt to meet donor requirements.

Field interviews in central Punjab confirm that the prevalence and intensity of water conflicts inversely correlates with the closeness of social ties between individuals and families in a community. In communities dominated by members of the same extended family or caste, water disputes, if they arise at all, are generally successfully resolved internally before they escalate into violence or formal authorities are involved to investigate/adjudicate. Even where powerful individuals from outside the community steal canal water or otherwise harm the legitimate rights and interests of downstream farmers, overt conflicts do not necessarily arise; farmers in rural Pakistan are acutely aware that political and economic power tends to override the formal mechanisms through which they are supposedly able to defend their rights and achieve justice. Many farmers interviewed for this report took a rather fatalistic stance on the possibility of defending their rights against the vested interests of wealthy and politically well-connected landlords. This issue is clearly exacerbated by the continued lack of accountability on the part of the relevant government departments and institutions, which still seem guided by a colonial bureaucratic ethos—which patronizes and is adversarial toward the public—rather than a sense of genuine civil service. An effect of the Pakistani water bureaucracy’s isolation from, and occasional hostility toward, civil society is its vulnerability to meddling by powerful politicians, who exploit the weak relations and pervasive suspicion between the state functionaries and the public.⁶⁶ The farmers ultimately pay the price for these institutional deficits, as they often find themselves up against unresponsive irrigation officials and powerful landholders with no legitimate way to hold either to account.

Financial constraints also contribute to the dismal service delivery of the provincial irrigation departments. The abiana rates have not been adjusted to keep up with inflation or reflect the real value of irrigation water. In Punjab, the abiana amounts to merely PKR 135 per annum per acre of irrigated land, which is 15–20 times lower than the cost of tube well irrigation water for the same area of land. However, the Planning Commission of Pakistan estimates that on average only 60 percent of the assessed amount is actually annually recovered across the country, and that the generated revenues cover only 24 percent of the annual operation and maintenance costs of the extensive canal irrigation system.⁶⁷ It is little wonder, then, that this mismatch results in a vicious cycle where farmers’ dissatisfaction with the poor performance of the irrigation system leads to low fee payments, which in turn leads to further deterioration of the irrigation infrastructure and services.

Water Access as a Point of Contention and a Means to an End

Unlike water conflicts at the national and international level, which are often embedded in complex institutional frameworks designed to defuse tensions and prevent escalations, water contestations at the local level are more prone to turn violent. Local conflict-resolution mechanisms may be easily flouted, and deprivations have immediate repercussions on farmers’ livelihoods. At the microscale, moreover, water tends to be an instrument or accelerant of conflicts rather than the original cause. As a superintending engineer of the Punjab Irrigation Department said:

In 100 percent of the [water-related] cases that I have prosecuted, the grievance is something else, but they make cutting off the water...a way of settling disputes. In my thirty-year experience, there has never been an instance of water being the sole cause of conflict. It has always been the symptom and a weapon for settling other disputes. (Superintending engineer, Punjab Irrigation Department, April 27, 2015)

Many water conflicts in rural Punjab investigated for this report turned out to be about personal grievances or political disagreements in the first instance, and the (denial of) access to irrigation water supplies eventually became leverage against an opponent. Differing or changing party affiliations and the perceived challenges that these pose to interfamily and intercaste relations in a largely collectivist political culture are a case in point and were a common theme in our interviews. This is not to say, however, that contestations over water do not lead directly to violence at times.

A case of intercommunal conflict along a minor canal (off the Gogera Distributary in Tandlianwala in Faisalabad District) illustrates the institutional and governance failures that induce water conflicts in rural Pakistan. In the 1960s, the Punjab Irrigation Department extended this canal by about two kilometers to irrigate previously uncultivated land along the Ravi River. But it did not increase the canal water supply; rather, the existing quantity was divided among a larger number of users, which substantially reduced the share of the original farming community. The farmers were not consulted in the reallocation process, nor did they ever relinquish their rights to the water. As the actual volumetric supply of water went down, the upstream farmers began to steal the water allocated to the new tail-enders by putting a barrier and pipes into the minor canal. After the failure of several attempts at resolving the conflict internally and an armed standoff and scuffle between members of the two communities, the Punjab Irrigation Department was eventually involved to settle the dispute once and for all. However, its officials ultimately suggested that the farmers at the tail end relinquish their rights to their irrigation water and in turn be exempted from the payment of the canal water fee, thus siding with one party to the conflict and not addressing the water insecurity at the tail end in any way. The officials' collusion with the more powerful and politically well-connected farmers and their neglect of the weaker party is representative of the commonly alleged failure of the irrigation department to fulfill its obligations toward farmers in the vast canal command areas.

Water access is often leveraged in disputes within and between agricultural communities. In Sahiwal District, for instance, a dispute about the reallocation of leftover surplus irrigation water (*niqal*) broke out among farmers at the tail end of a village watercourse after the recipient of the *niqal* stopped a long-standing practice of sharing the water with two neighboring families—a change that took place after the families changed their political affiliations. While they held no rights to the water, the families felt entitled to a continued share of it. A first plea of the original recipient's decision to reallocate the surplus water was rejected by an irrigation official several years ago, but a second one recently yielded a favorable decision that effectively reallocated the *niqal* to one of the other families, and hence away from the original recipient. It is not known why the official settled the water dispute in a way that merely recreated the unequal allocation that gave rise to the conflict in the first place. The decision indicates, however, how deeply water access and politics are entangled in rural agricultural communities in Pakistan and the extent to which personal and political influence undermines institutional and judicial processes. It is noteworthy that while a change of party affiliation may have triggered the conflict in the first place, it may also have led to resolution of the conflict in the contesting family's favor. The president of the farmers' organization in charge of the mediation happened to have the same party affiliation as the people who had been deprived of the water by their neighbor.

A similar political underpinning could be identified in the murder of a village headman in Sahiwal District in 2015 over a water allocation dispute. The primary account of the incident emphasized the dispute between two families over the timing of the irrigation of a plot of land.

But as we further queried those with knowledge of the event, it emerged that a change in the political allegiance of one of the families had caused a rupture between them. While we can't know with certainty whether the water dispute or the political change was the more important cause, the escalation of the conflict into murder cannot be explained merely with reference to the economic or social value of the irrigation water. Rather, it has to be viewed through the prism of a local culture that sanctions the use of violence in the pursuit of vested interests and the restoration of honor. Here again, then, water was possibly one of the weapons in a larger political conflict rather than a main driver of conflict itself.

Future Pathways

Irrigation water conflicts at the microscale will remain a concern in Pakistan given the disproportionate share of the country's water resources allotted to irrigation and the continuing importance of irrigated agriculture for the national economy. Other conflicts at the subnational level may eclipse local irrigation water conflicts in their scope and the attention they receive from both politicians and the public, but the unequal access to, allocation of, and availability of irrigation water and attendant conflicts will continue to permeate rural life and affect the livelihoods of a sizeable share of Pakistan's population. The institutional factors that are conducive to irrigation water conflicts, such as the lack of accountability on the part of irrigation officials and the impunity of powerful landlords, cannot be viewed—or transformed—separately from the wider bureaucratic and political culture of Pakistan. The ineffective performance of participatory water management institutions such as farmers' organizations suggests the constraints that the wider structural context imposes on individual initiatives or attempts at fixing parts of the current system.

One way to modulate water conflict could be to decrease the water charges and/or increase water allocations proportional to users' position along an irrigation distributary and village watercourse. At the moment the flat water charges and water allocations per acre are patently unjust, because volumes of water received at the head and tail of a watercourse are likely to be very different. The tail-enders should be given preferential treatment in terms of allocation and/or cost of water so that a key, deliberately unjust aspect of the irrigation system is removed. This change might also remove an important reason for conflict in the system. It would of course also have to be coupled with appropriate institutional reforms in the provincial irrigation and drainage authorities and irrigation departments.

The participatory irrigation management model can work very well in areas where there is not a big difference in power and land holding between farmers. But it cannot work where there are big differences in power. In that vein, then, the Pakistani irrigation system could have a hybrid management system, where large farmer-dominated areas are administratively managed by well-paid and secure irrigation officials, and small farmer-dominated areas are managed in a participatory fashion by the farmers. But participatory reforms, where implemented, currently do quite the opposite of what is suggested here, for the reasons that have been discussed in this chapter—e.g., large farmers' power and relationship to the state enables them to have favorable participatory reforms in their areas to the neglect of the areas dominated by small farmers.

In the short term, the on-farm water management methods and conservation technologies being promoted by both the government and nongovernmental organizations (such as the laser-leveling of fields or the introduction of drip irrigation) may allow agricultural production to continue. In the long run, however, Pakistan will not be able to avoid addressing the

Irrigation water conflicts at the microscale will remain a concern in Pakistan given the disproportionate share of the country's water resources allotted to irrigation and the continuing importance of irrigated agriculture for the national economy.

larger structural and institutional issues that plague its agricultural economy, particularly the gap between the designed and the actual cropping intensities of the irrigation system and the cultivation of water-intensive cash crops in water-stressed areas. Conflicts within and between farming communities will be exacerbated as agricultural production increases and the available quantities of water for irrigation remain constant (or decrease). Irrigation water conflicts in rural Punjab cannot be detached from other contestations over water and questions of justice at the subnational level; as an executive engineer at Sukkur Barrage in Sindh stated, “There is a Kalabagh Dam on every watercourse in Sindh.” It would be well if the debate about subnational water conflicts in Pakistan reflected this awareness and irrigation water conflicts at the microscale were given the careful attention they deserve.

Farmer-Fisherfolk Conflict: The Case of Sindh’s Manchar Lake

This chapter looks at conflict between the vulnerable, marginalized indigenous fisher communities and the culturally and economically dominant farming communities living on or around Manchar Lake in Sindh Province. Big infrastructure projects and development imperatives are causing an ecological disaster and the dispossession of the vulnerable fisherfolk. The conflict is one in which the politics of water and land are played out through preexisting class divides.

We begin by explaining the physical context of the Manchar Lake conflict, and then provide the historical context. We describe how big infrastructure projects—from the Sukkur Barrage to the unfinished drainage canal known as Right Bank Outfall Drain-II (RBOD-II)—have changed the geographies of power and vulnerability in the lake. The contamination of the lake’s water with industrial and agriculture wastewater has produced new vulnerabilities and ignited conflict over natural resources among the communities inhabiting the lake. We analyze the conflicting interests of the fisherfolk and the farmers as well as the role played by patronage politics in a setting where class, caste, and political affiliation intersect to perpetuate vulnerability and dispossession. We then discuss future pathways for Manchar Lake and offer some recommendations.

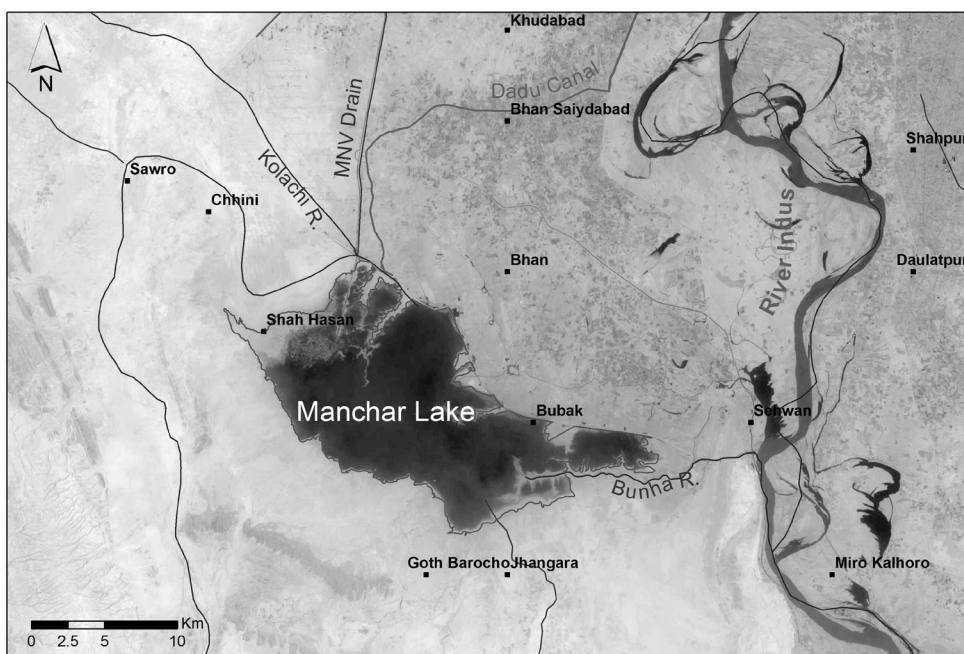
The Physical Context

Manchar Lake is the largest freshwater lake in Pakistan and one of the largest in Asia. It is located west of the Indus River, in the province of Sindh, with the closest urban center, Sehwan, about eighteen kilometers away. The lake covers an area of approximately 233 km² (figure 4). The lake in its current form was created in the early 1930s, when the Sukkur Barrage command area was constructed. The lake is a natural depression flanked by the Kirthar hills in the west, the Laki hills in the south, and the Indus River in the east.

During monsoon season (July–September) water enters the lake through the many torrents (*naai*) coming from the hills.⁶⁸ The lake gets freshwater from the Indus River through five main sources (see table 4). Rainwater from the catchment area encompassing West Sindh and Balochistan comes through the Gaj River, while high floodwater arrives through the Aral Laki Canal and the Danister Canal. The Aral Manchar Canal is an inundation canal, while the Main Nara Valley Drain (MNVD) channels effluent water from Hamal Lake (upstream) into Manchar Lake (figure 5).

The World Bank–funded construction of the Right Bank Outfall Drain (RBOD) was initiated in 1992 (see table 5 for a timeline of the project) in order to drain agricultural effluents and municipal waste from low-lying lands on the right bank of the Indus River into the sea. The project is ongoing, but since 1996 the MNVD has been extended from the up-

Figure 4. Map of Manchar Lake



Source: Faisal Mueen Qamer, © 2017.

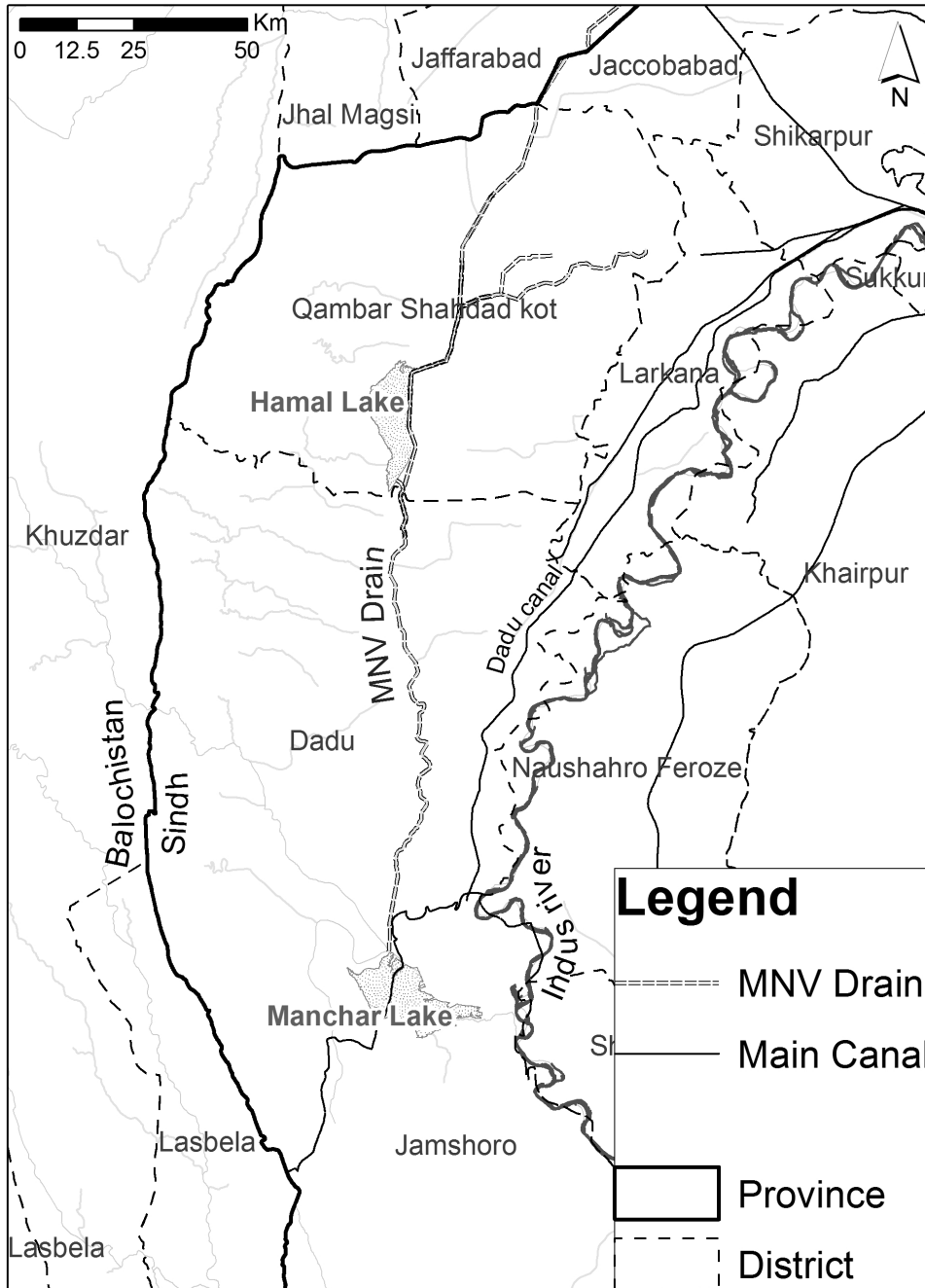
Table 4. Main Sources Feeding Manchar Lake

Gaj River	This is the main source and brings about 350,000 CFS of storm water from Balochistan during heavy rains.
Aral Manchar Canal	This inundation canal is located off the Indus River upstream of Sehwan Town. Its head regulator is at Larkana Sehwan Bund. Designed to carry 4,370 CFS discharge, it both drains and fills water for Manchar Lake, according to water demands.
Aral Laki Canal	The canal is situated downstream of Sehwan Town (Lal Bagh). It is controlled through the Aral Tail regulator, which was constructed on a depression and damaged during the 1995 flood, then subsequently remodeled by adding one span on each side to carry 25,000 CFS discharge.
Danister Canal	The canal head regulator was washed off during the 2010 flood and was subsequently remodeled in 2012–13 to carry about 3,500 CFS discharge. The tail regulator is located at RD 62 of Manchar Containing Bank, and its discharge is 500 CFS. The regulators both drain and fill water.
Main Nara Valley Drain (MNVD)	The MNVD was constructed in 1932 to provide drainage for rice effluents and rainwater and to pass floodplain flows, which were stored at Hamal Lake. The drain diverts water from F.P. Bund RD 346, where its head regulator (constructed in 1972) is located. The effluent water of Hamal Lake (upstream) finds its way into the MNVD.

Source: Sindh Irrigation Department, October 2015.

per reach up to Balochistan and Punjab Provinces. As a result of this drainage, saline water from the districts of Larkana, Shikarpur, and Qambar Shahdadkot and wastewater from industries in Balochistan and Punjab have been dumped into Manchar Lake. They have contaminated the water and disrupted the lake’s ecosystem, with disastrous consequences for the surrounding communities.⁶⁹

Figure 5. Main Nara Valley Drain Channels



Source: Faisal Mueen Qamer, © 2017.

Historical Developments: Engineering a Disaster

“Manchar is the most important thing for us, if it gets well, we all get well.”
 —Fisherman, Khair Din Mallah village

Groups of fisherfolk have lived on Manchar Lake for decades, earning their livelihood almost entirely from fishing-related activities. These groups include the Mohanas, who live mainly on houseboats, although some permanent villages (*miyannies*) exist, as well as members of the

Table 5. Timeline of the RBOD

1932	The MNVD connecting Hamal Lake with Manchar Lake (111 km) was constructed to provide drainage for agricultural and waste storm water.
1976	The North Dadu surface drain was built by WAPDA to carry waste for disposal in Manchar Lake.
1992	The Right Bank Master Plan was designed to provide drainage and boost agriculture across some 4.5 million acres of land irrigated by the right bank canals emanating from the Sukkur and Guddu Barrages.
1994	The RBOD was designed to divert the effluents from Manchar Lake to the Indus River through the Indus Link Canal, but the project stalled because of objections from environmentalists.
2001	WAPDA began work on RBOD-II to drain saline water from Manchar Lake into the Arabian Sea. It was to be finished within four years, but it is still far from completion.
2004	During Prime Minister Zafarullah Jamali's term, another drain was built, the RBOD-III, to dispose of effluents from Balochistan in the RBOD and Manchar Lake.

Sources: Z. T. Ebrahim, "The Destruction of Pakistan's Manchar Lake," Third Pole, September 17, 2015, www.thethirdpole.net/2015/09/17/photo-story-the-destruction-of-pakistans-manchar-lake/; Z. Birwani and M. M. Noshirwani, *To Secure Livelihood Resources for the Fishing Communities of Manchar Lake and Karachi Coast* (Karachi: Trust for Conservation of Coastal Resources, 2014).

Mallah caste. Manchar Lake was historically home to several species of fish, which used to be transported to other cities in Sindh, Punjab, and Balochistan via railways. The fishing communities used to live a relatively prosperous life. As put by a fisherman in the village of Ibrahim Rodhani: "Until the early 1990s Manchar was like Dubai for us. There was fishing, crops, and bird for us to hunt, and fodder for cattle."⁷⁰

Until 1990, more than two thousand houseboats on the lake were home to forty-five thousand to fifty thousand people, and there were thousands of small commercial boats as well. By 2010, the population had dwindled to less than twenty thousand people.⁷¹ The Mohanas have been living on boats for generations, but the degradation of the lake and the subsequent loss of their main livelihood source has forced many to move to the embankments, to migrate to other areas for labor, or to supplement their income with wage labor. In winter, when the lake water recedes, the Mohanas used to build huts on the banks of Danister and Aral Wah Canals and migrate there temporarily. As the fish catch declined, these temporary shelters became more permanent.

Before the RBOD, the average catch was twenty to eighty kilograms of large fish per trip.⁷² Today the catch is restricted to small, unprofitable fishes, locally known as *dhayya*, which are sold for PKR 50 per kilogram and used as chicken feed. The pollution of the lake has also destroyed the flora, and thirty species of aquatic plants are now extinct. There has been also a dramatic drop in the numbers of Siberian migratory birds, which used to stop off at the lake en route to India. But the lake no longer provides fish for birds' diet or flora for nesting and roosting grounds. In 1988, twenty-five thousand birds were counted, but that number had dwindled to just 2,800 birds by 2002.⁷³

The lake also provided large volumes of water for irrigation through the Danister and Aral Wah Canals to the land around Sehwan and Johi *tehsils* (administrative units). The land is now polluted and no longer viable for agriculture. Some farmers have lost their livelihoods, and have also been forced to migrate or seek other ways to support themselves.⁷⁴

The education and health situation for the people of Manchar is dire. There are only four government primary schools. A few schools have been established by local nongovernmental organizations, but the lack of qualified personnel, widespread absenteeism, and delayed infrastructural work have made these interventions barely relevant for the children of Manchar, especially for girls. There is only one dispensary at the lake, though polluted water increases the risk of water-borne diseases, including gastrointestinal diseases, scurvy, and eye infection. Hard labor and undernourishment, especially for women, causes a number of other health issues, along with increased danger during pregnancy.

The dispossession and vulnerability of the local people has been engineered by the development of the MNDV, as well as by bad decisions taken by the main actors engaging with the various phases of the RBOD project. There is little doubt that the RBOD is the main cause of the contamination of the lake's water, as several academic studies confirm this.⁷⁵

In 2002, WAPDA began the second phase of the RBOD (RBOD-II) to drain saline water from Manchar Lake into the Arabian Sea. The project was supposed to be completed in 2004 at a cost of PKR 14 billion (US\$135 million) but remains unfinished. According to Mr. Mohammad Idris Rajput, a former Sindh Irrigation Department official, the scheme is about 70 percent completed. He identifies corruption as contributing to the delay:

It could be completed in two years, in principle, but all depends on the political will and the allocation of funding. Corruption is the biggest issue, along with the fact that engineers are not given enough authority, and all relies upon the unwise choice of power-driven and corrupted politicians. (Mohammad Idris Rajput, Karachi, April 21, 2015)

Mr. Rajput endorsed the project from a technical perspective, but he is concerned over its viability in the present politico-institutional context. Even more sceptical was Syed Murad Ali Shah, formerly finance minister and now chief minister of Sindh:

The RBOD is being financed by the federal government. The last estimate was PKR 50 billion. They have spent about PKR 20 billion. I personally believe that this scheme will never be completed. (Syed Murad Ali Shah, April 29, 2015)

The fisherfolk likewise have doubts, but they nonetheless do not want to leave Manchar. They are enduring terrible conditions in the hope of getting back their lake, which constitutes their food, their water, their livelihoods, and their culture. The fisherfolk hope that in addition to the RBOD-II, there will be interventions to channel freshwater to the lake.

As of October 2015, the Sindh Irrigation Department was carrying out a feasibility study to explore four technical solutions for improving the quality of water in Manchar Lake and restoring ecological balance in the area. The solutions include

1. Diverting the polluted water of the MNVD into the Arabian Sea through the RBOD, and allowing only acceptable flows into Manchar Lake
2. Bringing freshwater from the Indus River into Manchar Lake by excavating a canal upstream of Dadu Moro Bridge
3. Bringing freshwater from the Indus River into Manchar Lake by upgrading the existing Danister Pumping Scheme, opposite Sehwan town
4. Providing water supplies from the Nai Gaj Reservoir

While this study by the Sindh Irrigation Department represents an important step, there is no guarantee that its recommendations will be implemented; it may encounter obstacles, just as the RBOD-II project did. In the words of a senior official of the Sindh Irrigation Depart-

ment (April 28, 2015): “We will do our job, but you can’t say anything about the political issues that affect our work.”

Contracts, Commercialization, and Conflict: Fisherfolk versus Contractors

There are a lot of factories and big landlords who dump their waste in the MNVD. We are poor, humble people. We cannot pick a fight with them and ask them to stop this to save ourselves. We just have to bear what they are dishing out to us. (Fisherman, Khan Mohammad Mallah village, April 23, 2015)

In 1998, fishing rights on Manchar Lake were opened for auction and a fishing contract system was set in place. Contractors (*thekadar*) and middlemen were allowed to enter the marketing system and set the price of fish, thus depriving the fisherfolk of the right to determine the price of their own work. In the early 2000s, several organizations lobbied for the rights of fisherfolk (e.g., Pakistan Fisherfolk Forum; Pakistan Network for Rivers, Dams and People; Shirkat Gah; and Panos). The Pakistan People’s Party, sitting in the opposition at the time, promised to abolish the contract system for fishing. Eventually, in 2011, the Pakistan People’s Party did abolish it with the Sindh Fisheries (Amendment) Act, which replaced the contract system with a new licensing system (under which a license cost PKR 600 a year). The 2011 Amendment Act also provided a definition of “fishermen” that distinguishes those whose primary source of livelihood is fishing (the fisherfolk) from others, such as contractors, who fish for profit or out of commercial interests.

But the licensing system was not implemented, partly due to the opposition of powerful interest groups, and the contract system is still in effect. As a couple of fishermen explain:

The people working for the contractor are outsiders and not from our community. They have no legal right to fish here, or to stop us from fishing here, but they are powerful and we are not...[The Pakistan Fisherfolk Forum] has organized campaigns against the contractors and the contracting system. But the contractors are very resourceful and they have the support of the MPAs [members of the provincial assembly], MNA [National Assembly], and *waderas* [landlords]. (Fisherman, Mustafa Mallah village, April 23, 2015)

Contractors are still very much here. They would not let us touch fish in this water. There is no legal way they can stop us, but they bring in gangsters and scare us away from getting any fish. They want us to sell all of our catch to them for half the price we would get otherwise. (Fisherman, Khan Mohammad Mallah village, April 23, 2015)

The contamination of the lake and the persistence of the contractor system have pauperized the fisherfolk, many of whom now depend on middlemen for loans; some loans are for purchase and repair of boats and nets (up to PKR 150,000 needed), but most are consumption loans for everyday expenses or repayment of ancestral debt. The middlemen keep a 20 percent commission on the fish sold to them by the fisherfolk. The decline of fishing livelihoods caused by lake pollution, along with the dependency on borrowing, has left the fishing communities vulnerable to this exploitation by more powerful groups.

Almost all of the traders used to be of the Mallah caste before the 1990s, and are in fact dependent upon the business they do with the Mallahs. Now even the Balochs, e.g., Jamalis, Buzdars, Rudhranis [Balochi tribes, traditionally farmers] have entered the trade. In fact, they are the majority of the lenders. They used to be the laborers of the Mallahs, but now they are more powerful. (Fisherman, Khair Din Mallah, April 23, 2015)

Over the last five years, more and more fisherfolk have stopped working with contractors. They are increasingly diversifying their livelihoods by reverting to different forms of migration and daily wage labor. These are risky strategies, which come at a very high cost. They travel to places as far as Sanghar District (located in central Sindh) and the coast of Balochistan,

Karachi, and even up to Hamal Lake. Migration was never part of the portfolio of livelihoods of the Mallahs. As incisively put by a fisherman:

Before, we never used to leave Manchar. In the 1970s my grandfather went to visit Hyderabad [about 175 km away] and the entire village gathered to see him off with tears, saying that he was going *pardes* [abroad]. Now we are always abroad. (Fisherman, Khair Din Mallah village, April 23, 2015)

Fisherfolk are likewise vulnerable to exploitation in the destination areas. For instance, a fisherman reported that at Hamal Lake a local *sardar* (tribal chief) extorts money from them: “He pays fisherfolk PKR 10,000 but claims that he pays PKR 100,000 and that they owe him PKR 90,000.” Those now employed as fisherfolk on the coast of the Arabian Sea also shared the difficulties encountered while adapting to a different type of fishing, which entails going into deep water and getting used to storms and winds.

Whereas under the law the contractors are no longer allowed to exploit the fisherfolk, in practice political patronage, intimidation, and structural dependency force them into a state of subjugation, with little ability to negotiate.⁷⁶

Local Geographies of Power between Land and Water

The Need for Drinking Water

Access to drinkable water has become the most pressing issue for the fisherfolk. The government has provided only two rural water supply schemes and twelve reverse osmosis (RO) water filtration plants for all of Manchar Lake, leaving 60 percent of the fisherfolk with contaminated lake water for drinking, cooking, and other domestic purposes.⁷⁷ Access to RO and solar RO filtration plants is regulated by political patronage and tribal ties.

In the village of Khan Mohammad Mallah, located on a strip of land separate from the mainland and reachable only by boat, the water quality has been deteriorating for the last ten to twelve years. Earlier, the community was using an underground aquifer east of the village for freshwater. Three to four years ago, the aquifer water became bad and brackish, after which a nongovernmental organization installed a filter plant. Fisherfolk interviewed for this study reported that the RO plant motor and the entire plant were stolen four days before our April 2015 visit. They pointed out that the removal of the plant required technological knowledge, and they suspect the thief to be a knowledgeable person, working for powerful people.

The RO plant was installed far away on the mainland next to the road [that is, not easily accessible to the fisherfolk] because an influential person got the government to install it on the mainland under the plea that others could benefit from it...in addition to the fisherfolk. The reality is that this is a tribal area and if we had the plant here, we won't let outsiders...come here and take water either. So we don't like going to the other tribe's area either for water. (Fisherman, Khan Mohammad Mallah village, April 23, 2015)

Solar RO plants have been provided to villages who have contacts with MPAs and waderas [landlords]. We would also like to have the solar plant, here in the village—if you could please help us get one. Other places have solar systems, which provide them electricity. Here at night I can't even see where I am going or if I am stepping on a snake. I have fallen in the water at times at night. Surely we deserve at least that much. (Elderly woman, Khan Mohammad Mallah, April 23, 2015)

In the village of Khair Din Mallah, the interviewees complained about the poor maintenance of the government-installed RO plant. The membranes have not been changed and they no longer filter. *Thekedar* [patrons] of the RO plant said that the replacement of the filtration membranes would cost PKR 200,000, which is far beyond the reach of the villagers.

The lack of drinkable water has allowed the spread of water-borne diseases, some causing blindness or other symptoms in the interview subjects. A bottle of mineral water costs PKR 40,

too expensive for most fisherfolk. Dehydration and malnutrition are widespread. The villagers' diet is based on rice with cardamom and sugar for dinner, and papad *chai* [tea] for breakfast. Meat is reserved for special guests: "For now we can't even serve proper food to our guests. And if we can't do that, what kind of a life is this?" lamented a fisherman in Khair Din Mallah.

Despite the hardships they face, the fisherfolk are very reluctant to abandon the lake for good and still hope for a better future:

These people have seen so many difficulties they have to be [the] bravest people in the world to be still living on this lake. They drink poison but won't leave this lake: amazing! They work for six months in the sea but won't take their kids, because they want their old life back. When the RBOD is done, this problem will be over. (Fisherman, Mustafa Mallah village, April 24, 2015)

Water fetching has become increasingly burdensome for women. Previously, women were engaged in livelihood activities related to fisheries, but they are now mostly restricted to the domestic sphere. Women and young girls collect low-quality water from available sources located up to thirteen kilometers away from their village. Even when the source of water is closer, women and girls risk harassment from men in the village, who may belong to other ethnic groups or classes; the villages with water are mainly populated by the Jamali tribe, who are Balochi farmers, and they do not welcome the fisherfolk.

The fisherfolk perceive political patronage as the only way out of their sufferings. Access to water can be granted only via a system of patronage, which at least partially shields the fisherfolk from open conflict with the waderas. Nevertheless, the fisherfolk recognize that political patronage does not necessarily guarantee easy access to water, as one fisherman observed:

We have access to Syed Murad Ali [then finance minister of Sindh Province], who is a patron and like an elder brother to us. He is the local MPA. But the reality is that before we can get to him, we can be imprisoned by the police at the behest of a local big farmer, especially during election time. So, you see, it is not a surprise that humans have made it to the moon and Pakistan is still the same as before (Fisherman, Khair Din Mallah village, April 23, 2015).

Farmers and Fisherfolk in Conflict

Conflict between fisherfolk and farmers inhabiting the land around Manchar Lake is getting worse, as both communities contest each other's right over fish and birds. The vice chairperson of the Pakistan Fisherfolk Forum, Mr. Mustafa Mirani, traces the roots of this conflict back to 1976–77, when Zulfikar Ali Bhutto, then the prime minister, visited Manchar Lake and embraced the demand of the fisherfolk to raise its water level from eight feet to twelve feet in order to secure sufficient water in dry winters. This intervention submerged farmers' property, and despite the scheme launched by the government to compensate farmers, acrimony lingers, and claims for (higher) compensation continue to be made. Farmers and officials report that only some of those entitled to compensation actually received it. Fisherfolk and landholders both reported an escalation of the conflict in the 1990s, when the decline in the fish and bird populations due to contamination further fueled grievances:

Farmers and fishermen...were all equal because we have our livelihoods and they have theirs. But ever since the fish catch has declined we have become like the servants of the *zamindar* [landholders]. (Fisherman, Khan Mohammad Mallah, April 23, 2015)

We have a claim on the Manchar...The big landlords got compensation, but [there is] no compensation to the ordinary people. Even our houses were where the Manchar is right now. In the past, with the sweet water, every time the water went down we would get a crop. We would do *rabi abadkari* [winter irrigation] when there was sweet water. (Farmer, Safi Thalo village, April 24, 2015)

The increasing conflict between farmers, landlords, contractors, and fisherfolk over fishing rights coincided with dwindling supply of fish in the lake. As fisherfolk have been forced to leave their boats and move to the shores, hunting rights have also become more contested. Both fishing and hunting rights have traditionally been allocated following customary laws. The Mallahs have rights over the fish, as set forth by the Sindh Fisheries (Amendment) Act of 2011; hunting rights for birds are parceled out, and one can hunt only on one's own land. Farmers are now asking fisherfolk for money and royalties to hunt on their lands and have also started staking out a claim to land on the lake section. Fisherfolk pay for licenses and are de jure protected by the Sindh Fisheries (Amendment) Act of 2011, but they feel increasingly exposed to the attacks of the farmers.

The Role of Oil in Furthering Conflict

Since the MNVD started and the fish disappeared, the farmers and thekedars [contractors] have taken over the lake. Now, there is also this oil company that seems to own the lake, and not us. (Fisherman, Khair Din Mallah Village, April 23, 2015)

The fight between the fisherfolk and the farmers is further complicated by another resource: oil. Since 2013, BGP (a Chinese geophysical service company providing services for the oil and gas industry and working as a contractor for Pakistan Petroleum Ltd.) has been conducting oil explorations in the lake. In late 2014, BGP conducted a seismic survey that killed a large number of fish (mostly the low-quality dhayya fish that now populate the lake).

Section 7 of the Sindh Fisheries Ordinance of 1980 prohibits “the use of dynamite, poison, lime or noxious material in any waters with the intention of catching or destroying fish or aquatic life therein.” The ordinance seems to pertain only to fisheries and not to other industries active in the lake. A spokesperson for the oil company working as a contractor for Pakistan Petroleum Ltd. told reporters that Pakistan Petroleum Ltd. had “acquired the necessary approval from the Environmental Protection Agency...before starting the seismic survey around the Manchar lake.”⁷⁸

After the discovery of the dead fish, the fisherfolk were accused of using chemicals to catch the dhayya (in violation of Section 7 of the 1980 ordinance). These claims recalled accusations made against them in the 1990s, when construction of the RBOD and increased pollution caused fish to die off. Fisherfolk interviewed for this report categorically denied having ever used chemicals for fishing:

Our children and our lives depend upon this lake. We eat the fish here. How could we poison what we eat? If we poison it, we kill ourselves: this [accusation] is outrageous. (Fisherman, Mustafa Mallah village, April 23, 2015)

Every time we catch fish by digging a hole we would not put chemicals in there. In a 12 foot deep and 233 km² lake, how much poison should one use to actually catch fish? Do you know how expensive [any] chemical is? How much is fish worth? How could it economically make sense? Name me one example of anybody caught for putting chemicals in the water. They need to shut down the RBOD. (Fisherman, Sehwan, April 23, 2015)

The fishing communities see these accusations as a strategy to scapegoat them and free the oil company of its responsibility. The oil company's attempt is just the latest in a series of efforts to plunder the resources of the lake—efforts that result in the destruction of the fisherfolk's livelihoods. The fisherfolk themselves are very clear in pointing to the RBOD as the original cause of their misery.

The landholding farmers, unlike the fisherfolk, were quite positive about the oil exploration and looked upon it as a big opportunity to make money by collaborating with BGP. As described by one farmer:

If the BGP finds any oil in our land, because we have survey numbers for our underground property, we for sure will ask for royalties for the oil drilled from our land. (Farmer in Shafi Talu, April 24, 2015)

The fisherfolk also perceive the landholders as being more aggressive with their claims on the lake since the arrival of the oil company. The landholders asked that the company pay a commission for using their land. The company hired boats from the fisherfolk, but the farmers extorted a commission of PKR 200 per day from the fisherfolk who had rented out their boats. The company also used speed boats, which destroyed many of the fisherfolk's nets.

The fisherfolk tried to organize themselves and oppose the seismic survey, which they saw as further hurting their already meagre livelihoods. However, they were discouraged by the farmers:

It was known that the federal government has sent [the oil company], the [paramilitary Sindh] Rangers were with them, and if anybody went against them, they would have had a First Information Report [police report] against them and [be sent] to prison...We are poor people...The farmers said to us that the waderas would kill us [if we protested], and if not them then the Rangers will, so please don't spoil our livelihoods or lives. So, I thought if that's what the farmers want, I better step back. (Fisherman, Mustafa Mallah village, April 23, 2015)

Farmers interviewed indicated that the oil company's activities are actually controlled and run by local gangsters:

They [BGP] gave all the money to the big-shot gangsters. Yar Mohd. Rind from Shoran, in Balochistan, is extorting money from the oil company. He also extorts money from transport and for jobs. Even the company people cannot rent a car without his approval. (Farmer, Zamindar Bukhari, April 24, 2015)

(Is It Always) Development versus the Environment? Future Pathways

The depletion of the lake ecosystem and the subsequent loss of basic amenities and livelihoods are fostering conflict and pauperizing the fisherfolk of Manchar. The contamination of the lake ecosystem has very little to do with nature, but is rather the result of an ill-designed World Bank-funded megaproject that is sacrificing entire communities in the name of a certain paradigm of "development."

The "development versus environment" debate is a frequent feature of big infrastructure projects, and sacrificing the environment is often portrayed as a necessary evil in order to foster development. Manchar Lake is but one example of how the imperatives of development, as endorsed by the state, ignore local views in pursuit of some not always well-defined goal.

In the case of Manchar, the vulnerability of the most dispossessed and vulnerable has been "engineered" by the imperatives of a model of development that imposes technical solutions on preexisting processes and ignores rural social and class differentiation. Under the circumstances, it is not surprising that the politics of water, land, and class dynamics lead to conflict.

The outlined conflict between dispossessed fisherfolk and an increasingly powerful class of farmers/landholders can be addressed only if sound technical solutions are integrated within a transparent consultative political process.

Toward that end, we recommend the following:

First, meeting the basic needs of the dispossessed communities is paramount. Providing drinking water facilities should be prioritized, and the existing RO plants must be maintained,

possibly by people from the community who are given special training. Health and education schemes should be launched, with special attention to girls and women. Programs have been launched seeking to ensure that fisherfolk's basic needs are met, such as the joint project initiated by the Benazir Income Support Programme and the Zakat Department in 2013—at a cost of more than PKR 50 million. But institutional barriers and a lack of coordination and transparency are preventing meaningful relief.⁷⁹

Second, greater coordination and transparency are needed to address holistically the different issues and interests at play. Several actors, including the Pakistan Fisherfolk Forum, are asking that a Manchar Lake Development Authority be established as a forum where representatives of the fisherfolk, farmers, and local organizations can start a consultative process in coordination with the concerned government departments. Such an authority could greatly help the institutions and nongovernmental organizations working in the area to focus on a common long-term program, rather than on a narrower project-oriented approach.

An authority of this kind would also help to lessen the potential for conflict that exists where there is competition over (natural) resources and political patronage. Clearly, people will keep on lobbying for protection; nonetheless, a forum could help in articulating concerns in a more transparent and consultative fashion.

Finally, alternative livelihood options and a conservation plan should be prepared with the participation of the local fisher community and experts. A migration scheme could be designed that gives priority to migrants from affected fisher communities.

The conflict between the fisherfolk and the farmers documented in this chapter is emblematic of the developmental direction that a postcolonial society may take. If a country chooses to pursue the path of narrowly defined development at the national scale—and do so at the expense of the poor and the vulnerable and their ecologies at the local scale—the result will be the privations and injustices described above. But countries can choose another direction. Hopefully this chapter can help start a debate about different understandings of development in Pakistan, including one in which the lives and livelihoods of the poor and vulnerable are as integral to the future as oil companies' profits or farmers' prosperity. Instead of being an instrument of devastation, water may yet be the means of realizing a positive future for the people of Manchar.

Conflict over Domestic Water Supply: The Case of Karachi

Conflict over domestic water supply has immense implications for social peace and public policy in Pakistan, which has the fastest urbanizing population in Asia.⁸⁰ Karachi, the country's largest city, is a mini-Pakistan; practically all of Pakistan's ethnic groups are represented in force in the city, which accounts for 35 percent of federal tax revenues and 25 percent of gross domestic product.⁸¹ The city has also been suffering spates of ethnic and religious conflict, particularly over the last three decades. The water supply situation in the city is dismal. A very small proportion of water users in the city have access to reliable and safe domestic water supply, even in affluent neighborhoods.⁸²

City water managers maintain that Karachi faces an absolute scarcity of water; demand totals at least one thousand million gallons a day, while the supply is less than five hundred million gallons a day.⁸³ In this framing of the problem, the solution is also quite clear: enhance the supply through large infrastructure projects. In addition to insufficient water supply, Karachi suffers from dilapidated infrastructure that leads to 20–25 percent line losses, an insufficient revenue base for the Karachi Water and Sewerage Board, corruption among the lower staff of KWSB, who divert water to the highest bidder, illegal hydrants diverting water from

Conflict over domestic water supply has immense implications for social peace and public policy in Pakistan, which has the fastest urbanizing population in Asia.

residential customers toward water tankers, and illegal tampering with water mains and theft of water. Thus the story is much more complicated than a simple shortage of supply. But the most important issue facing Karachi's water supply is the state's abdication of its responsibility to provide domestic water to city residents, relying instead on the private market to make up the shortfall.

The situation in Karachi as outlined in this chapter is not unique. To a lesser extent many of the themes we highlight also apply to other urban areas of Pakistan. If one can solve Karachi's water problems one can also solve urban water supply issues all over Pakistan. We will start with a physical and institutional outline of the water supply situation in Karachi. We will then highlight issues related to the de facto privatization of water in the city and the role of social power in allowing differential access to water. We will conclude with a discussion of the possible future pathways for addressing water conflicts and supply issues in the city.

Physical and Institutional Context of Water Supply in Karachi

Karachi is a megalopolis of an estimated twenty million people located on the Arabian Sea at the eastern edge of the Indus delta. In the nineteenth century it was largely a fishing village on the left bank of the seasonal Lyari River. In 1883, the British colonial authorities dug shallow wells in the Dumlottee area along the banks of the Malir River. As the city expanded following independence, additional water sources were tapped from Kinjhar Lake and Hub Dam on the Hub River in Balochistan. Historically, different government departments have been responsible for water supply in Karachi; KWSB was set up as a separate entity in 1996 under the Karachi Water and Sewerage Board Act of 1996.

There are neighborhoods in Karachi that have water supply infrastructure in place but that haven't received running water for fourteen years. There are neighborhoods where people routinely drink brackish water. Some of the more affluent neighborhoods, on the other hand, get more than twelve hours of water per day. The upscale housing authorities in the city get bulk water supply from KWSB and then make their own water supply arrangements: the Defence Housing Society authority is responsible for water supply to its residents, while the Clifton Cantonment Board supplies water to the residents of Clifton. Low-income towns within KWSB's jurisdiction can sometimes get only 30–40 percent of their water quotas, whereas the cantonment can get up to 133 percent of its quota.⁸⁴ Lately, however, these posh housing societies have also been hit by the water crisis, and their residents have had to rely on expensive supply through water tankers.⁸⁵ Because of substantial physical leakage and illegal tapping, an estimated 20–25 percent is not supplied within the system, while 40 percent of KWSB customers do not pay their bills.⁸⁶ This is not including water users who are simply not on the books of the KWSB.

In June 2015, Chief Minister Qaim Ali Shah of Sindh initiated work on the Greater Karachi Bulk Water Supply Scheme, also known as the K-IV project. To be completed over the next three years at a cost of over PKR 25 billion, the project will add 560 million gallons a day to the city's existing supply from Keenjhar Lake.⁸⁷ While this project is being promoted as a solution to the water problems of Karachi, the city's problems are much more complex than simply an issue of supply.

There are neighborhoods where people routinely drink brackish water. Some of the more affluent neighborhoods, on the other hand, get more than twelve hours of water per day.

Privatization by Other Means

We focus here upon the conflicts arising from de facto privatization of water in Karachi, with reference to case studies from the neighborhoods of Orangi, Bilal Colony, and Bhagwan Das Colony in Baldia Town. There are officially nine legal water hydrants in Karachi and about 161 unofficial hydrants.⁸⁸ These hydrants service more than ten thousand water tankers operating in the city. The tankers and hydrants were introduced in the early 1990s by KWSB as a stop-gap arrangement until the pipe network could be expanded and water supply enhanced. But tanker-delivered water has come to all but replace the piped water system. Costs vary according to the proximity to a hydrant source; in April 2015, the cost of a one thousand gallon tanker in Orangi close to the pumping station was PKR 1,600; the cost increased to PKR 3,000–4,000 further away from the water source.

In Orangi, water supplied through the underground piping system is generated through two pumping stations: the Germany pump and Disco pump. In 2013, a third pump was added in Altaf Nagar, a real estate development north of Orangi established by the Mutahida Qaumi Movement (MQM), a Mohajir ethnic party.⁸⁹ At the Germany and Altaf Nagar pumping stations, illegal overhead pipes were installed to fill up water tankers, which became the main means of water supply in the neighborhood. Since 2014 there has been no piped water supply to Orangi; the water that does arrive at the Germany pump, closest to Orangi, is used entirely to fill up private water tankers. The stolen water is resold to the same people the water was meant for in the first place—at ten to one hundred times the price they would have had to pay otherwise.⁹⁰ Local residents interviewed for this study also reported that in order to fill up, each tanker has to pay PKR 400 to MQM party activists who control the facility.⁹¹

The people of Orangi did not take the changes lying down, and in early 2015 they attacked and destroyed the pumping station at Altaf Nagar. This move was somewhat surprising, since Orangi is also a solid MQM stronghold where the party organization penetrates the lowest levels of the community. The people we spoke to explained:

Water was here till about a year ago, but then it stopped since they brought the Altaf Nagar header on line. We took action ourselves and went about three times to destroy it. Now, it [stands] abandoned but they won't allocate the water from the mainline to the Germany pump that supplies the water to the Orangi neighborhood.

When we asked how they dared to attack the Altaf Nagar pump, we were told that

when there is a necessity people lose fear. Sometimes the lower-level party people get together with the community to go against the higher-ups. They know that the party can't go against the people, and they also know that upper leadership understands that they don't have a choice. (Community meeting participant, Orangi, April 20, 2015)

Tankers are not the only method for making a private profit off water and subjecting its provision to commercial imperatives. There is a market driving manipulation of water valves to supply higher-paying customers in high-rise flats or more affluent neighborhoods. In the neighborhood of Gujjar Nala, there hasn't been water for fourteen years; following the construction of high-rise flats further down the neighborhood water main, valves were manipulated to make supplying that new development the higher priority. As a resident explained:

Up until 1990 there was enough water, but since the early 1990s there isn't any water here. There are flats down the water line from us, which do get water. I guess if they were to give us water, the flats won't get any water. In the past, however, only the flats used to get water, but now there is an illegal area further down the line from the flats, which does get water as well...See, it is all about power. If there is an activist influential councillor he can get an extra line. Truth be told: I got an extra line right here from the main line. (Focus group participant, Gujjar Nala, April 24, 2015)

Those households that can afford it maintain suction pumps on the premises. The ability to access water depends upon distance from the water main, the size of the pump, and the ability to pay the electricity charges for operating the pump. People able to buy and operate more powerful pumps often divert water from the mains toward their households, causing the people further down the system to get no water at all. A resident of Gadap Town stated:

We get ten hours of water every second day, but every time there is water, there is conflict. Everybody has a suction pump. So the people near the main pipe get water and the people further away do not get any water...We, as the elders, ask people to shut off their pumps so that the people at the tail end can get water. But this is because we are here. In neighborhoods where there is no arbitration or leadership, it inevitably comes to blows.

[To his friend] Do you remember the day before yesterday, when there was load shedding, everybody got water, little water with less pressure, yet everybody got it. (Resident of Gadap Town, April 20, 2015).

This breakdown of communitarianism is a feature that often drives conflict over water at the household scale, as the more powerful deprive their less well-off neighbors of even small amounts of water. In fact, every mode of water delivery—from tankers to piped water manipulated by valves—serves higher-paying customers better than lower-paying. Precisely because market-based mechanisms are premised upon ability to pay, the poor are always going to be at a disadvantage. Yet the poor of Karachi are not passive: they proactively seek to reclaim their right to water from powerful interests. This struggle, and the power dimension of access to water more generally, is addressed in the following section.

Have Power? Have Water

The geography of access to water and conflict over water closely follows the fault lines of class, ethnicity, and political affiliation in Karachi. The fieldwork for this report was conducted in the neighborhoods of Bhagwandas, a Hindu and Sikh working-class neighborhood in Baldia Town; Ghaziabad and Bilal Colony in Orangi Town; and Christian Colony in the Gujjar Nala area in Liaqatabad Town. In each of these places the patterns of political patronage, antagonism, religious discrimination, and gender politics intersect with class to limit access to and generate conflict over water.

The case of Ghaziabad in Orangi Town was discussed in the previous section. In the nearby Bilal Colony, too, the oversight of water supply pumping stations by a single political party comes into play. This is the case even though the neighborhood is a bastion of MQM support, and many young people of the area are activists who have been targeted by the recent anti-terrorism and crime operations of the Pakistan Rangers. The operations have had visible effects on access to water as well:

There is no water here, hasn't been for six months. There is a tap 200 meters down from here, but we have to put in double motors of 1 horsepower each to get water for two hours. In the past, water used to come but now all water is sold at the pump. There was a schedule before, [though] it was politically decided even then who will get water at what time. In lower Bilal, there was water but none in upper [Bilal Colony]. My son would go to the donkey-cart person and fill up water from him, who would fill it from the mosque in lower Bilal. We used to collect money to pay the valve man to open water for us. As long as there was Bhaia [the big shot of the neighborhood] we could get water. Ever since he died there is no water. In the past there was patronage. Now, a lot of the people have died or gone underground, so we have no protection.

We women sometime go the pump to ask for water, but they say where are your men? Send your men over and they can sit at the valve and make sure that you get your turn. But many of our men have been martyred. So where do we find men to send their way? Bhaia used to protect us, but he too is missing now. Now it is all the Rangers looking over the water situation. (Female focus group participants, Bilal Colony, April 20, 2015)

In Bilal Colony, as in almost all the other surveyed neighborhoods, women are the main managers of domestic water, and hence the most concerned about its provision in their households. They often take a proactive role in trying to negotiate water delivery with the donkey-cart vendors, or even with the political party workers at the pump. In the perception of Bilal Colony residents, the party and the local toughs were the arbiters of their access to water. Their conflict was not with the state, but with the local powerful interests. The same story was repeated in Baldia Town. Initially, respondents reported that every street and house had pumps to suck water from the water mains toward the street water line. But upon further inquiry, it emerged that the neighboring streets had highly organized Pashtun residents who often saw to it that their valves were opened when there was water in the main, that their valve capacity was higher than others', and that other valves were forcibly closed to make sure that they got the water. As a resident ruefully declared:

It all comes down to [the fact] that we are weak and other people at other valves are strong. We simply cannot fight them. (Resident of Baldia Town, April 21, 2015)

Religious minorities in particular are vulnerable to being denied water, and we describe that situation below. It is important to understand the broader context for this vulnerability, however, including the difficulty religious minorities may have in finding a place where they are permitted to live, and their struggle to be accorded the rights of citizens. In Bhagwandas Goth, for example, Hindu and Sikh residents were even reluctant to refer to themselves by their religious name and instead simply used the neutral phrase "we, the minority people." They had been moved multiple times since the 1980s, when they had come into Karachi from Kandkot in interior Sindh. They have lived in their present location, which was previously a solid waste dump, for the past twelve years. There have been attempts at moving them, but they have successfully resisted and have been able to enlist the patronage of the local Pakistan People's Party parliamentary representative. Part of what makes them vulnerable is their invisibility in the eyes of the state; being illiterate and born in rural areas, many of them do not have birth certificates and are hence unable to gain the national identity card that would prove their citizenship. They therefore cannot access government services or find employment in the formal sector, nor can their children be admitted to schools and educated. Consequently, they are exceptionally reliant on political leaders for patronage and protection against the everyday harassments often suffered by the poor and the weak in Pakistan, especially those from minority communities:

I was pulled over by policemen at night in Karachi. They took away my wallet and my mobile and told me to get lost. I said, "You guys are being unfair and I have contacts with the MPA [member of the provincial assembly] who you will have to deal with." They rebuked me by saying: "You pimp of a Hindu, you talk back to us?" I said: "Look in my mobile phone. If you find the MPA's number in there give me back my stuff, if you don't then I will walk away or you can arrest me." They did look up the number and saw the MPA's number. So they quietly handed me back my mobile and the wallet and let me go. (Bhagwandas resident, April 21, 2015)

The extreme dependence upon patronage is also apparent in the water sector. In Bhagwandas, the local MPA sanctioned a water supply scheme for the residents. The infrastructure for the water supply was laid out, as was the sewerage system, but there has never been any water in the pipes. The dependence of the residents on water tankers is complete, and a major financial burden. Moreover, the quality of water delivered by tankers is often poor; during field research, we observed a tanker deliver water that was brackish and clearly unfit for human consumption. But the quality of water being consumed by the residents of Bhagwandas is no different from that being consumed by the residents of Christian Colony in Gujjar Nala. There, one resident said quite bluntly:

The dependence of the residents on water tankers is complete, and a major financial burden. Moreover, the quality of water delivered by tankers is often poor; during field research, we observed a tanker deliver water that was brackish and clearly unfit for human consumption.

Simple thing is, if you have *bimat* [strength] there is water. No *bimat*, no water: keep buying tankers of saline water and drink away that swill. (Resident of Gujjar Nala, April 23, 2015)

In Gujjar Nala, there are serious intra- and intercommunity conflicts bearing upon access to water. At the intracommunity level, conflict arises when residents are driven to ask neighbors for water and are refused. While we were sitting on the roadside having a conversation with the few community representatives, about five to six children and adults knocked on the door of one of the persons sitting with us, across the street from where we were sitting. As one of the participants in the discussion said:

You see that little girl there [the third person to knock]? She is not going to get any water. Giving away water is a problem [because one doesn't have enough]. Not giving water is also a headache and cause for conflict and fights [because people say that you are being stingy with water and not being a good neighbor]. (Focus group participant, Gujjar Nala, April 24, 2015)

The lanes of the neighborhood are too narrow for tanker trucks to get in. An influential community member on the main road has had an illegal connection from the main connected to his house, but other residents have to buy water from water vendors or water tankers on the main road, or from people who have borewells of saline water on their property and then carry it in carts into the neighborhood.

This community's access to water is also affected by its conflict with neighboring Pashtun and other Muslim communities. Residents said that in the 1990s, the Pashtuns (or Pathans) started to close the water main valve to direct more water to their neighborhood:

In the 1990s the Pathans [Pashtuns] up the [24-]inch main water line [by the Christian Colony of Gujjar Nala] started closing the valve to direct more water to their neighborhood. We went out there and fought them, but they had guns...and TTs [Tokarev TT-33 semiautomatic pistols] and we can't put our children's life at risk. In any event, Master Niaz [a local tough] finally got the valve opened, but once Master Niaz was gone, they closed it again. Finally, the Pathans just opened the valve a few rings up and poured concrete in it, so that it can't be tampered with, and limited flow does come down the line toward us. But our 4-inch pipe for the neighborhood is connected to the top of the pipe, so the water level in the main 24-inch pipe never really reaches high enough to get into the authorized 4-inch pipe. [The] other 4-inch pipe that I got laid, however, is connected to the bottom, so it does get some water every ten days or so.

...There are all these Muslim neighborhoods on the other side of the main line, which have also hooked in connections to the main. Lala Yaqoob was the gangster here. We complained to the MQM unit in charge. He said, come with me. When we got to Lala Yaqoob, Lala tried to talk tough to the MQM guy. [The MQM man] said to him, speak very softly to me, you have no idea what I can and will do to you. He scared Lala Yaqoob into laying off our line and letting us open the valve to our line. (Focus group participant, Gujjar Nala, April 24, 2015)

The Christian community in this Gujjar Nala neighborhood staunchly supports the largely secular MQM, because it is through MQM's patronage that its members are able to fight off competing claims on water and other resources by other communities, which are often not averse to playing the religious card to intimidate minority poor communities. For this community, as for many others in Karachi, there is perpetual conflict over water: conflict with KWSB employees who keep valves shut, and with other ethnic or religious groups who appear to be getting preferential treatment. The highly violent politics of Karachi are also experienced through water for these residents, as one of the community leaders said:

We have not raised our children to get into fights. They killed my young son: why? Because I raised a voice for my community and they killed him to put me down. There is water all around us, but no water for us...[The] reality is that...Bhaia [the local MQM tough] helps us we get our way, but we need his protection. The network was for us, but now the Muslims also take water from our 4-inch line and their connections are com-

pletely illegal. With those Muslims there are always fights and there is some sector...or unit in charge extorting money for mediation or backing one side or another. If we want to take our rights, we have to sacrifice. (Christian community leader, Gujjar Nala, April 24, 2015)

The dominant narrative on the water situation in Karachi emphasizes the tanker, land, and water mafias; the paucity of water; and the K-IV water infrastructure project intended as a measure of relief. But this narrative does not do justice to the nitty-gritty details of how the poor and the vulnerable living in a politically, ethnically, and socially polarized city make alliances and fight every day for access to water. The solutions to Karachi's water problems and conflicts are going to have to move beyond the standard narratives and basket of solutions, as we suggest in the concluding section of this chapter.

Conclusion: Possible Ways Forward for Resolving Water Conflict and Improving Access in Karachi and Other Pakistani Cities

Karachi's water conflicts map onto the ethnic, religious, class, and political conflicts in the city. Concerns about supply enhancement, system upgrade, and revenue generation are fair enough and well documented. But beyond those, there is a need for a paradigm shift from a vast networked piped system toward more modular, possibly standpipe-based systems for the poorest. Pouring money into sewerage infrastructure when the water needed to operate it is lacking, and providing unused water connections as a mode of patronage to individual housing units, is dysfunctional. The same money could be used to dispense water from central storage tanks and standpipes to give people some access to water instead of having them pay exorbitant prices for very low-quality water.

In addition, the governance of water must be devolved to the local level with a rights-based approach to be enforced by the provincial government. Devolution is effective in meeting public demands and administering the system. At the same time, oversight is still necessary for quality control and to ensure that the right to water is respected. In this vein, closer links between a representative city government and water administration will be a step in the right direction.

It is also important to view the water conflict in Karachi and other urban areas of Pakistan in the proper political context. Politics over and through water cannot be wished away, they can only be managed. The communities of Karachi are already well organized. The question arises, can that same organizational strength be turned toward more constructive and cooperative ends? A positive answer will require a type of public education campaign that confronts the current political landscape, and through democratic discourse helps identify more equitable and just outcomes in the water sector.

Lastly, there is no alternative to the state's playing its role as a provider of basic services, including water, in urban areas. The rich may be able to insulate themselves from the day-to-day privations suffered by the vast majority of the residents of cities like Karachi. But they cannot always remain insulated from what is happening to their fellow citizens. Politics recast as something not just about electricity, roads, and lack of corruption, but rather about redistributive justice, basic rights, identity, and citizenship, will create the necessary bridges for urban citizens to empathize, communicate, and hopefully make common cause with others with very different backgrounds and social status than their own. This is not wishful thinking; it is, in fact, imperative. In the absence of any change, water conflicts in urban Pakistan are likely to continue to follow the familiar trajectory of more intense and violent conflicts in other spheres.

In the absence of any change, water conflicts in urban Pakistan are likely to continue to follow the familiar trajectory of more intense and violent conflicts in other spheres.

Conclusion

The scholarly literature on water and conflict overwhelmingly focuses on international trans-boundary conflict. But this report has made a case for attending to subnational scale water conflict in Pakistan. We have reviewed case studies of mesoscale interprovincial water conflict, conflict around flood management at the interprovincial and local scale, conflict between fisher and agricultural interests at the local scale in Sindh, local scale conflict at the level of canal commands and village watercourses, and finally (again) local scale conflict in urban Karachi. In this concluding chapter, we will review the key insights of each of the chapters and then reflect on broader lessons that can be drawn from the report's cross-scalar approach and the empirical evidence presented.

The interprovincial water conflict (explored in "Water Patriotism") is certainly about the material supply of water in the Indus basin and its distribution between the upper and lower riparian provinces. On the other hand, water also becomes a medium through which identity, ethnicity, development, and the nature of the Pakistani polity are contested and negotiated. Is the lack of trust between Sindh and Punjab driving the water conflict, or is the water conflict causing the lack of trust? There is no way to definitively answer that question. The chapter argues, however, that there are structural features of the upstream-downstream relationship, and of the Indus basin specifically, that drive the conflict over water distribution between provinces. The controversy over the Kalabagh Dam, however, is more about competing visions of development, about national versus local and regional politics, and about problem definition. More open democratic debate and greater transparency in the water sector are broad solutions to addressing interprovincial water conflict.

Conflict over flood management (the subject of "Floods in Pakistan") tends similarly to be framed as an issue of technical material management of flood peaks in the Indus system and the technological fetish of the flood managers. But floods, like water supply and distribution, are also imbricated with meaning about provincial rights, ill intent of the upper riparians at the national and international scales, and power politics at the local scale. Given the nature of the humanly transformed hydrology of the Indus, there is nothing natural about flood frequency and intensity in the basin. What places get flooded and when are contingent human decisions influenced by power relations, not just currently but since the inception of the system. Flood engineering projects ought to make those power politics transparent and open to public scrutiny; people should be able to debate and contest policy decisions formally instead of relying on patronage politics to do it for them clandestinely. On the material side, early warning and flood-proofing initiatives should be directed to the most exposed and best-known locations, instead of undifferentiated administrative units, to prevent the hazard from turning into a disaster.

The evidence on local scale conflict over water ("Irrigation Conflicts in Punjab") seems to suggest that water may become an effective weapon for individuals and communities to use in their disagreements and conflicts about other issues, e.g., political allegiances, family and caste affiliations, and so on. State in this context often plays the role of an enabler for more powerful actors through its acts of omission, i.e., by ignoring illegal deprivation of water to lower riparians or modifications in the water conveyance infrastructure. Here the role of the postcolonial Pakistani state has to be reoriented toward delivering services instead of practicing the science of the empire that is its legacy.⁹² A starting point for that reorientation could be modifying the enabling legislation for water management in Punjab and Sindh to make these laws more

consonant with the expectations of a democratic society rather than the law-and-order imperatives of a colonial and postcolonial state.

The case study of Manchar Lake in Sindh (“Farmer-Fisherfolk Conflict”) highlights the conflict between extremely vulnerable and marginalized fisher interests and the more dominant agricultural interests in the Indus basin. The chapter documents the social and economic consequences of the humanly induced ecological collapse of the lake. But beyond bearing witness it also documents how a modernizing developmental state ignores local subjectivities and interests in the name of national development. Along the way the agricultural interests too continue to engage in rent-seeking behavior against the fishers. The engineering works at Lake Manchar that did so much harm to the lake and the surrounding area are emblematic of the type of developmental future Pakistan is pursuing. The country needs to rethink its developmental direction such that the lives and livelihoods of the fisherfolk are valued as much as the profits of the oil companies or the prosperity of the farmers.

The case study of Karachi (“Conflict over Domestic Water Supply”) documents how conflict over water takes place along ethnic, class, and religious fault lines in urban Pakistan. On the one hand, class-based conflict over water derives from the de facto privatization of water in urban Pakistan. Commodifying water precipitates class conflict because people unable to afford water through tankers or suction pumps often organize and sometimes become violent in pursuit of their ends. But another aspect of class conflict over water involves the powerful and well-off stealing water from or rationing water to the weak. The weak have to gain the patronage of political parties or gangsters to assert their claims on water or to appropriate it from others. As a possible solution, the chapter proposes devolving water supply to the local government level and implementing modular local water supply systems instead of the vast networked system presently in place in the city. The chapter also stresses accepting the political valence of water distribution in urban Pakistan so that water conflict can be addressed politically.

To sum up, Pakistan experiences both conflict over water, and conflict through water. The evidence in this report about the causation of water and conflict has been mixed. At the interprovincial level of water and flood management, the conflict is indeed about water, but the water infrastructure debates are really debates about politics at the local and provincial scale rather than national scale, and similar national-versus-local-scale development and conceptions of polity.

At the local scale, the water conflict over irrigation water or between fisher and agricultural interests is really conflict through water about development, land, power, and resources. In urban Pakistan the water conflict is certainly about water, but then that conflict closely follows the contours of class and power relations. The report has suggested relevant pathways for addressing water conflict in each of the chapters. Those suggestions are both technical and political.

Water is life, and life is embedded in politics and culture. It is essential that beyond water’s simple material value, its politically and culturally mediated values are acknowledged in water management. Water is unique because there is no substitute for it and because it is imbued with all the esthetic, symbolic, material, cultural, and political impulses that humans bring to life. Like life, water management must also take into account all of these impulses, which flourish in human spaces and geographies at the local scale. Therefore, we endorse local and regional scale hydro-politics. The nation-state scale is a historically contingent abstraction that cannot trump the right to water, livelihoods, and ecology at the local scale. Much of the water conflict

in Pakistan is a manifestation of people's attempt to claim legitimacy for their experiences within local environments against the encroachment of national scale imperatives. Democratization of the Pakistani polity will in fact be the greatest moderator of the water conflict in the country.

Notes

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13. Laghari, Vanham, and Rauch, "Indus Basin in the Framework of Current and Future Water Resources Management," 1065. Again it should be noted here that FAO gives a wider range of precipitation in the basin. FAO, "Indus River Basin," www.fao.org/nr/water/aquastat/basins/indus/indus-CP_eng.pdf.
14. T. Shah, "The Groundwater Economy of South Asia: An Assessment of Size, Significance and Socio-ecological Impacts," in *The Agricultural Groundwater Revolution: Opportunities and Threats to Development*, ed. M. Giordano and K. G. Villholth (Wallingford, UK: CABI, 2007), 7–36.
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Water—a precious, unique, and finite resource—is a mediator of conflict in Pakistan and is often enlisted as a weapon in existing conflicts around regional identity, political affiliations, family, and caste. But is water-related conflict in Pakistan inevitable? Drawing on interviews with decision makers and communities at the provincial, municipal, and village watercourse levels, this report shows how Pakistan's location in the Indus basin, along with its colonial history, political structure, and ethnic conflicts, combine to make water a highly contested resource. It also suggests a number of steps—technical, institutional, and political—that could help negotiate conflict going forward.

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